SUBMIT BID TO:

PROCUREMENT SERVICES UNIVERSITY OF FLORIDA 971 ELMORE DRIVE PO BOX 115250

Web Address: https://procurement.ufl.edu/

GAINESVILLE, FL 32611 Phone: (352) 392-1331 - FAX: (352) 392-8837



Construction Acknowledgment Form

| Page 1 of 698 | 3 pages | withdrawn within 45 days after such dat Mandatory Pre-bid: December 2, 202 | | BID NO.: ITB23KO-117 |
|---|---|---|--|---------------------------------|
| DATE: 11/23/ | 2022 | PROCUREMENT AGENT: KO | BID TITLE: Multi-purpose Building Renovation (#8003) – Marianna, FL | |
| VENDOR NAM | ΙE | | | |
| VENDOR MAILING ADDRESS | | REASON FOR NOT SUBMITTING BID | | |
| CITY - STATE - ZIP CODE | | POSTING OF BID TABULATIONS | | |
| AREA CODE | TELEPHONE NO | | Bid tabulations with intended award(s) will review by interested parties at https://procure.next.ed for a posied of 72 hours excluding | ement.ufl.edu/ and will remain |
| | FAX NO. | | posted for a period of 72 hours excluding holidays. Failure to file a protest in accorda (BOG) Regulation 18.002 or failure to post | ance with Board of Governors |
| | WEB ADDRESS | | required in the BOG regulations 18.002 and waiver of protest proceedings. | d 18.003(3), shall constitute a |
| | EMAIL ADDRESS | | | |
| I certify that the connection with materials, suppose | is bid is made with any corporation, firm is or equipment and is | out prior understanding, agreement, or or person submitting a bid for the same s in all respects fair and without collusion | | |
| authorized to sig with all the requirectification require hereinafter knowle | n this bid for the vend irements of the Invita rements. In submitting n as the University, the | outons of this bld aim deemly that it aim for and that the vendor is in compliance tion to Bid, including but not limited to, a bid on behalf of the Board of Trustees, vendor offers and agrees that if the bid is | AUTHORIZED SIGNA | TURE (MANUAL) |
| I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm or person submitting a bid for the same materials, supplies, or equipment and is in all respects fair and without collusion or fraud. I agree to abide by all conditions of this bid and certify that I am authorized to sign this bid for the vendor and that the vendor is in compliance with all the requirements of the Invitation to Bid, including but not limited to, certification requirements. In submitting a bid on behalf of the Board of Trustees, hereinafter known as the University, the vendor offers and agrees that if the bid is accepted the vendor will convey, sell, assign, or transfer to the University all rights, title and interest in and to all causes of action it may now or hereafter acquire under the Anti-trust laws of the United States and the University for price fixing relating to the particular commodities or services purchased or acquired by the University. A the University's discretion, such assignment shall be made and become effective at the time the purchasing agency tenders final payment to the | | NAME AND TITL | E (TYPED) | |
| vandar | at the time the purcha | ising agency tenuers infal payment to the | | |

GENERAL CONDITIONS

SEALED BIDS: All bid sheets and this form must be executed and submitted in a sealed envelope. (DO NOT INCLUDE MORE THAN ONE BID PER ENVELOPE.) The face of the envelope shall contain, in addition to the above address, the date, and time of the bid opening and the bid number. Bids not submitted on the attached bid form shall be rejected. All bids are subject to the conditions specified herein. Those which do not comply with these conditions are subject to rejection.

- EXECUTION OF BID: Bid must contain an original manual signature of authorized representative in the space provided above. Bid must be typed or printed in ink. Use of erasable ink is not permitted. All corrections to prices made by vendor
- 2. **NO BID**: If not submitting a bid, respond by returning only this vendor acknowledgment form, marking it "NO BID", and explain the reason in the space provided above. Failure to respond to a procurement solicitation without giving justifiable reason for such failure, nonconformance to contract conditions, or other pertinent factors deemed reasonable and valid shall be cause for removal of the supplier's name from the bid mailing list. NOTE: To qualify as a respondent, vendor must submit a "NO BID", and it must be received no later than the stated bid opening
- BID OPENING: Shall be public, on the date, location and the time specified on the bid form. It is the vendor's responsibility to assure that the bid is delivered at the proper time and place of the bid opening. Bids which for any reason are not so delivered will not be considered. A bid may not be altered after opening of the bids. NOTE: Bid tabulations will be posted electronically at <a href="https://https:
- PRICES, TERMS AND PAYMENT: Firm prices shall be bid and will include all packing, handling, shipping charges, and delivery to the destination shown herein.
 (a) TAXES: The University does not pay Federal Excise and Sales taxes on direct
- purchases of tangible personal property or services. The Florida Tax Exempt Number is 11-06-024056-57C. This exemption does not apply to purchases of tangible personal property or services made by vendors who use the tangible personal property or services in the performance of contracts for the improvement of University-owned real property as defined in Chapter 192, F.S.

 (b) DISCOUNTS: Vendors are encouraged to reflect trade discounts in the unit property and the property and
- prices quoted; however, vendors may offer a discount for prompt payment. Prompt payment discounts will not be considered in the bid award. However, every effort will be made to take the discount within the time offered.

- (c) MISTAKES: Vendors are expected to examine the specifications, delivery schedule, bid prices, extensions, and all instructions pertaining to supplies and services. Failure to do so will be at vendor's risk. In case of a mistake in extensions
- the unit price will govern.

 (d) INVOICING AND PAYMENT: Payment will be made by the University of Florida after the items awarded to a vendor have been received, inspected, and found to comply with award specifications, free of damage or defect and properly invoiced. All invoices shall bear the purchase order number. Payment for partial shipments shall invoices shall bear the purchase order number. Payment for partial shipments shall not be made unless specified. An original invoice shall be submitted. Failure to follow these instructions may result in delay in processing invoices for payment. Payment shall be made in accordance with Section 215.422 (1) (2) F.S. VENDOR OMBUDSMAN: The University's vendor ormbudsman, whose duties include acting as an advocate for vendors may be experiencing problems in obtaining payment from the University, may be contacted at 352-392-1241.

 (e) ANNUAL APPROPRIATIONS: The University's performance and obligation to pay under any contract awarded is contingent upon an annual appropriation by the Legislature.
- (f) CONDITION AND PACKAGING: It is understood and agreed that any item offered or shipped as a result of this bid shall be a new, current standard production model available at the time of this bid. All containers shall be suitable for storage or
- shipment, and all prices shall include standard commercial packaging.

 (g) SAFETY STANDARDS: Unless otherwise stipulated in the bid, all manufactured items and fabricated assemblies shall comply with applicable requirements of Occupational Safety and Health Act and any standards hereunder.
- CONFLICT OF INTEREST: The award hereunder is subject to the provisions of Chapter 112, F.S. All vendors must disclose with their bid the name of any officer, director, or agent who is also an employee of the University of Florida. Further, all vendors must disclose the name of any University employee who owns, directly or indirectly, an interest of five percent (5%) or more in the vendor's firm or any of its
- **6. AWARDS:** As the best interest of the University may require, the right is reserved to make award(s) by individual item, group of items, all or none or a combination thereof; to reject any and all bids or waive any minor irregularity or technicality in bids received. When it is determined there is no competition to the lowest responsible vendor, evaluation of other bids are not required. Vendors are cautioned to make no assumptions unless their bid has been evaluated as being responsive

- 7. INTERPRETATIONS/DISPUTES: Any questions concerning conditions or specifications shall be directed in writing to Procurement Services. Inquiries must reference the date of bid opening and bid number. No interpretations shall be considered binding unless provided in writing by the University in response to requests in full compliance with this provision.
- NOTICE OF BID PROTEST BONDING REQUIREMENT; Any person or entity who files an action protesting a decision or an intended decision pertaining to a competitive solicitation shall at the time of filing the formal protest, post with the University a bond payable to the University in an amount equal to: 10% of the estimated value of the protestor's bid or proposal; 10% of the estimated expenditure during the contract term; \$10,000.00; or whichever is less. The bond shall be conditioned upon the payment of all costs which may be adjudged against the person or entity filing the protest action. In lieu of a bond, the University may accept a cashier's check, bank official check or money order in the amount of the bond. FAILURE OF THE PROTESTING PERSON OR ENTITY TO FILE THE REQUIRED BOND, CASHIER'S CHECK, BANK OFFICIAL CHECK OR MONEY ORDER AT THE TIME OF THE FILING THE FORMAL PROTEST SHALL RESULT IN DENIAL OF THE PROTEST.
- 9. GOVERNMENTAL RESTRICTIONS: In the event any governmental restrictions may be imposed which would necessitate alteration of the material, quality, workmanship or performance of the items offered in this bid prior to their delivery, it shall be the responsibility of the successful vendor to notify the purchaser at once, indicating in writing the specific regulation which requires an alteration. The University reserves the right to accept any such alteration, including any price adjustments occasioned thereby, or to cancel the contract at no expense to the University.
- 10. LEGAL REQUIREMENTS: Applicable provision of all Federal, State, county and local laws, and of all ordinances, rules and regulations shall govern development, submittal and evaluation of all bids received in response hereto and shall govern any and all claims and disputes which may arise between person(s) submitting a bid response hereto and the University, by and through its officers, employees and authorized representatives, or any other person, natural or otherwise: and lack of knowledge by any vendor shall not constitute a cognizable defense against the legal
- 11. LOBBYING: Vendor is prohibited from using funds provided under any contract or purchase order for the purpose of lobbying the Legislature or any official, officer, commission, board, authority, council, committee, or department of the executive branch or the judicial branch of state government.
- **12. ADVERTISING**: In submitting a bid, the vendor agrees not to use the results therefrom as a part of any commercial advertising. Vendor may not use the names, logos, or trademarks of the University, its employees, or affiliates without the prior written consent of the University.
- **13. ASSIGNMENT**: Any contract or purchase order issued pursuant to this Invitation to Bid and the monies which may become due hereunder are not assignable except with the prior written approval of the purchaser.
- 14. LIABILITY: The vendor agrees to indemnify and save the University of Florida, the State of Florida and the Florida Board of Governors, their officers, agents, and employees harmless from any and all judgments, orders, awards, costs and expenses, including attorney's fees, and also all claims on account of damages to property, including loss of use thereof, or bodily injury (including death) which may be hereafter sustained by the vendor, its employees, its subcontractors, or the University of Florida, the State of Florida and the Florida Board of Governors, their officers, agents, or employees, or third persons, arising out of or in connection with any contract awarded and which are the result of the vendor's breach of contract or of the negligent acts of the vendor, its officers, agents, and employees. This clause does not apply to contract to a contract between government agencies. apply to contracts between government agencies.
- FACILITIES: The University reserves the right to inspect the vendor's facilities at any time with prior notice.
- **16. ADDITIONAL QUANTITIES**: For a period not exceeding ninety (90) days from the date of acceptance of any offer by the University of Florida, the right is reserved to acquire additional quantities up to but not exceeding those shown on bid or the bid level at the prices bid in this invitation. If additional quantities are not acceptable, the bid sheets must be noted "BID IS FOR SPECIFIED QUANTITY ONLY".
- SERVICE AND WARRANTY: Unless otherwise specified, the vendor shall define any warranty service and replacements that will be provided during and subsequent to this contract. Vendors must explain on an attached sheet to what extent warranty and service facilities are provided.
- 18. SAMPLES: Samples of items, when called for, must be furnished free of expense, on or before bid opening time and date, and if not destroyed, may upon request, be returned at the vendor's expense. Each individual sample must be labeled with vendor's name, manufacturer's brand name and number, bid number and item reference. Request for return of samples shall be accompanied by instructions which include chipping authorization and name of carrier and must be precised with the bid. include shipping authorization and name of carrier and must be received with the bid. If instructions are not received within this time, the commodities shall be disposed of
- 19. INSPECTION, ACCEPTANCE AND TITLE: Inspection and acceptance will be at destination unless otherwise provided. Title and risk of loss or damage of all items shall be the responsibility of the contract supplier until accepted by the University, unless loss or damage results from negligence by the University. The contract supplier shall be responsible for filing, processing and collecting all damage claims. However, to assist him in the expeditious handling of damage claims, the University will:
- Record any evidence of visible damage on all copies of the delivering carrier's (a) Bill of Lading.

- Report damage (Visible or Concealed) to the carrier and contract supplier confirming such reports in writing within 15 days of delivery, requesting that the
- carrier inspect the damaged merchandise.
 Retain the item and its shipping container, including inner packing material until inspection is performed by the carrier, and disposition given by the contract
- Provide the contract supplier with a copy of the carrier's Bill of Lading and damage inspection report.
- 20. PATENTS, COPYRIGHTS, TRADEMARKS, ROYALTIES and other Intellectual Property: The vendor, without exception, shall indemnify and save harmless the University and its employees from liability of any nature or kind, including cost and expenses for or on account of any copyrighted, patented, or unpatented invention, process, or article manufactured or used in the performance of the contract, including its use by the University of Florida. If the vendor uses any design, device, or materials covered by letters, patent or copyright, it is mutually agreed and understood without exception that the bid prices shall include all royalties or costs arising from the use of such design, device or materials in any way involved in the work such design, device, or materials in any way involved in the work.
- 21. CONFLICT BETWEEN DOCUMENTS: If any terms and conditions contained within the documents that are a part of this ITB or resulting contract are in conflict with any other terms and conditions contained therein, then the various documents comprising this ITB or resulting contract, as applicable, shall govern in the following order of precedence: change order, purchase order, addenda, special conditions, general conditions, specifications, departmental description of work, and bid.
- MANUFACTURERS' NAMES AND APPROVED EQUIVALENTS: manufacturer's names, trade names, brand names, information and/or catalog numbers listed in a specification are for information and not intended to limit competition. If bids are based on equivalent products, indicate on the bid form the completition. It bids are based on equivalent products, indicate on the bid form the manufacturer's name and number. Vendor shall submit with the bid, cuts, sketches, and descriptive literature, and/or complete specifications. Reference to literature submitted with a previous bid will not satisfy this provision. The vendor shall also explain in detail the reasons why the proposed equivalent will meet the specifications and not be considered an exception thereto. The University of Florida reserves the right to determine acceptance of item(s) as an approved equivalent. Bids which do not comply with these requirements are subject to rejection. Bids lacking any written comply with these requirements are subject to rejection. Bids lacking any written indication of intent to quote an alternate brand will be received and considered in complete compliance with the specifications as listed on the bid form.
- 23. NONCONFORMANCE TO CONTRACT CONDITIONS: Items may be tested and/or inspected for compliance with specifications by any appropriate testing facilities. Should the items fail, the University may require the vendor to reimburse the University for costs incurred by the University in connection with the examination or testing. The data derived from any tests for compliance with specifications are public records and open to examination thereto in accordance with Chapter 119, F.S. tems delivered not conforming to specifications may be rejected and returned at vendor's expense. These items and items not delivered as per delivery data in bid and/or purchase order may result in vendor being found in default in which event any and all reprocurement costs may be charged against the defaulting vendor. Any violation of these conditions may also result in the vendor's name being removed from the University of Florida's vendor file.
- 24. PUBLIC RECORDS: Any material submitted in response to this Invitation to Bid will become a public document pursuant to Section 119.07 F.S. This includes material which the responding vendor might consider to be confidential or a trade secret. Any claim of confidentiality is waived upon submission, effective after opening pursuant to Section 119.07 F.S.
- 25. DELIVERY: Unless actual date of delivery is specified (or if specified delivery cannot be met), show number of days required to make delivery after receipt of purchase order in space provided. Delivery time may become a basis for making an award (see Special Conditions). Delivery shall be within the normal working hours of the University of Florida, Monday through Friday, unless otherwise specified.
- 26. PUBLIC PRINTING PREFERENCE GIVEN PRINTING WITHIN THE STATE: The University of Florida shall give preference to vendors located within the state when awarding contracts to have materials printed, whenever such printing can be done at no greater expense than, and at a level of quality comparable to, that obtainable from a vendor located outside of the state.
- (a) CONTRACTS NOT TO BE SUBLET: In accordance with Class B Printing Laws and Regulations "Printing shall be awarded only to printing firms. No contract shall be awarded to any broker, agent, or independent contractor offering printing manufactured by other firms or persons."

 (b) DISQUALIFICATION OF VENDOR: Reasonable grounds for believing that a vendor is involved in more than one bid for the same work will be cause for rejection
- of all bids in which such vendors are believed to be involved. Any or all bids will be rejected if there is reason to believe that collusion exists between vendors. Bids in
- which the prices obviously are unbalanced will be subject to rejection.

 (c) TRADE CUSTOMS: Current trade customs of the printing industry are recognized unless accepted by Special Conditions or Specifications herein.

 (d) COMMUNICATIONS: It is expected that all materials and proofs will be picked
- up and delivered by the printer or his representative, unless otherwise specified. Upon request, materials will be forwarded by registered mail.

 (e) RETURN OF MATERIAL: All copy, photos, artwork, and other materials supplied by the University of Florida must be handled carefully and returned in good condition upon completion of the job. Such return is a condition of the contract and payment will not be made until return is affected.
- 27. E-VERIFY COMPLIANCE. Agency is obligated to comply with the provisions of Section 448.095, Fla. Stat., "Employment Eligibility." Compliance with Section 448.095, Fla. Stat., includes, but is not limited to, utilization of the E-Verify System to verify the work authorization status of all newly hired employees. Vendor affirms and represents that it is registered with the E-Verify system and are using same, and will continue to use same as required by Section 448.095, Fla. Statute.

END OF SECTION

Bid Number: ITB23KO-117

Title: Multi-purpose Building Renovation (#8003) – Marianna, FL



AUTHORIZED REPRESENTATIVES AND CONTACT INFO:

UF PROCUREMENT SERVICES:

Karen Olitsky 971 Elmore Drive / PO Box 115250 Gainesville, FL 32611-5250 (352) 294-1163 kolitsk@ufl.edu

NON-TECHNICAL SPECIFICATIONS TABLE OF CONTENTS

I. <u>Bidding Conditions</u>

00020 Invitation to Bid 00100 Instruction to Bidders 00310 Bid Form 00430 List of Subcontractors

II. General Terms and Conditions

https://facilities.ufl.edu/wp-content/uploads/forms/contracts/GTC.pdf

III. <u>Division 0 Non-Technical Specifications</u>

https://facilities.ufl.edu/wp-content/uploads/forms/contracts/Div0NonTechSpecs.pdf

IV. <u>Division 1 Non-Technical Specifications</u>

https://facilities.ufl.edu/wp-content/uploads/forms/contracts/Div1 NonTech Specs SEPT 2020.pdf

V. UF Design and Construction Standards

https://facilities.ufl.edu/projects/forms-standards/design-construction-standards/

VI. Standards, Policies, Regulations, Forms, Guides, Inspection & Closeout and References

https://facilities.ufl.edu/projects/forms-standards/

- a. Other Forms
 - Dig Permits: https://www.facilitiesservices.ufl.edu/departments/utilities/dig-permits/
 - Building Codes Enforcement Inspections: https://www.ehs.ufl.edu/departments/facility-support-services/building-codes-enforcement/inspections/
 - Fire Plan Review and Inspection: https://www.ehs.ufl.edu/departments/facility-support-services/fire-safety/

TECHNICAL SPECIFICATIONS

- I. <u>Project Manual</u> (656 Pages)
- II. <u>Drawings</u> (32 Pages)

END OF SECTION

00020 - INVITATION TO BID

The Invitation to Bid shall be in accordance with the University of Florida, Procurement Services "Invitation to Bid Acknowledgement Form" with all relevant information provided therein.

END OF SECTION

<u>00100 - INSTRUCTIONS TO BIDDERS</u>

1.1 RELATED SECTIONS

A. Documents affecting the work of this Section include, but are not necessarily limited to, the General Terms & Conditions and other Sections in Divisions 0 and 1 of these Specifications.

1.2 THE WORK

PROJECT TITLE: Multi-purpose Building Renovation (#8003) – Marianna, FL

1.3 SECURING DOCUMENTS

Copies of the proposed Contract Documents may be obtained from: https://procurement.ufl.edu/vendors/schedule-of-bids/

1.4 MANDATORY PRE-BID CONFERENCE

A mandatory Pre-bid Conference will be held prior to the scheduled bid opening for the purpose of considering questions posed by bidders. The conference and is open to interested bidders, prospective subcontractors, and any other interested parties. This conference will be held <u>December 2, 2022 at 1:00PM CST at the IFAS North Florida Research and Education Center, 3925 Highway 71, Marianna, FL 32446.</u>

1.5 INTERPRETATION OF CONTRACT DOCUMENTS PRIOR TO BIDDING

- A. If any person contemplating submitting a bid for construction of the Work is in doubt as to the true meaning of any part of the Contract Documents, or finds discrepancies in or omissions from any part of the Contract Documents, they may submit a written request for interpretation thereof no later than December 9, 2022 at 5:00PM EST, to Karen Olitsky, Procurement Agent III at kolitsk@ufl.edu. The person submitting the request shall be responsible for its prompt delivery.
- B. Interpretations or corrections of proposed Contract Documents will be made only by Addendum and will be available on the Procurement Services "Schedule of Bids" webpage https://procurement.ufl.edu/vendors/schedule-of-bids/. The Owner will not be responsible for any other explanations or interpretations of the proposed Contract Documents.

1.6 BID SUBMITTAL

To be considered responsive and responsible, make bids in accordance with the following:

A. Make bids upon the forms provided, properly signed and with all items completed. Do not change the wording of the bid form and do not otherwise alter or add words to the bid form.

Unauthorized conditions, limitations, or provisions attached to the bid may be cause for rejection of the bid.

- B. Include with bid a completed and signed Invitation to Bid Construction Acknowledgment Form.
- C. Include completed Section 00310 Bid Form.
- D. Include list of subcontractors as described below in 1.9 Subcontracts.
- E. Bids must be submitted no later than <u>January 5, 2023 at 3:00PM EST</u>. No bids received after the time fixed for receiving them will be considered. Late bids will be returned to the bidder unopened.
- F. Address bids to Karen Olitsky, Procurement Agent III, and deliver to:

University of Florida

Procurement Services

971 Elmore Drive / PO Box 115250

Gainesville, FL 32611-5250

Submit bid in a sealed envelope that includes the bid number, contractor name and date and time of the bid opening on the outside of the envelope. Submit one (1) original bid and one (1) electronic copy on flash drive or CD/DVD. It is the sole responsibility of the bidder to see that bids are received on time. Faxed and/or emailed bids will not be accepted.

1.7 WITHDRAWAL OF BIDS

- A. A bidder may withdraw their bid, either personally or by written request, at any time prior to the scheduled time for opening bids.
- B. No bidder may withdraw their bid for a period of forty-five calendar days after the date set for opening thereof, and bids shall be subject to acceptance by the Owner during this period.

1.8 PROOF OF COMPETENCY AND QUALIFICATION OF BIDDERS

- A. A bidder may be required to furnish evidence, satisfactory to the Owner, that the bidder and the bidder's proposed subcontractors have sufficient means and experience in the types of work required to assure completion of the Contract in a satisfactory manner.
- B. A contract will be awarded only to a responsible bidder, qualified by experience and in a financial position to perform the work specified.
- C. If the bidder has not been pre-qualified with UF Procurement Services within the fiscal year (July 1 through June 30), the bidder may be required to submit the following evidence of eligibility:
 - 1. Evidence that bidder is licensed by the appropriate government agency to perform the work specified.
 - 2. Experience record showing bidder's training and experience in similar work.
 - 3. List a brief description of projects of similar size and/or complexity satisfactorily completed, with location, dates of contracts, names of contracts, and names and addresses of owners.

1.9 SUBCONTRACTS

If the Bidder intends to subcontract any of the Work:

- A. Each bidder shall furnish with its bid a list of all subcontractors for subcontracted scopes/packages of work valued at more than \$10,000.
- B. This list shall identify, for each subcontracted package in excess of \$10,000, the name and address of the proposed subcontractor and the approximate value of the subcontract.
- C. If the bidder does not intend to subcontract portions of the Work in amounts greater than \$10,000, then a statement to that affect shall be furnished with the bid.
- D. Each subcontractor performing work more than \$10,000 must present evidence of being qualified in and licensed for the applicable trade. Such proof of subcontractor licensure shall be provided by the successful bidder after award, but prior to commencement of Work.

1.10 PERFORMANCE AND PAYMENT BONDS

Performance and Payment Bonds are required pursuant to 255.05, Florida Statutes. See <u>General Terms</u> & Conditions, Article 20.

1.11 BID BOND

Not required.

1.12 AWARD OR REJECTION OF BIDS

The Contract, if awarded, will be awarded to the responsible and responsive bidder who has proposed the lowest Contract Sum, subject to the owner's right to reject any or all bids and to waive informality and irregularity in the bids and in the bidding. Alternates may be accepted in any order or not at all. Acceptance or rejection of any bid will be at the owner's sole discretion.

1.13 EXECUTION OF AGREEMENT

- A. A Purchase Order (PO) will be issued for purposes of fiscal encumbrance and payment. The PO itself serves as the form of contract.
- B. Upon notice of Bid Award, the bidder to whom the Contract is awarded shall deliver to UF those Certificates of Insurance and Payment & Performance Bonds required by the Contract Documents.
- C. Bonds and Certificates of Insurance shall be approved by UF before the successful bidder may proceed with the Work.

1.14 DIRECT PURCHASE PROGRAM

The Owner may elect to implement a direct purchase program whereby it may purchase materials and equipment included in any Subcontractor's bid for a portion of the Work directly from the supplier of such materials or equipment in order to achieve sales tax savings. Such materials and equipment are referred to as "Direct Purchase Materials." If Owner elects to implement a direct purchase program, it shall so notify the Contractor in writing, and the terms of this paragraph shall govern, along with Owner's policies on the subject in effect at the time the Contractor commences construction of the Project. The Contractor may be required to obtain Builder's Risk insurance on the Direct Purchase Materials naming Owner as the insured or an additional insured, provided Owner shall reimburse the

Contractor for the cost of such insurance. The Contractor shall be responsible for safeguarding all Direct Purchase Materials on the Project site on Owner's behalf.

1.15 TIME OF COMPLETION

A. Date of beginning, rate of progress and time for completion of Work for this Project are ESSENTIAL CONDITIONS of Contract. Successful Bidder hereby agrees that Work required by this Contract shall be commenced within ten (10) calendar days after issuance date of written Notice to Proceed; that all insurance and permits will be obtained; that all documents and notices will be filed; that all requirements as specified will be met; and that Work shall be prosecuted regularly, diligently and uninterruptedly at such rate of progress as will insure Substantial Completion of entire Project within 15 calendar days after receipt of Notice to Proceed, and shall be finally completed within 15 days after the date of Substantial Completion.

END OF SECTION

00310 - BID FORMS

| BID PRO | POSAL | |
|--|---|---|
| FROM: | (Name of Bidder) | |
| TO: | UNIVERSITY OF FLORIDA PROCUREMENT SERVICES 971 Elmore Drive P.O. Box 115250 Gainesville, Florida 32611-5250 | |
| entitled II and thoro conditions materials, the Project thereto on | TB23KO-117, Multi-purpose Building bughly inspected the site of the prosest affecting and governing the construct equipment and other items, facilities et, in strict compliance with the Control file in Procurement Services, and, if a ts called for in the Documents and as | having reviewed the Contract Documents for the Project g Renovation (#8003) – Marianna, FL and having visited posed Project and familiarized himself/herself with all tion of said Project, hereby proposes to furnish all labor, is and services for the proper execution and completion of ract Documents, Addenda, and all other Documents relating the warded the Contract, to complete the said Work within the se stated herein, for the sums as enumerated on this and the |
| BASE BI | ID: | Dollars |
| Figures: \$ | \$ | |
| | VE ALTERNATE #1: Construction in Future Build Out 10 | 0 and Remodel Space Dollars |
| Figures: \$ | \$ | |
| | VE ALTERNATE #2: pgrade in Conference Room 124 | |
| | | Dollars |
| Figures: \$ | \$ | |
| | TIVE ALTERNATE #3: ish for Break Room 120 (Behind Wa | ter Coolers), Custodial Room 121, and Toilet Room 123 |
| | | Dollars |
| Figures: \$ | \$ | |

ADDITIVE ALTERNATE #4: Office 110 Build Out Dollars Figures: \$ ADDENDA: Receipt of the following Addenda to the Construction Documents is acknowledged: ADDENDUM # Dated ADDENDUM #_____ Dated _____ **COMPLETION DATE:** All Work covered by the Bidding Documents and the foregoing Base Bid shall be completed and ready for Owner's occupancy as specified in the contract documents. **SIGNATURE:** I hereby certify that for all statements and amounts herein made on behalf of (Name of Bidder) a (Corporation) (Partnership) (Individual) organized and existing under the laws of the State of Florida, I have carefully prepared this Bid Proposal from Contract Documents described hereinbefore, I have examined Contract Documents and local conditions affecting execution of Work before submitting this Bid Proposal, I have full authority to make the statements and commitment herein and submit this Bid Proposal in (its) (their) behalf, and all statements are true and correct. Signed and sealed this day of ,202. (Signature of Bidder) (Print Name) (Title) WITNESS: (Signature of Witness) (Print Name)

END OF SECTION

(Zip Code)

(State)

(City)

project manual

UNIVERSITY FLORIDA

INSTITUTE OF FOOD & AGRICULTURAL SCIENCES

NFREC BUILDING 8003 REMODEL

UF IFAS Project No. 21114

01 November 2022

ARCHITECTURAL MEPF



CONFORMED DOCUMENTS

Architect's Project Number: 2021-0011



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project manual

UF IFAS

NFREC BUILDING 8003 REMODEL

UF IFAS Project No. 21114

01 November 2022

ARCHITECT

Beverly Frank, AIA BFrank Studio, LLC 4836 West Gandy Boulevard Tampa, Florida 813. 769. 9378

MEP

Craig Gulledge, PE, CxA. LEED P BD+C Mitchell Gulledge Engineering 210 SW 4th Avenue Gainesville, Florida 32601 352. 745. 3991 [THIS PAGE LEFT INTENTIONALLY BLANK]

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GENERAL TERMS and CONDITIONS

for Construction Management At-Risk and Design-Bid-Build Projects

Revised May 2017

Business Affairs
Planning Design & Construction
www.facilities.ufl.edu

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ARTICLE 1 – DEFINITIONS

When one of the following capitalized words, terms, or phrases is used in the Contract for Construction, it shall be interpreted or construed first as defined below, second according to its generally accepted meaning in the construction industry, and third according to its common and customary usage.

Authority Having Jurisdiction (AHJ): That person or entity who has the delegated authority to determine, mandate, and enforce building code requirements established by jurisdictional governing bodies. For University of Florida projects, the University's Division of Environmental Health & Safety is normally the primary AHJ.

BIM Execution Plan: A detailed and project-specific guide for the development, sharing, use, and finalization of BIM models and model-related documents and information.

Building Information Modeling (BIM): A process involving the generation and management of digital representations of physical and functional characteristics of a facility through the use of three–dimensional, intelligent design information. The resulting building information models become shared knowledge resources to support decision-making about a facility from the earliest conceptual stages, through design, construction, and the facility's operational life.

Builder: An entity, including but not limited to a general contractor, a trade contractor or a construction manager, engaged directly by the Owner pursuant to a Contract for Construction.

Certificate of Substantial Completion: Document declaring the Work Substantially Complete and suitable for occupancy or beneficial use by the Owner.

Commissioning: A process – normally handled by one or more independent consultants working directly for the Owner – to ensure that particular building systems are planned, designed, installed, tested, optimized, and capable of being operated and maintained to perform in accordance with the Owner's goals and requirements.

Construction Documents: Drawings, specifications, revisions, addenda, and other information which set forth in detail the Work.

Construction Price: The dollar amount for which a Builder agrees to perform the Work set forth in a Contract for Construction.

Construction Schedule: The timetable which sets forth pertinent dates for timely completion of the Work.

Contract for Construction: The entire agreement between Owner and Builder, consisting of the Owner-Builder Agreement and all exhibits thereto; these General Terms and Conditions; special conditions, if any; proposal(s) submitted by the Builder and accepted by Owner, if any; the Construction Documents; any amendments or addenda executed by the Owner and the Builder hereafter; and Owner-approved change order(s) or field orders. Documents not included or expressly contemplated in this definition do not, and shall not, form any part of the Contract for Construction. Without limiting the generality of the foregoing, shop drawings and other submittals from the Builder or its subcontractors and suppliers do not constitute a part of the Contract for Construction.

Final Completion: The stage of construction when the Work has been completed in accordance with the Contract for Construction and the Owner has received all documents and items necessary for closeout of the Work. Final Completion of the Work shall be deemed to have occurred on the later of: (i) the date that the Work passes a Final Completion inspection, or (ii) the date that the Builder has produced all required Final Completion close-out documentation and items. Final Completion shall not be deemed to have occurred and no final payment shall be due the Builder or any of its subcontractors or suppliers until the Work has passed the Final Completion inspection and Builder has provided all required Final Completion closeout documentation and items to the Owner.

Hazardous Substances: The term "Hazardous Substances" means all hazardous or toxic substances, materials, wastes, pollutants and contaminants which are listed, defined, or regulated under applicable laws, rules, regulations, codes, ordinances, orders and directives pertaining or related to health, safety, or the environment, including, but not limited to, the Comprehensive Environmental Response Compensation and Liability Act as amended, (42 U.S.C. § 9601 et seq), the Resource Conservation and Recovery Act as amended, (42 U.S.C. § 6901 et seq), the Federal Water Pollution Control Act (33 U.S.C.A. §§ 1251 to 1387), the Clean Air Act (42 U.S.C.A. §§ 7401 to 7671q), the Emergency Planning and Community Right to Know Act (42 U.S.C.A. §§ 11001 to 11050), the Toxic Substances Control Act (15 U.S.C.A. §§ 2601 to 2692), the Solid Waste Disposal Act (42 U.S.C.A. §§ 6901 to 6992k), the Oil Pollution Act (33 U.S.C.A. §§ 2701 to 2761) and all rules and regulations promulgated pursuant thereto. Without limiting the generality of the foregoing, "Hazardous Substances" shall specifically include polychlorinated biphenyl, asbestos (friable and non-friable), radon, urea formaldehyde, gasoline, diesel, oil, hydrocarbons, petroleum derived constituents, biomedical waste, or hazardous or toxic residue.

Owner: The University of Florida Board of Trustees, a public body corporate of the State of Florida.

Owner's Related Parties: The Board of Governors and its officers, trustees, and employees; and the Owner and its officers, trustees, and employees.

Professional: An entity, including but not limited to a licensed architect or engineer, engaged directly by the Owner to provide design or engineering services.

Project: Owner's undertaking to effect the construction, installation, renovation, or demolition of a facility or improvement, as the case may be, that is the subject of the Contract for Construction between Owner and Builder.

Site: The geographical location of a Project, usually defined by legal boundary lines, and the location characteristics including, but not limited to, grades and lines of streets, alleys, pavements and adjoining structures, rights-of-way, restrictions, easements, encroachments, zoning, deed restrictions, existing buildings and improvements, and service and utility lines.

Substantial Completion (or Substantially Complete): The stage of construction when the Owner can occupy or beneficially use satisfactorily completed Work for its intended purpose and a certificate of occupancy has been issued. Substantial Completion of the Work shall be deemed to have occurred on the later of: (i) the date the Work passes all Substantial Completion inspections, (ii) the date Builder has produced the required Substantial Completion documentation and items, or (iii) the date Authorities Having Jurisdiction provide a certificate of occupancy.

Work: Any and all computers, construction machinery, documents, equipment, facilities, fixtures, furnishings, goods, heat, items, labor, licenses, management, materials, permits, products, services, supervision, supplies, systems, taxes, testing, tools, utilities, transportation, vehicles, and water, required to be performed or supplied and/or necessary for proper execution and completion of the Project, or some portion thereof, whether or not incorporated or to be incorporated into the Project; provided, however, that Work does not include performance of preconstruction services by a construction manager.

ARTICLE 2 - CONSTRUCTION DOCUMENTS

2.1 Quantity and Format of Documents

The Owner shall provide the Builder with one printed set of Construction Documents, one set of electronic documents (plans and specifications) in PDF format, and one set of BIM files.

2.2 Minimum Requirements

In every case, requirements established by the Construction Documents shall be considered as the minimum acceptable standard.

2.3 Owner Disclaimer of Warranty

The Owner has requested that its Professional(s) prepare Construction Documents for the Project, including the plans and specifications, which are to be complete, accurate, coordinated, and adequate for bidding, negotiating, and constructing the Work. However, the Owner makes no representation or warranty of any nature whatsoever to the Builder concerning the Construction Documents or BIM documents. The Builder hereby acknowledges and represents that it has not relied, and does not and will not rely, upon any representations or warranties by the Owner concerning such documents, as no such representations or warranties have been or are hereby made.

2.4 Conflicts in Documents

In the event of any conflict, discrepancy, or inconsistency among any of the documents comprising the Contract for Construction, the following shall control:

- 2.4.1 As between figures given on plans and scaled measurements, the figures shall govern;
- 2.4.2 As between large-scale plans and small-scale plans, the large-scale plans shall govern;
- 2.4.3 As between plans and specifications, the requirements of the specifications shall govern;
- 2.4.4 As between plans or specifications and BIM models, the requirements of the plans or specifications shall govern.
- 2.4.5 As between architectural drawings and (structural, civil, mechanical, electrical, plumbing, or fire protection) engineering drawings, the engineering drawings shall govern.

2.5 Contract Changes

The Builder understands and agrees that the Contract for Construction – including the Construction Documents – cannot be changed except as provided herein. No act, omission, or course of dealing by the parties shall alter the requirement that modifications of the Contract for Construction must be accomplished by written documents signed by the parties.

ARTICLE 3 - BUILDER'S REVIEWS AND EVALUATIONS

3.1 Sufficiency of Construction Documents

The Builder acknowledges its continuing duty to review and evaluate the Construction Documents during the performance of its services and shall immediately notify the Owner and the Professional(s) of any (i) problems, conflicts, defects, deficiencies, inconsistencies, or omissions it discovers in or between the Construction Documents; and (ii) variances it discovers between the Construction Documents and applicable laws, statutes, building codes, rules, or regulations.

- 3.1.1 If the Builder performs any Work it knows or should have known involves (i) a recognized problem, conflict, defect, deficiency, inconsistency or omission in the Construction Documents; or (ii) a variance between the Construction Documents and requirements of applicable laws, statutes, building codes, rules, regulations, or the Owner's design and construction standards without notifying the Professional(s) and prior to receiving written authorization to proceed, the Builder shall be responsible for the consequences of such performance.
- 3.1.2 Drawings are generally drawn to scale; however, the figured dimensions or notes thereon shall govern. Before ordering any materials or doing any Work, the Builder and subcontractors shall verify all measurements at the Site and shall be responsible for the correctness of same. Discrepancies shall be reported in writing to the Professional prior to proceeding with the Work. No extra charge or compensation will be entertained due to differences between actual measurements and dimensions indicated on drawings, if such differences do not result in a change in the scope of Work or if the Professional failed to receive written notice before the Work was performed.

3.2 Sufficiency of Site

Prior to signing the Contract for Construction, the Builder has:

- (i) visited the Site and become familiar with local conditions under which the Project is to be constructed and operated; and
- (ii) reviewed and familiarized itself with the Site survey and any existing structures on the Site, and gathered all other information necessary for a full understanding of the Work.

In addition, if the Work involves modifications to or remodeling of an existing structure(s) or other man-made feature(s) on the Site, the Builder has also:

(iii) reviewed all as-built and record drawings, plans and specifications of which Owner has informed Builder; and

(iv) thoroughly inspected the structure(s) and man-made feature(s) to be modified or remodeled prior to submission of bid, if any, but in all events prior to signing the Contract for Construction.

Claims resulting from the Builder's failure to familiarize itself with the Site or pertinent documents shall be deemed waived.

ARTICLE 4 – BUILDER'S DUTIES, OBLIGATIONS, AND RESPONSIBILITIES

4.1 Performance Of Work

The Builder shall perform and complete its obligations under the Contract for Construction using its best skill and attention, and covenants with the Owner to furnish management, supervision, coordination, labor, and services (i) which expeditiously, economically and properly complete the Work in the manner most consistent with the Owner's interests and objectives; (ii) which comply with the Contract for Construction; and (iii) which are in accordance with the highest standards currently practiced by persons and entities performing or providing management, supervision, coordination, labor and services on projects similar in size, complexity, and cost to the Project.

- 4.1.1 The Builder shall not be required to provide professional services which constitute the practice of architecture or engineering, unless provided in the Construction Documents and relating to those divisions of the Work for which it is appropriate for Builder's subcontractors to engage or employ licensed engineers for design associated with the Work, such as trusses.
- 4.1.2. All services rendered by the Builder for the Project shall be performed by or under the immediate supervision of persons possessing expertise in the discipline of the service being rendered.
- 4.1.3 The Builder shall, in the course of providing the Work, cooperate and communicate with the Owner, the Professional, the Owner's Commissioning consultants, and all other persons or entities as required for satisfactory completion of the Project.
- 4.1.4 The Builder understands and acknowledges that the Work referred to in the Contract for Construction may be only part of the Project and that the Project may include the construction of other structures or other construction activities on the same Site. The Builder shall conduct all its activities so as not to interfere with the construction of, or operations within or from, other structures on the Site.
- 4.1.5 The Builder shall not damage, endanger, compromise, or destroy any part of the Project or the Site, including by way of example and not limitation, work being performed by others on the Site, monuments, stakes, benchmarks and other survey points, utility services, and existing features or structures on the Site. Should the Builder damage, compromise or destroy any part of the Project or the Site, the Builder shall be fully and exclusively responsible for and bear all costs associated therewith.

4.2 Compliance With Laws

- 4.2.1 The Builder shall comply with all applicable laws, statutes, building codes, rules, regulations, and lawful orders of all governmental, public, and quasi-public authorities and agencies having jurisdiction over the Project.
- 4.2.2 The Builder shall prepare and file documents required to obtain, and shall obtain, all necessary approvals and permits, including building permit(s), of all governmental authorities having jurisdiction over the Work, provided Owner shall pay all building permit and state fire marshal inspection fees directly.
- 4.2.3 The Builder shall give all notices required of it by governmental authorities relating to the Project.

4.3 Safety

Safety shall be a prime concern of the Builder at all times. The Builder shall be solely responsible for and have control over the means, methods, techniques, sequences, and procedures for coordinating and constructing the Work, including Site safety and safety precautions and programs.

4.4 On Site Records

- 4.4.1 The Builder shall maintain at the Site one copy of all drawings, specifications, addenda, approved shop drawings, daily logs, change orders, submittals, other modifications, and all other documents generated throughout the course of the project in good order. The daily logs shall contain detailed information regarding weather conditions, materials delivered, work performed, operating hours, subcontractors working on the Project, and staffing of each subcontractor.
- 4.4.2 The Builder shall continuously update all drawings and specifications to reflect changes as they occur throughout construction. Such "as-built" plans and specifications shall be available at all times to the Owner, the Professional(s), the Owner's consultants, and quality control and testing agency personnel. The drawings shall be neatly and clearly marked in color during construction to record all variations made during construction, and the Builder shall include such supplementary notes and details necessary to clearly and accurately represent asbuilt construction.
- 4.4.3 Depending on the requirements of the project-specific BIM Execution Plan, the Builder shall also maintain copies of the BIM models that reflect the as-built or as-installed conditions, geometry, and product/equipment information.

4.5 Bribes and Kick-Backs

The Builder shall not by any means:

- (i) induce any person or entity employed in the construction of the Project to give up any part of the compensation to which that person or entity is entitled;
- (ii) offer or accept any bribes or kick-backs in connection with the Project from or to any individual or entity, including any of its trade contractors, subcontractors, consultants, suppliers, or manufacturers of Project goods and materials; or

(iii) without the express written permission of the Owner in accordance with Owner's policies, call for or by exclusion require or recommend the use of any subcontractor, consultant, product, material, equipment, system, process, or procedure in which the Builder has a direct or indirect proprietary or other pecuniary interest.

4.6 Quality Control And Testing

The Builder shall develop and implement a quality management program to ensure quality construction. Unless otherwise specified in the Contract for Construction, the Builder shall procure the quality control and testing agencies, subject to Owner's written approval. The Builder shall coordinate all tests and inspections required by the Construction Documents, and the Builder shall arrange for tests and inspections to be conducted as necessary to avoid any interference with the progress of Work. No claims for extension of time or extra costs will be allowed on account of any testing, retesting, inspection, re-inspection, or rejection of Work when defective or deficient Work is found. Cost of specified measures and tests required by the Construction Documents and performed by Owner-approved quality control and testing agencies shall be included in the Cost of the Work.

4.7 Incident Reporting

The Builder shall immediately notify the Owner and Professional(s), both orally and in writing, of the nature and details of all incidents which may adversely affect the quality or progress of the Work including, but not limited to, union jurisdictional disputes, accidents, delays, damages to Work, and other significant occurrences.

4.8 Hazardous Substances

The Builder shall immediately notify the Owner and the Professional(s), both orally and in writing, of the presence and location of any physical evidence of, or information regarding, environmental contamination on the Site (including but not limited to Hazardous Substances and petroleum releases) of which it becomes aware. If the Builder encounters environmental contamination (including but not limited to Hazardous Substances), the Builder shall (i) immediately stop performance of Work or that portion of the Work affected by or affecting such contamination; (ii) secure the contaminated area against intrusion; (iii) not disturb or remove the contamination; (iv) not proceed, or allow any subcontractor or supplier to proceed, with any Work or other activities in the area affected by such contamination until directed to do so by the Owner; and (v) take any other steps necessary to protect life and health.

4.9 Owner's Use Of and Access To The Site

The Builder shall perform the Work so as not to interrupt any operations of the Owner on, adjacent to, or near the Site.

- 4.9.1 The Builder understands and acknowledges that the Owner may need access to or use of certain areas of the Site or Work prior to the Builder's achievement of Substantial Completion, and that such occupancy, access, or use shall not constitute the Owner's acceptance of any Work.
- 4.9.2 The Builder shall not enter any Owner-occupied area of the Site or Project unless first approved and scheduled by the Owner. The Builder understands and acknowledges that the Owner may incur damages if the Owner's operations on the Site are interrupted or impaired as a result of the Work.

4.9.3 The Builder shall afford the Owner's own forces and other consultants, trade contractors, subcontractors, and suppliers, access to the Site for performance of their activities, and shall connect and coordinate its construction and operations with theirs as required by the Construction Documents.

4.10 Utilities

The Builder shall be responsible for all costs associated with connections to, and consumption of, utilities required for temporary service and construction.

ARTICLE 5 – BUILDER'S PERSONNEL, SUBCONTRACTORS, SUPPLIERS, AND SITE FACILITIES

5.1 Project Staffing

The Builder shall staff the Project with qualified and designated individuals and entities responsible for its obligations and performance.

- 5.1.1 An authorized representative of the Builder shall be present at all times when Work is being performed.
- 5.1.2 The Builder shall employ persons skilled in the tasks assigned to them and shall contract with subcontractors and suppliers skilled in the tasks assigned to them and capable of working harmoniously with all trades, crafts and other individuals on the Project. The Builder shall use its best efforts to minimize the likelihood of any strike, work stoppage, or other labor disturbance.
- 5.1.3 Students, faculty, and staff shall not be harassed, disturbed, or in any way disrupted in their lawful pursuits. The Builder shall immediately remove from the Site, for the duration of the Project, any person making an inappropriate religious, racial, sexual or ethnic comment, statement or gesture toward any other individual. Sexual harassment shall be reported to the University's Title IX Coordinator and Deputy Title IX Coordinator for Students as prescribed elsewhere in the Contract for Construction.
- 5.1.4 The Builder shall immediately remove from the Site, for the duration of the Project, any person who is incompetent, careless, or not working in harmony.
- 5.1.5 The Builder shall be responsible to the Owner for the acts and omissions of Builder's agents and employees, consultants, subcontractors, and suppliers.
- 5.1.6 Employees of the Builder and its subcontractors shall be screened for and banned from working on the Owner's property if found to have committed certain crimes as described elsewhere in the Contract for Construction. The cost of such screening shall be included in the Construction Price.

5.2 Subcontractor / Supplier Contracts

The Builder shall enter into written contracts with its subcontractors and suppliers, and those written contracts shall be consistent with the Contract for Construction. It is the intent of the Owner and the Builder that the obligations of the Builder's subcontractors and

suppliers inure to the benefit of the Owner and the Builder, and that the Owner be a third-party beneficiary of the Builder's agreements with its subcontractors and suppliers.

- 5.2.1 The Builder shall make available to each subcontractor and supplier, prior to the execution of written contracts with any of them, a copy of the pertinent portions of the Contract for Construction, including those portions of the Construction Documents to which the subcontractor or supplier will be bound, and shall require that each subcontractor and supplier shall similarly make copies of applicable parts of such documents available to its respective subcontractors and suppliers.
- 5.2.2 The Builder shall include in its written contracts with subcontractors and suppliers a provision that includes the acknowledgment and agreement of the subcontractor or supplier that it has received and reviewed the applicable terms, conditions, and requirements of the Contract for Construction included by reference in its written contract with the Builder, and that it will abide by those terms, conditions, and requirements.
- 5.2.3 The Builder's written contracts with its subcontractors and suppliers shall preserve and protect the rights of the Owner and include the acknowledgment and agreement of each subcontractor or supplier that the Owner is a third-party beneficiary of the contract. The Builder's agreements with its subcontractors and suppliers shall require that in the event of default under, or termination of, the Contract for Construction, and upon request of the Owner, the Builder's subcontractors and suppliers will perform services for the Owner.
- 5.2.4 Without limitation of the foregoing subsections, the Builder's written contracts with its subcontractors and suppliers shall include the following provision: "When the Builder receives payment from the Owner for labor, services, or materials furnished by subcontractors and suppliers hired by the Builder for the Project, the Builder shall remit payment due to those subcontractors and suppliers, less the value of any item contested in accordance with the Contract for Construction, within ten (10) days after the Builder's receipt of payment from the Owner. When the payment due the subcontractor is for final payment, including retainage, the subcontractor must include with the invoice for final payment, a conditional release of lien and all required warranties and closeout documentation. When the subcontractor receives payment from the Builder for labor, services, or materials furnished by the subcontractors and suppliers hired by the subcontractor, the subcontractor shall remit payment due to those subcontractors and suppliers, less the value of any item contested in accordance with the Contract for Construction, within ten (10) days after the subcontractor's receipt of payment."

5.3 Resolution of Trade Disputes

The Builder shall promptly resolve claims, complaints, labor disputes, and disputes over assignment of work tasks by and among its subcontractors and suppliers.

ARTICLE 6 – GOODS, PRODUCTS, AND MATERIALS

6.1 Quality Of Materials

The Builder shall furnish goods, products, materials, equipment, and systems that:

- (i) comply with the Contract for Construction;
- (ii) conform to applicable specifications, descriptions, instructions, drawings, data, and samples;
- (iii) are new (unless otherwise specified or permitted) and without apparent damage;
- (iv) are of quality, strength, durability, capacity, or appearance equal to or higher than that required by the Construction Documents;
- (v) are merchantable;
- (vi) are free from defects; and
- (vii) exceed and/or are in addition to those required by manufacturers' or suppliers' specifications where such additional items are required by the Construction Documents.

6.2 Installation And Use Of Materials

All goods, products, materials, equipment, and systems shall, unless specifically stated otherwise, be furnished, used, installed, employed, and protected in strict compliance with the specifications, recommendations, and instructions of the manufacturer or supplier, unless such specifications, recommendations, or instructions deviate from accepted construction practices or the Construction Documents, in which case the Builder shall so inform the Owner and Professional and shall proceed as directed by that Professional, unless otherwise directed by the Owner. The Builder shall coordinate and interrelate all trade contracts and subcontracts to ensure compatibility of goods, products, materials, equipment, and systems – and validity of all warranties and guarantees – required by the Construction Documents for the Work.

6.3 Unsuitable Materials

The Builder shall inform the Owner of goods, products, materials, and equipment or systems the Builder knows are unsuitable or unavailable at the time of bid submission. Claims relating to or arising out of claims that goods, products, materials, equipment, or systems are unsuitable or unavailable shall not be entertained by the Owner unless the Builder, subcontractor, or supplier notified the Owner in writing at the time of bid submission, along with proposed alternatives. Approval by the Owner and the Professional does not mean or imply final acceptance by the Owner and Professional if such items should be defective or not as previously represented. Should the Builder furnish any approved goods, products, materials, equipment, or systems different from or in addition to those required by the Construction Documents which require supplemental materials or installation procedures different from or in addition to those require for specified items, the Builder shall provide such at no increased cost to the Owner.

6.4 Substitutions

There shall be no substitution of products, materials, or equipment unless approved by the Professional in advance of procuring such goods, except as expressly permitted by the Contract for Construction.

6.5 Construction Manager Responsibility

If Builder is acting as a construction manager, Builder shall also inform the Owner and Professional during the various stages of design development if proposed materials or equipment do not conform with the Owner's construction budget, Owner's program and/or project requirements, or Owner's design and construction standards.

6.6 Security For The Project

The Builder shall provide security for the Project, including but not limited to security for Work in progress and for the goods, products, materials, equipment, systems, construction machinery, tools, devices, and other items required, used, or to be used for performing the Work.

ARTICLE 7 - DOCUMENTS AND INFORMATION

7.1 Information from Owner

The Owner shall provide the Builder with information reasonably necessary to assist the Builder in performing its services including, if applicable and available:

- (i) the Site legal description and any required survey;
- (ii) all written and tangible material of which it informs Builder concerning conditions below ground at the Site;
- (iii) if the Project involves an existing structure, all as-built drawings, record drawings, plans, specifications, and structural information; and
- (iv) the Owner's pertinent Project dates and key milestone dates.

7.2 Resolution of Questions

The Builder shall resolve all questions concerning the Construction Documents with the Professional(s) who prepared the documents.

7.3 Processing of Documents

When requested to do so by the Owner, the Builder shall process documents and provide other reasonably required drawings, services, and certifications necessary to enable the Owner to (i) obtain permits or other approvals not otherwise required to be obtained by Builder and (ii) represent that the Work complies with the requirements of Authorities Having Jurisdiction.

7.4 Sufficiency of Owner Information

The furnishing of information by the Owner to the Builder shall not relieve the Builder of responsibilities contained elsewhere in the Contract for Construction to evaluate information and documents provided by the Owner. The Builder shall timely notify the Owner in writing of any additional information needed or services required from the Owner in order for the Builder to perform the Work.

ARTICLE 8 – SUBMITTALS

8.1 Submittal Schedule

The Builder shall timely prepare and transmit to the Professional a schedule for provision of all anticipated submittals and shop drawings. The schedule shall (i) include submittals required by the specifications; (ii) be in a format acceptable to the Professional; (iii) be coordinated with the Construction Schedule; and (iv) set forth specific dates for submission of the listed submittals.

8.2 Processing of Submittals

The Builder shall in timely fashion review, approve or reject as necessary, and forward approved submittals to the Professional for review and approval along with such detail and information as the Professional requires. No part of the Work dealt with by a submittal shall be fabricated or performed until such approval has been given.

- 8.2.1 Submittals and shop drawings shall be provided in electronic format searchable PDF for product data and other submittals; DWG, RVT, or other Navisworks-compatible software for shop drawings.
- 8.2.2 The Professional is responsible to the Owner, but not to the Builder, to verify that the submittals conform to the design concept and functional requirements of the plans and specifications, that the detailed design portrayed in shop drawings and proposed equipment and materials shown in submittals are of the quality specified and will function properly, and that the submittals comply with the Contract for Construction.
- 8.2.3 All Work shall be performed in accordance with approved submittals. Approval of submittals by the Professional shall not relieve the Builder from complying with the Contract for Construction, including all plans and specifications, addenda thereto, and approved Change Orders.
- 8.2.4 Re-submittals required to correct errors, omissions, or invalid substitutions by the Builder or its subcontractors shall not constitute an excusable or compensable delay.

8.3 Record Documents

The Builder shall provide to Owner final and complete electronic copies of all submittals and shop drawings, updated and annotated as needed to illustrate the products, equipment, and materials actually installed.

ARTICLE 9 – BUILDER'S INSPECTION AND CORRECTION OF DEFECTIVE OR INCOMPLETE WORK

9.1 Rejection and Correction of Work In Progress

During the course of Project, the Builder shall inspect and promptly reject any Work that (i) does not conform to the Construction Documents or (ii) does not comply with any applicable law, statute, building code, rule, or regulation of any governmental, public, and quasi-public authorities or Authorities Having Jurisdiction.

- 9.1.1 The Builder shall promptly correct or require the correction of all rejected Work, whether observed before or after Substantial Completion and whether or not fabricated, installed, or completed. The Builder shall bear all costs of correcting such Work, including additional testing and inspections and compensation for all services and expenses necessitated by such correction.
- 9.1.2 The Builder shall bear the cost of correcting destroyed or damaged Work, whether completed or partially completed, of the Owner or other trade contractors or subcontractors caused by the Builder's correction or removal of rejected Work.

9.2 Covered or Concealed Work

If a portion of the Work has been covered, the Builder shall, if notified to do so by the Owner or the Professional, uncover the designated portion for observation and then replace it.

- 9.2.1 If the designated portion of the Work was covered contrary to the request of the Owner or the Professional, or to requirements specifically expressed in the Construction Documents, the Builder shall receive no additional compensation for the costs of uncovering and replacement or modification of the Construction Schedule.
- 9.2.2 If the designated portion of the Work was covered prior to a specific request by the Owner or the Professional that it remain uncovered, the Builder shall receive additional compensation for the costs of uncovering and replacement or modification of the Construction Schedule(s) only if the designated portion of the Work was in conformance with the Construction Documents.

ARTICLE 10 – CHANGE ORDERS, CHANGES TO THE WORK, AND CHANGED CONDITIONS

10.1 Change Order Proposals and Requests

Builder may propose, and Owner or the Professional may request, changes to the Work, compensation, or applicable schedules.

- 10.1.1 With respect to Builder's proposals for changes, the Builder shall prepare and submit change order proposals to the Professional, together with appropriate backup documentation.
- 10.1.2 With respect to Owner's and/or the Professional's requests for changes, the Builder shall promptly review and respond to such requests provided by the Owner or the Professional.
- 10.1.3 When requested to do so, the Builder shall prepare and submit to the Professional drawings, specifications, detailed cost estimates as prescribed below, or other data in support of a change order proposal or request.
- 10.1.4 Each Builder-submitted change order proposal shall include any and all time and monetary impacts of the change, whether the change order is considered alone or with all other changes during the course of the Project, together with substantiating back-up documentation.

10.2 Owner-Directed Changes

The Owner may unilaterally direct the Builder to implement changes in the Work so long as the Work the Owner is requiring is not outside of the general scope of the Contract for Construction, and the Builder, upon written direction from the Owner, shall proceed with such change.

10.3 Professional-Directed Changes

The Professional, without the Owner's prior approval, may authorize or direct the Builder to make minor changes in the Work that are consistent with the intent of the Construction Documents and which do not involve a change in Project cost, time for construction, scope, or approved design elements. Any such minor changes shall be implemented by written field order or supplemental instruction from the Professional and executed promptly by the Builder.

10.4 Administration of Changes

The Professional will administer and manage all change orders and change order proposals or requests – including claims for additional compensation, time, or both – and will prepare required drawings, specifications, and other supporting data in connection therewith.

10.5 Compensation for Changes

With respect to all change order proposals or requests involving credit to the Owner or additional compensation to the Builder, the Builder shall (i) obtain from subcontractors and suppliers the best possible price quotations; (ii) review such quotations to ascertain whether they are reasonable; (iii) prepare an itemized accounting together with appropriate supporting data, including reasonable expenditures by, and savings to, those performing the Work involved in the proposed change; and (iv) provide a reasonable and detailed price quotation to the Professional.

- 10.5.1 If Professional determines price quotations for change order proposals or requests are unreasonable, the Builder shall, in writing, justify said quotations or provide additional back-up documentation. If, after review of the additional information, the Professional determines the quotation is unreasonable, the Owner may require the subject Work be performed on a time and material basis.
- 10.5.2 The Builder and its subcontractors and suppliers shall be allowed no additional compensation for any costs, fees, or expenses incurred in performing services already required by the Contract for Construction, and shall not be entitled to additional reimbursement for home office, other non-jobsite or indirect overhead expenses, or tools necessary for construction.
- 10.5.3 It is the responsibility of the Builder to review and approve all pricing of additional work required of its subcontractors and suppliers.

10.6 Concealed and Unforeseen Conditions

If (i) the Builder encounters concealed or unforeseen conditions of an unusual nature that affect performance of the Work; or (ii) the conditions vary from those indicated by the Construction Documents; and (iii) such conditions are not ordinarily found to exist or differ materially from those generally recognized as inherent in work of the character provided by the Builder, the Builder shall promptly, but in no event later than seven (7) calendar

days after first observance of the conditions, notify the Professional and the Owner before conditions are disturbed and give the Professional or the Owner opportunity to observe the condition in its undisturbed state.

- 10.6.1 Owner and Professional shall promptly investigate the conditions. If Owner and Professional determine, within their discretion, that the conditions (i) differ substantially from those indicated in the Construction Documents and (ii) cause a material increase or decrease in the Builder's cost of, or time required for, performance of the Work, then compensation and/or time for performance will be equitably adjusted.
- 10.6.2 All adjustments in compensation or extensions of time shall be by change order. Change order proposals or requests shall be submitted within fourteen (14) calendar days of the date of observation of the changed or unknown conditions.
- 10.6.3 The Builder's failure to notify the Professional and Owner as provided in this Article shall constitute a waiver of any claim arising out of or relating to such concealed or unknown condition.

10.7 Performance of Changes

Upon Builder's receipt of an executed change order or approved change order proposal, changes in the Work shall be promptly performed. All changes in the Work shall be performed under applicable conditions of the Construction Documents.

10.8 Disputes Regarding Changes

- 10.8.1 Regardless if there is a dispute (i) that a change has occurred; (ii) whether a change in the Work will result in adjustment of compensation or applicable schedules; or (iii) as to the amount of any adjustment of compensation or applicable schedules, the change shall be carried out if the Owner so directs. No claim shall be prejudiced by performance of the Work so long as the Owner is notified of the claim in writing prior to performance of the Work which is the subject of the dispute and the party disputing the decision of the Owner recites the reasons for its dispute in the written notice. Failure to notify the Owner in writing shall constitute a waiver of any claim resulting from the change.
- 10.8.2 In the event a change order proposal is approved by the Owner in the absence of an agreement as to cost, time, or both, the Professional will (i) receive and maintain all documentation pertaining thereto; (ii) examine such documentation on the Owner's behalf; (iii) take such other action as may be reasonably necessary or as the Owner may request; and (iv) make a written recommendation to the Owner concerning any appropriate adjustment in the Construction Price or time.

10.9 Necessity for Signature Approval

No act, omission, or course of dealing shall alter the requirement that change orders shall be in writing and signed by the Owner, and that change orders are the exclusive method for effecting any adjustment to compensation or applicable schedules. The Builder understands and agrees, on behalf of itself and its subcontractors and suppliers, that neither compensation nor applicable schedules can be changed by implication, oral agreement, or unwritten change order.

ARTICLE 11 – OWNER'S CONSULTANT(S) AND CONSTRUCTION ADMINISTRATION

11.1 Owner's Designated Professional Representative

Unless otherwise directed by the Owner, the Professional shall act as the Owner's agent for design-related issues, interpretation of the Construction Documents, and other matters described in these General Terms & Conditions.

- 11.1.1 The Professional will be the Owner's design representative during performance of the Work and will consult with and advise the Owner on all design and technical matters.
- 11.1.2 The Professional will act as initial interpreter of the requirements of the Contract for Construction and as the Owner's advisor on claims.

11.2 Professional Site Visits

The Professional will visit the Site with sufficient frequency for familiarization with the progress and quality of the Work and to inspect the Work to determine compliance of the Work with (i) the Contract for Construction; (ii) approved shop drawings and other submittals; (iii) the Construction Schedule; and (iv) applicable laws, statutes, building codes, rules, or regulations of all governmental, public, and quasi-public authorities or Authorities Having Jurisdiction.

11.3 Professional Rejection of Work

The Professional may disapprove or reject Work which does not comply with (i) the Contract for Construction; (ii) approved shop drawings and other submittals; or (iii) applicable laws, statutes, building codes, rules, or regulations of any governmental, public, and quasi-public authorities and Authorities Having Jurisdiction.

11.4 Professional Evaluations

- 11.4.1 The Professional will review and evaluate the results of all inspections, tests, and written reports required by the Contract for Construction and by any governmental entity having or asserting jurisdiction over the Project. The Professional will take appropriate action, if necessary, arising from such evaluations, including acceptance, rejection, requiring additional testing or corrective work, or such other action deemed appropriate by the Professional. The Professional will promptly reject Work which does not conform to and comply with testing requirements.
- 11.4.2 The Professional may require inspection or testing of any Work in addition to that required by the Contract for Construction or governmental entities having or asserting jurisdiction over the Project when such additional inspections and testing is necessary or advisable, whether or not such Work is then fabricated, installed, or completed. The Professional will take appropriate action on all such special testing and inspection reports, including acceptance, rejection, requiring additional testing or corrective work, or such other action deemed appropriate by the Professional.

11.5 Professional Submittal Activities

The Professional will review and approve, reject, or take other appropriate action on submittals such as shop drawings, product data, samples, proposed equal materials or

equipment, and requested substitutions not more than fourteen (14) calendar days after receipt, and will not approve any submittals unless such submittals conform to the Construction Documents. The Professional's review of submittals shall not constitute final acceptance of materials or equipment furnished or installed if such materials or equipment prove to be defective or not as represented by approved submittals or as otherwise required by the Construction Documents. The Builder remains responsible for details and accuracy, for confirming and correlating all quantities and dimensions, for selecting fabrication processes, for techniques of assembly, and for performance of the Work.

11.6 Professional Interpretations

The Professional will, when requested to do so in writing by the Builder, promptly and so as to cause no unnecessary delay, render written or graphic interpretations and decisions necessary for the proper execution of the Work. The Professional's interpretations and decisions relating to aesthetic or artistic effect shall be final if not inconsistent with the Contract for Construction.

11.7 Professional Pay Application Activities

The Professional will review applications for payment, including such accompanying data, information, and schedules as the Professional requires, to verify the amounts due to the Builder and shall authorize payment by the Owner to the Builder in writing. After the Work is determined to be Finally Complete by the Professional, the Professional will certify to the Owner in writing that the Builder is entitled to final payment and submit the pay application to the Owner for final approval.

11.8 Professional Relationship to Builder

The duties, obligations, and responsibilities of the Builder under the Contract for Construction shall not be changed, abridged, altered, discharged, released, or satisfied by any duty, obligation, or responsibility of any Professional. The Builder shall not be a third-party beneficiary of any agreement by and between the Owner and any Professional. The duties of the Builder to the Owner shall be independent of, and shall not be diminished by, any duties or obligations of any Professional to the Owner.

11.9 Commissioning Consultant

The Owner may also employ an independent Commissioning consultant to verify performance and/or quality of certain building systems or components. The Builder shall coordinate the Work and its schedule and activities with the Commissioning consultant and shall act upon the observations and recommendations of same, provided such action does not conflict with the Contract for Construction or specific direction by the Owner or the Professional.

The Builder shall perform functional performance testing of items being commissioned under the supervision of the Owner's Commissioning consultant.

ARTICLE 12 - SUBSTANTIAL AND FINAL COMPLETION

12.1 Substantial Completion

12.1.1 When the Builder believes that the Work is Substantially Complete, it shall notify the Owner and the Professional that the Work is ready for a Substantial Completion inspection. The Builder shall endeavor to give the Owner and the

- Professional notice two (2) weeks prior to the predicted Substantial Completion inspection date(s).
- 12.1.2 Upon receipt of notification from the Builder, the Professional will coordinate with the Owner and the Builder date(s) for inspection(s) of the Work to determine whether the Work is Substantially Complete.
- 12.1.3 Prior to such inspections, the Builder shall develop a comprehensive list of known discrepancies, deficiencies, or incomplete Work (i.e., the "punchlist").
- 12.1.4 At inspection(s) to determine whether the Work is Substantially Complete, the Professional, the Commissioning consultant(s), the Owner, and other governing or concerned entities will:
 - (i) inspect the Work;
 - (ii) create or append punchlists;
 - (iii) review the overall status of the Work and any outstanding or deficient issues; and
 - (iv) determine whether Substantial Completion of the Work has occurred.
- 12.1.5 If the Work is determined not to be Substantially Complete, the Work shall be prosecuted until the Work is Substantially Complete and the inspection process shall be repeated at no additional cost to the Owner until the Work is determined to be Substantially Complete. Builder will be responsible for costs of the Owner's consultants associated with premature or failed inspections.
- 12.1.6 On or prior to the required date of Substantial Completion, the Builder shall deliver to Owner reports, extra materials, and other necessary documents and items for the Owner's occupancy and use of the Work for its intended purpose. These documents and items are enumerated on the Owner's website (www.facilities.ufl.edu). The Professional will review such documentation and items, and will inform the Owner and the Builder of any deficiencies.
- 12.1.7 When the Owner, the Builder, and the Professional agree that the Work has passed Substantial Completion inspection(s) and the Builder has produced the required Substantial Completion documentation and items, they shall each sign the Owner's standard Certificate of Substantial Completion form, declaring the Work Substantially Complete and establishing the actual date of Substantial Completion. The Certificate of Substantial Completion shall also be accompanied by a final, consolidated punchlist.
- 12.1.8 If the Work is commissioned through the services of a Commissioning consultant, such Commissioning including functional performance tests shall be completed as a pre-requisite to the Work being declared Substantially Complete, provided Builder shall not be responsible for delays in Commissioning not the fault of Builder.

- 12.1.9 The Builder shall provide the Owner with operation and maintenance documents not less than forty-five (45) calendar days prior to the required date of Substantial Completion to allow adequate time for review, correction, and training of the Owner's personnel prior to Commissioning and the Owner's occupancy of the Project.
- 12.1.10 The Builder shall meet with the Owner's personnel prior to the required date of Substantial Completion to familiarize and train them with respect to maintenance and use of the Project. All training sessions shall be recorded (audio and visual), with copies provided to the Owner.
- 12.1.11 The date of Substantial Completion shall fix the commencement date of warranties and guaranties and allocate between the Owner and the Builder responsibility for security, utilities, damage to the Work, and insurance.

12.2 Final Completion

- 12.2.1 When the Builder believes the Work has achieved Final Completion (including correction of all punchlist items), the Builder shall notify the Owner and the Professional that the Work is ready for Final Completion inspection.
- 12.2.2 Upon receipt of such notification from the Builder, the Professional will coordinate with the Owner and the Builder a date for inspection of the Work to determine whether the Work has achieved Final Completion.
- 12.2.3 At the Final Completion inspection, the Owner and the Professional will:
 - (i) inspect the Work;
 - (ii) determine whether all punchlist items have been satisfactorily completed and corrected;
 - (iii) determine whether the Work complies with (a) the Contract for Construction; (b) applicable laws, statutes, building codes, rules, or regulations of all governmental, public, and quasi-public authorities or Authorities Having Jurisdiction; and (c) applicable installation and workmanship standards;
 - (iv) determine whether required inspections and approvals by the official(s) having or asserting jurisdiction over the Project (including, but not limited to, the AHJ) have been satisfactorily completed; and
 - (v) confirm receipt of the deliverables listed below.
- 12.2.4 If Final Completion has not been achieved, the Builder shall continue to prosecute the Work, and the inspection process shall be repeated at no additional cost to the Owner, until Final Completion is achieved.
- 12.2.5 On or prior to the date of Final Completion, the Builder shall deliver to the Owner the following documentation and items:

- (i) Certificate of Final Completion executed on Owner's standard form;
- (ii) all operation and maintenance manuals not previously produced;
- (iii) one (1) set of as-built plans and specifications;
- (iv) record copies of BIM files as required by the project-specific BIM Execution Plan, if applicable;
- (v) certification and affidavit that all insurance required of the Builder beyond final payment, if any, is in effect and will not be canceled or allowed to expire without notice to the Owner:
- (vi) written consent of the surety(ies), if any, to final payment;
- (vii) full, final, and unconditional waivers of mechanics or construction liens, from each contractor, subcontractor, supplier, or other person or entity who has or might have a claim;
- (viii) full, final, and unconditional certification and affidavit that all of the Builder's obligations to contractors, subcontractors, suppliers, and other third parties for payment for labor, materials or equipment related to the Project have been paid or otherwise satisfied;
- (ix) all written warranties and guarantees relating to the labor, goods, products, materials, equipment, and systems incorporated into the Work, endorsed, countersigned, and assigned as necessary;
- (x) affidavits, releases, bonds, waivers, permits, and other documents necessary for final close-out of Work;
- (xi) a list of any item(s) due but unable to be delivered and the reason for nondelivery; and
- (xii) any other documents reasonably and customarily required or expressly required herein for full and final close-out of the Work, including those items enumerated on the Owner's website (www.facilities.ufl.edu).
- 12.2.6 The Professional will review and determine the sufficiency of all such documentation and items and will immediately inform Owner and the Builder of any deficiencies and omissions.

ARTICLE 13 – BUILDER'S WARRANTIES AND GUARANTEES

13.1 One-Year Warranty

In addition to the warranties and guarantees set forth elsewhere in the Contract for Construction, the Builder, upon request by the Owner or the Professional, shall promptly correct all failures or defects in the Work for a period of one year after the actual date of Substantial Completion, or the date of acceptance by the Owner, whichever is later.

- 13.1.1 The Builder shall schedule, coordinate, and participate in a walk-through inspection of the Work one month prior to the expiration of the one-year correction period, and shall notify the Owner, the Professional, and any necessary subcontractors and suppliers of the date of, and request their participation in, the walk-through inspection. The purpose of the walk-through inspection is to determine if there are defects or failures requiring correction.
- 13.1.2 Should the Builder fail to promptly correct any failure or defect, the Owner may take whatever actions it deems necessary to remedy the failure or defect and the Builder shall promptly reimburse the Owner for any expenses or damages it incurs as a result of the Builder's failure to correct the failure or defect.

13.2 Post-Completion Commissioning Activities

The Builder and its subcontractors shall participate in Commissioning activities following Substantial Completion as prescribed in the Construction Documents, the purpose of which is to confirm and optimize performance of the commissioned systems. Such participation may include the need for the Builder to perform corrective work if deficiencies in the Work are revealed.

13.3 Express Warranties and Guarantees – Builder

In addition to the warranties and guarantees set forth elsewhere herein, the Builder expressly warrants and guarantees to the Owner:

- (i) that the Work will comply with the Construction Documents and all applicable laws, statutes, building codes, rules, and regulations of all governmental, public, and quasi-public authorities or Authorities Having Jurisdiction;
- (ii) that all goods, products, materials, equipment, and systems incorporated into the Work will conform to applicable specifications, descriptions, instructions, drawings, data, and samples;
- (iii) that all goods, products, materials, equipment, and systems incorporated into the Work will be new (unless otherwise specified or permitted) and without apparent damage or defect; of quality equal to or higher than that required by the Construction Documents; and merchantable; and
- (iii) that all management, supervision, labor, and services required for the Work will comply with the Contract for Construction and will be performed in a workmanlike manner.

13.4 Express Warranties and Guarantees – Subcontractors and Suppliers

The Builder shall require that all of its subcontractors and suppliers provide written warranties, guarantees, and other undertakings to the Owner and the Builder in a form identical to the warranties, guarantees, and other undertakings set forth in the Contract for Construction, including the warranties, guarantees, and undertakings set forth in this Article, which warranties, guarantees, and undertakings shall run to the benefit of the Owner as well as the Builder.

13.5 Non-Exclusivity and Survival

The warranties and guarantees set forth in this Article shall be in addition to all other warranties – express, implied, or statutory – and shall survive the Owner's payment,

acceptance, inspection of or failure to inspect the Work, and review of the Construction Documents.

13.6 Non-Limitation

Nothing contained in Paragraph 13.1 shall be construed to establish a period of limitation with respect to the Builder's obligations under the Contract for Construction. Paragraph 13.1 relates only to the Builder's specific obligations with respect to the Work, and has no relationship to the time within which the Builder's contractual obligations under the Contract for Construction may be enforced, nor to the time within which proceedings may be commenced to establish the Builder's liability with respect to any contractual obligations pursuant to Paragraph 13.1 or contained elsewhere herein.

13.7 Commencement of Obligations

Unless otherwise specified, all of the Builder's warranty and guaranty obligations, including the time period(s) for all written warranties and guarantees of specifically designated equipment required by the Construction Documents, shall begin on the actual date of Substantial Completion or the date of acceptance by the Owner, whichever is later.

ARTICLE 14 – OWNER'S DUTIES, OBLIGATIONS, AND RESPONSIBILITIES

14.1 Timely Compensation of Builder

The Owner shall, in a timely manner, compensate the Builder in accordance with the Contract for Construction.

14.2 Owner Review of Documents

The Owner shall review documents prepared by the Builder in a timely manner and in accordance with schedule requirements. Review by the Owner shall be solely for the purpose of determining whether such documents are generally consistent with the Owner's intent. No review of such documents shall relieve the Builder of any of its responsibilities. In addition, the Owner's review of documents for purposes of issuing a building permit shall not relieve the Builder of any of its responsibilities.

14.3 Status of Owner

The Owner shall not have control of, or responsibility for, construction means, methods, techniques, sequences, procedures, or safety precautions and programs in connection with the Work, nor shall the Builder, for any of the foregoing purposes, be deemed the agent of the Owner.

ARTICLE 15 - BUILDER'S COMPENSATION

15.1 Schedule of Values

- 15.1.1 Prior to submitting its first application for payment for the Work, the Builder shall prepare and present to the Owner and Professional for approval a schedule of values (SOV) using the Owner's form.
- 15.1.2 For construction management projects, this SOV shall be based on the draft schedule of values submitted with the GMP proposal, adjusted to account for the final subcontract award amounts.

- 15.1.3 Allowances for un-awarded trade subcontracts may be included in the SOV.
- 15.1.4 The Builder shall not imbalance or artificially inflate any element in the SOV.
- 15.1.5 Upon the Owner's acceptance, the SOV shall be used to process and pay the Builder's payment requests.
- 15.1.6 The Builder shall comply with the Trench Safety Act (Chapter 553, Part VI, Florida Statutes), which requires that builders delineate in their Schedules of Values the cost of compliance with applicable trench safety standards.

15.2 Unit Prices

If any portion of the Construction Price is determined by the application of unit prices, the number of units contained in the Schedule of Values is an estimate only, and compensation to the Builder shall be determined by the actual number of units incorporated in, or required by, the Work.

15.3 Invoicing Procedures

In accordance with the procedures and requirements set forth in the Owner's policies, the Builder shall invoice the Owner and the Owner shall pay the Builder the amount due subject to the following and the Contract for Construction.

- 15.3.1 The Builder shall submit invoices to the Professional requesting payment for labor and services rendered during the preceding thirty calendar days. Each invoice shall contain such detail and be backed up with whatever supporting information the Owner or the Professional requests and shall at a minimum state:
 - (i) the total original Construction Price and total current Construction Price;
 - (ii) the amount due for properly provided labor, materials, and equipment properly incorporated into the Project; and with respect to amounts invoiced for materials or equipment necessary for the Project and properly stored at the Site (or elsewhere if offsite storage is approved in writing by the Owner), be accompanied by written proof that the Owner has title to such materials or equipment and that such material and equipment is fully insured against loss or damage;
 - (iii) a breakdown of the various phases, bid packages, or parts of the Work as related to the Construction Price in accordance with standard Construction Specifications Institute (CSI) format;
 - (iv) the value of the various phases, bid packages, or parts of the Work actually performed;
 - (v) previously invoiced amounts and credit payments made;
 - (vi) the total amount due, less any agreed retainage; and
 - (vii) a summary of change orders to date.

Applications for payment shall also include such lien waivers and other documentation verifying the Builder's payment to subcontractors and suppliers as the Owner or Professional may request.

15.3.2 Goods and materials procured through the Owner Direct Purchase process shall be invoiced separately in accordance with Owner's policies.

15.4 Payment Procedures

- 15.4.1 Within seven (7) days of receipt, the Professional will review the Builder's applications for payment, including such accompanying data, information, and schedules as the Professional requires, to determine the amounts due to the Builder and, based upon such review, together with its inspections of the Work, shall authorize payment by the Owner to the Builder in writing. Such authorization will constitute the Professional's certification to the Owner that:
 - (i) the Work described in the Builder's invoice has progressed to the level indicated and has been performed in accordance with the Contract for Construction;
 - (ii) all necessary and appropriate lien waivers have been submitted;
 - (iii) the "as-built" record documents are current and up-to-date; and
 - (iii) the amount requested is currently due and owing to the Builder.
- 15.4.2 In the case of unit price work, the Professional's recommendations for payment will constitute a final determination of quantities and classifications of such work.

15.5 Owner's Right to Refuse Payment

The Professional's approval of the Builder's invoice shall not preclude the Owner from exercising any of its remedies under the Contract for Construction. In the event of a dispute, payment shall be made within the timeframe(s) prescribed herein for amounts not in dispute, subject to any exceptions claimed by the Owner. The Owner shall have the right to refuse to make payment and, if necessary, may demand the return of all or a portion of the amount previously paid to the Builder due to:

- (i) the Builder's failure to perform the Work in compliance with the requirements of the Contract for Construction or any other agreement between the parties;
- (ii) the Builder's failure to correctly and accurately represent the Work performed in a payment request, or otherwise;
- (iii) the Builder's performance of the Work at a rate or in a manner that, in the Owner's opinion, is likely to result in the Project or any portion of the Project being inexcusably delayed;
- (iv) the Builder's failure to use funds previously paid the Builder by the Owner to pay the Builder's Project-related obligations including, but not limited to, the Builder's subcontractors, materialmen, and suppliers;

- (v) claims made, or likely to be made, against the Owner;
- (vi) loss caused by the Builder or the Builder's subcontractors or suppliers; or
- (vii) the Builder's failure or refusal to perform any of its obligations to the Owner.

15.6 Builder's Right to Refuse Performance for Non-Payment

If – within twenty (20) calendar days of Owner's receipt of the Builder's application for payment properly prepared in accordance with Owner's policies and approved and executed by the Professional – the Owner, without cause or basis hereunder, fails to pay the Builder any amounts then due and payable to the Builder, the Builder shall have the right, in addition to all other rights and remedies contained herein, to cease performance of the Work until receipt of proper payment after first providing fourteen (14) calendar days written notice to the Owner of its intent to cease work.

15.7 Correction of Past Payments

All prior payments, whether based on estimates or otherwise, may be corrected and adjusted in any subsequent payment and shall be corrected and adjusted in the final payment. In the event that any invoice contains a defect or impropriety which would prevent payment by the date due, the Owner shall notify the Builder in writing of such defect or impropriety. Any disputed amounts determined by the Owner to be payable to the Builder shall be due thirty (30) calendar days from the date the dispute is resolved.

15.8 Invoice Warranties and Guarantees

The Builder expressly warrants and guarantees to the Owner that:

- (i) title to all goods, products, materials, equipment, and systems covered by an invoice will pass to the Owner either by incorporation into the Work, or upon receipt of payment by the Builder, whichever occurs first;
- (ii) all goods, products, materials, equipment, and systems covered by an invoice are free and clear of liens, claims, security interests, or encumbrances; and
- (iii) no goods, products, materials, equipment, or systems covered by an invoice have been acquired by the Builder or its subcontractors or suppliers, subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Builder or its subcontractors or suppliers.

15.9 Builder's Signature

The signature of the Builder on any invoice constitutes the Builder's certification to the Owner that (i) the Builder's services listed in the invoice have progressed to the level indicated and have been performed as required by the Contract for Construction; (ii) the Builder has paid its subcontractors and suppliers their proportional share of all previous payments received from the Owner; (iii) the amount requested is currently due and owing; and (iv) all subcontractors performing the Work for which payment is made hold all necessary State of Florida licenses.

15.10 Taxes and Owner Direct Purchase Program

15.10.1 The Builder shall incorporate into the Construction Price, and pay, all sales, consumer, use, and similar taxes for goods, products, materials, equipment, and

- systems incorporated into the Work that were legally required at the time of execution of the Contract for Construction, whether or not yet effective or merely scheduled to go into effect.
- 15.10.2 For construction management projects, the Owner may elect to implement a direct purchase program, whereby eligible materials or equipment included in a subcontractor's bid are purchased by the Owner directly from the supplier in order to achieve sales tax savings.
- 15.10.3 Such direct purchases shall not relieve the Builder and/or its subcontractors of their responsibility to ensure the materials and equipment meet the specifications and requirements of the Contract for Construction.
- 15.10.4 When Builder's Risk insurance is furnished by the Builder (see Article 19), such insurance shall name the Owner as the insured or an additional insured and shall include coverage of such materials in transit or stored offsite. Builder shall in any case be responsible for safeguarding such materials on the project Site on the Owner's behalf.
- 15.10.5 The Owner's written policy on direct purchases shall govern. See www.facilities.ufl.edu.

15.11 Compensation of Builder's Subcontractors and Suppliers

- 15.11.1 Not less than forty-five (45) days after satisfactory completion of their portion of the Work, subcontractors may invoice Builder for remaining unpaid Work, including the full value of the retainage related to such Work less the value of any contested item(s), and provided each such subcontractor has provided Builder with all required close-out documentation. Builder shall include subcontractor pay requests in the Builder's application for payment. No later than ten days (10) after receipt of payment from the Owner, the Builder shall pay each of its subcontractors and suppliers out of the amount received by the Builder on account of such subcontractor's or supplier's portion of the Work, the amount to which each entity is entitled, reflecting percentages actually retained from payments to the Builder on account of such entity's portion of the Work, if any.
- 15.11.2 The Owner shall have no obligation to pay, and shall not be responsible for payments to, the Builder's subcontractors or suppliers. However, the Owner reserves the right, but has no duty, to make payment jointly to the Builder and to any of its subcontractors or suppliers in the event that the Owner becomes aware that the Builder fails to pay or unreasonably withholds payment from one or more of those entities. Such joint check procedure, if employed by the Owner, shall create no rights in favor of any person or entity beyond the right of the named payees to payment of the check and shall not be deemed to commit the Owner to repeat the procedure in the future.

15.12 Retainage

Subject to other provisions herein, and pursuant to Section 255.078, Florida Statutes, Owner will withhold and release retainage from each payment to Builder in accordance with the following:

- 15.12.1 Owner will withhold as retainage from each progress payment made to the Builder an amount equal to ten percent (10%) of the payment until the Work is fifty percent (50%) complete.
- 15.12.2 After the Work is fifty percent (50%) complete, Owner shall reduce the amount of retainage withheld from each subsequent progress payment made to the Builder to five percent (5%) of the amount of the payment.
- 15.12.3 After the Work is fifty percent (50%) complete, the Builder may present to the Owner a payment request for up to one-half of the retainage held by Owner, and Owner shall make payment to the Builder unless the Owner has grounds for withholding the payment of retainage (e.g., all or a portion of the retainage is the subject of a good faith dispute or a claim brought by Owner).
- 15.12.4 After the Work is fifty percent (50%) complete, the Builder may elect to withhold retainage from payments to its subcontractors at a rate higher than five percent (5%). The specific amount to be withheld must be determined on a case-by-case basis and must be based on the Builder's assessment of the subcontractor's past performance, the likelihood that such performance will continue, and the Builder's ability to rely on other safeguards. The Builder shall notify the subcontractor, in writing, of its determination to withhold more than five percent (5%) of the progress payment and the reasons for making that determination, and the Builder may not request the release of such retained funds from the Owner.

15.13 Final Payment

Prior to being entitled to receive final payment, and as a condition precedent thereto, the Builder must achieve Final Completion. The Owner shall, subject to its rights set forth above in this Article, make final payment of all sums due the Builder within twenty (20) calendar days of Owner's receipt of the Builder's application properly prepared in accordance with Owner's policies and approved and executed by the Professional.

ARTICLE 16 - SCHEDULE REQUIREMENTS

16.1 Construction Schedule

The Construction Schedule shall include all pertinent dates and periods for timely completion of the Work.

- 16.1.1 Unless otherwise directed and approved by the Owner, the Builder shall within fourteen (14) calendar days of the "Notice To Proceed" prepare a critical path method schedule with separate divisions for each major portion of the Work or operations. The Construction Schedule shall include and properly coordinate dates for performance of all divisions of the Work, including completion of offsite requirements and tasks, so that the Work can be completed in a timely and orderly fashion consistent with the required dates of Substantial Completion and Final Completion. When preparing the schedule, Builder shall consider and account for Owner's operational needs on the Site and adjacent thereto, particularly with regard to utility interruptions and access restrictions.
- 16.1.2 The Construction Schedule shall depict all activities necessary for, or incidental to, performance of the Work, showing the logic (sequence, dependency), duration,

and "float" of each activity, with the critical path highlighted and shall include (i) the required dates of commencement, Substantial Completion, and Final Completion; (ii) any guideline and milestone dates required by the Owner; (iii) any applicable subcontractor and supplier sub-schedules; (iv) coordination with the submittal schedule which allows sufficient time for review of documents and submittals; (v) allowances for procurement, fabrication, and delivery of materials, especially "long lead" items; (vi) the complete sequence of construction by activity, with dates for beginning and completion of each element of construction; (vii) the time required for testing, inspections, and Commissioning, if applicable; (viii) time for schedule constraints, such as holidays and events on Owner's property and adverse weather conditions which are normal and may be reasonably anticipated; and (ix) required decision dates.

- 16.1.3 By reviewing the Construction Schedule, the Owner and Professional do not assume any of the Builder's responsibility (i) that the Construction Schedule be coordinated or complete; or (ii) for timely and orderly completion by the required dates of Substantial Completion, Final Completion, or any milestone dates required by the Owner.
- 16.1.4 The Builder shall periodically and in all instances when the Builder anticipates that performance of the Work will be delayed or in fact has been delayed, but not less frequently than monthly, prepare a revised Construction Schedule and show actual progress of the Work through the revision date, projected completion of each remaining activity, activities modified since previous submittal, major changes in scope, and other identifiable changes. The updated Construction Schedule shall be accompanied by a narrative report which (i) states and explains any modifications of the critical path schedule, including any changes in logic; (ii) defines problem areas and lists areas of anticipated delays; (iii) explains the anticipated impact the problems and delays will have on the schedule and scheduled activities; (iv) reports corrective action taken or proposed; and (v) states how problems anticipated by projections shown on the schedule will be resolved to avoid delay in delivering the Work by the required dates of Substantial Completion and Final Completion, and other milestone dates required by the Owner, if any.

16.2 Delay in Performance

If at any time the Builder anticipates that performance of the Work will be delayed or in fact has been delayed, the Builder shall (i) immediately notify the Owner and Professional of the probable cause of and effect from the delay, and possible alternatives to minimize the delay; and (ii) take all corrective actions reasonably necessary to deliver the Work by the required dates of Substantial Completion and Final Completion, and other milestone dates required by the Owner, if any.

16.3 Early Completion

The Builder may attempt to achieve Substantial Completion before the required date of Substantial Completion. However, such planned early completion shall be for the Builder's sole convenience and shall not create any additional Builder rights or Owner obligations under the Contract for Construction, nor shall it change the required dates of Substantial Completion or Final Completion. The Owner shall not pay the Builder any additional compensation for achievement of Substantial Completion or Final Completion prior to the required dates nor will the Owner owe the Builder any compensation should the Owner

cause the Builder not to achieve Substantial Completion earlier than the required date of Substantial Completion or Final Completion earlier than the required date of Final Completion.

16.4 Document Review

The Builder shall provide documents to the Owner and Professional(s) for review in accordance with schedule requirements and with sufficient lead time to allow the Owner and Professional reasonable time for review.

ARTICLE 17 - TIME OF PERFORMANCE

17.1 Time of the Essence

The parties hereto mutually understand and agree that time is of the essence in the performance of the Contract for Construction and that the Owner will incur damages if the Work is not completed on time. The Builder shall at all times carry out its duties and responsibilities as expeditiously as possible and shall begin, perform, and complete its services so that (i) the Work progresses in accordance with the Construction Schedule; (ii) the Work is Substantially Completed by the required date of Substantial Completion; and (iii) the Work is Finally Complete by the date of Final Completion.

17.2 Modifications of Time for Performance

The Builder may submit delay claims or otherwise propose modifications to the dates for Substantial Completion, Final Completion, or other milestones required by the Owner, if any. However, such claims shall be submitted in writing and supported by evidence that the delay was excusable, critical, and, if applicable, compensable. The Builder shall determine and promptly notify the Owner and the Professional in writing when it believes such adjustments are necessary, but no such adjustments shall be effective unless approved in writing by the Owner and Professional.

- 17.2.1 Extensions of time will be granted only to the extent that equitable time adjustments for the impacted activity or activities exceed the total float along the network paths involved. Such claims shall include an estimate of cost, if any, and substantiate the projected impact on the overall critical path schedule of the Project. In the case of a continuing delay, only one claim is necessary.
- 17.2.2 Modification(s) of the required dates of Substantial Completion or Final Completion shall be accomplished only by duly authorized and accepted change order stating the new date(s) with specificity and reciting that all references in the Contract for Construction to the required dates of Substantial Completion or Final Completion shall thereafter refer to the date(s) as modified, and all rights and obligations, including the Builder's liability for actual damages, delay damages and liquidated damages, shall be determined in relation to the date(s) as modified.
- 17.2.3 If adverse weather conditions are the basis for a delay claim, the claim shall be documented by data substantiating that: the weather conditions were abnormal for the given location and period of time; the weather conditions could not have been reasonably anticipated; and that the weather conditions had an adverse effect on the overall critical path of the schedule. Delays caused by adverse weather conditions are not compensable.

17.3 Compensable Delay

If the Builder is delayed at any time in the progress or performance of the Work by (i) acts or omissions of the Owner or Professional; (ii) major changes ordered by the Owner in the scope of Work; or (iii) any other cause which the Owner determines may justify the compensation of the Builder for the delay, the Builder's compensation shall be equitably adjusted to cover the Builder's actual and direct increased costs attributable to such delay.

17.4 Excusable Delay

If the Builder is delayed at any time in the progress or performance of the Work by (i) acts or omissions of the Owner or Professional; (ii) major changes ordered by the Owner in the scope of Work; (iii) fire; (iv) unusual delays in transportation; (v) adverse abnormal weather conditions that Builder could not have reasonably anticipated; (vi) unavoidable casualties; (vii) causes beyond the Builder's control which the Owner agrees in writing are justifiable; or (viii) any other cause that the Owner determines may justify the delay. Owner may extend the time for performance to allow for a demonstrated increase in overall construction duration, which may or may not be equal to the length of such delay, but only if (a) such delay is not concurrent with other, inexcusable delay(s); (b) such delay impacts the critical path; (c) such delay is not in any way caused by default or collusion on the part of the Builder or by any cause which the Builder could reasonably control or circumvent; (d) the Builder would have otherwise been able to timely perform all of its obligations under the Contract for Construction but for such delay; and (e) immediately but not later than fourteen (14) calendar days after the beginning of any such delay the Builder gives notice of its delay claim to the Owner. Such delay claims shall be submitted as a change order proposal. All such claims will be reviewed by the Professional within seven (7) days of submission. Delay caused by labor disputes, picketing, employee boycotts, or the like which directly or indirectly involves employees of the Builder or its subcontractors and suppliers is not the responsibility of the Owner and will result in time extensions only if agreed to in writing by the Owner at the time such events arise.

17.5 Critical Delay

Additional work, unforeseen conditions, and other factors may result in one or more schedule activities being delayed. If, however, the critical path is not impacted and the overall construction duration and completion date(s) remain the same, the delay is not critical.

ARTICLE 18 - PROPRIETARY DOCUMENTS AND CONFIDENTIALITY

18.1 Nature and Use of Information

All information, documents, and electronic media furnished by the Owner to the Builder (i) belong to the Owner; (ii) are proprietary and confidential; (iii) are furnished solely for use on the Owner's Project; (iv), shall be kept confidential by the Builder; and (v) shall not be used by the Builder on any other project or in connection with any other person or entity, unless disclosure or use thereof in connection with any matter other than services rendered to the Owner hereunder is specifically authorized in writing by the Owner in advance or is required by law. The Owner hereby grants to the Builder a limited license to use and reproduce applicable portions of the Construction Documents necessary for execution of the Work. All copies made under this license shall bear the statutory copyright notice, if any, shown on the documents.

18.2 Ownership of Information

All information, documents, and electronic media prepared by or on behalf of the Builder for the Project are the sole property of the Owner, free of any retention rights of the Builder. The Builder hereby grants to the Owner an unconditional right to use, for any purpose whatsoever, any information, documents or electronic media prepared by or on behalf of the Builder for the Project, free of any copyright claims, trade secrets, or other proprietary rights with respect to such documents.

18.3 Disclosure of Information

The Builder shall not disclose any information it receives from the Owner to any other person or entity except to the extent necessary to allow it to perform its duties under the Contract for Construction or as required by law.

18.4 Instructions to Employees

Because it is difficult to separate proprietary and confidential information from that which is not, the Builder shall instruct its employees and agents to regard all information not in the public domain as information that is proprietary and confidential.

18.5 Non-Publication

Submission or distribution of documents to meet official regulatory requirements or for other required purposes in connection with the Project is not to be construed as publication in derogation of the Owner's common law copyrights or other reserved rights.

ARTICLE 19 – INSURANCE REQUIREMENTS

19.1 Basic Insurance Requirements

The Builder shall obtain and maintain the policies of insurance set forth in this Article with a company or companies lawfully authorized to do business in Florida, and with an A.M. Best Rating of no less than A, XV. All insurance policies shall be issued and countersigned by duly authorized representatives of such companies and shall be written on ISO standard forms or their equivalents. The insurance policies shall require that the insurer shall provide at least thirty (30) days written notice to Owner if a policy is to be canceled or the coverage thereunder reduced before the expiration date thereof and Builder shall provide Owner with a copy of an endorsement to the policy evidencing the same. The insurance required hereunder shall be carried by Builder at least until the Project has achieved Final Completion and has been accepted by Owner. At the Owner's sole discretion, the Owner may require the Builder and/or its subcontractors to carry additional types and amounts of insurance it deems appropriate given the nature and size of a particular Project. In such case, Owner shall notify Builder within a reasonable period of time prior to the commencement of the Work of such additional requirements.

19.1.1 Liability Insurance

19.1.1.1 **Commercial General Liability Insurance**.

The Builder shall obtain and maintain a commercial general liability insurance policy with limits of not less than the following:

- \$1,000,000 each occurrence and \$2,000,000 project aggregate for bodily injury, property damage, personal and advertising injury liability
- \$1,000,000 each occurrence and \$2,000,000 project aggregate for products and completed operations liability
- \$50,000 fire legal liability

Builder's commercial general liability policy must include coverage for contractual liability, independent contractors, and contain no exclusions for explosion, collapse, or underground damage. The University of Florida Board of Trustees and its officials, employees, and volunteers shall be covered as an additional insured with a form *CG-20-26-04-13 Additional Insured – Designated Person or Organization* or equivalent endorsement. The Builder's insurance coverage shall be primary insurance with respect to the Owner, its officials, employees, and volunteers. Any insurance or self-insurance maintained by the Owner, its officials, employees, or volunteers shall be in excess of Builder's insurance and shall be non-contributory. Builder's insurance policy shall protect Builder from claims which may arise whether such claims may arise out of the operations of the Builder or by anyone directly or indirectly employed by the Builder. If Builder is performing asbestos-related work, the policy shall also contain a pollution liability endorsement with limits of not less than \$1,000,000 per occurrence.

19.1.1.2 **Automobile Liability Insurance**.

Builder shall obtain and maintain automobile liability coverage, including coverage for all Owned vehicles, hired, and non-owned vehicles, for bodily injury and property damage with not less than a \$500,000 combined single limit for each accident. The University of Florida Board of Trustees shall be covered as an additional insured with a form *CA-20-48* or similar endorsement on such policy.

19.1.1.3 Deductibles.

Deductibles under these liability policies shall not exceed \$25,000. Owner shall not be liable for amounts that may represent a deductible in any insurance policy. The payment of such deductible shall be the sole responsibility of the Builder and/or subcontractor providing such insurance.

19.1.2 Worker's Compensation

Builder shall obtain and maintain worker's compensation coverage applicable to all Builder's employees at statutory limits in compliance with applicable state and federal laws. If any operations are to be undertaken on or about navigable waters, coverage must be included in accordance with the US Longshoremen & Harbor Workers Act.

Such coverage shall include employer's liability limits of not less than \$100,000 each accident, \$500,000 disease policy limit, and \$100,000 disease each employee.

The Builder and its insurance carrier waive all subrogation rights against the Owner for all losses, damages, and/or events that occur while the Contract for Construction is in effect, regardless of whether suit is actually brought during such period or at a later date. The Owner requires all worker's compensation policies to be endorsed with form *WC00-03-13 Waiver of Right to Recover from Others* or equivalent.

19.1.3 Builder's Risk Insurance

The Builder shall obtain and maintain builder's risk insurance, at replacement cost, covering the full value of the construction being performed, including where applicable, the existing structure. Such policy shall be written on an all-risk

coverage form including flood and windstorm coverage, and shall include coverage for reasonable compensation for the Professional's services and expenses required as a result of such insured loss. This insurance shall insure the interests of the Builder, subcontractors, and sub-subcontractors in the Work. Property covered by the insurance shall include temporary building(s) or structure(s) at the Project Site, other than any of Builder's office trailer(s). In addition, such insurance shall cover portions of the Work stored offsite (if Owner approves such storage) and materials and equipment in transit. The University of Florida Board of Trustees shall be named as an additional insured on such policy. The policy shall include a waiver of subrogation endorsement and a severability of interests endorsement, and shall also include a waiver of occupancy clause allowing the Owner to occupy the subject facility during construction, if necessary.

The deductible under the policy shall not exceed \$25,000. Owner shall not be liable for amounts that may represent a deductible in any insurance policy. The payment of such deductible shall be the sole responsibility of the Builder.

When the Work includes the repair, removal, installation, and/or testing of live steam boilers, valves, pipes, or lines, or mechanized, pressurized, or electrical equipment, then such insurance shall include boiler and machine/equipment breakdown coverage, written on an ISO form or its equivalent.

A loss or losses insured under this insurance policy shall be adjusted by the Builder and its insurance company. The Builder shall repair or replace the damaged property with the proceeds from the builder's risk policy. The Builder shall be responsible for all damages and necessary repairs whether or not the loss is covered by the builder's risk policy.

Alternatively, the Owner may elect to obtain and directly pay for Builder's Risk insurance through Owner's statewide program.

19.2 Certificates of Insurance

- 19.2.1 Certificates of insurance and/or evidence of insurance for all insurance policies required under this Article, together with certified copies of the insurance policies (including required endorsements), shall be filed with and approved by the Owner prior to commencement of the Work.
- 19.2.2 Such certificates of insurance shall be dated and show the name of the insurer, the number of the policy, its effective date, and its termination date.
- 19.2.3 Certificates of insurance evidencing the renewal of all insurance required to be carried under this Article shall be provided to Owner at least thirty (30) days prior to the date each applicable insurance policy is scheduled to expire.
- 19.2.4 Certificates must provide for thirty (30) days' prior written notice to Owner of any policy cancellation or material change in coverage.
- 19.2.5 Owner's review, inspection, or approval of Builder's insurance shall not relieve Builder of its responsibility for providing the insurance required hereby nor constitute a waiver of any such requirements.

19.2.6 Owner will not issue a "Notice To Proceed" for the Work until Builder has complied with this Article and Builder shall not be entitled to an extension of time or to compensation which may result from delays in the issuance of a "Notice to Proceed" caused by its failure to provide the foregoing certificates and policies in a timely manner.

19.3 Effect of Insurance

Compliance with insurance requirements shall not relieve the Builder of any responsibility to indemnify the Owner for any liability to the Owner as specified in any other provision of the Contract for Construction, and the Owner shall be entitled to pursue any remedy in law or equity if the Builder fails to comply with the contractual provisions of the Contract for Construction. Indemnity obligations specified elsewhere in the Contract for Construction shall not be negated or reduced by virtue of any insurance carrier's (i) denial of insurance coverage for the occurrence or event which is the subject matter of the claim; or (ii) refusal to defend any named insured.

19.4 Waiver of Subrogation

The Builder's insurers shall agree to waive all rights of subrogation against the Owner and the Owner's Related Parties. The Builder hereby releases and discharges the Owner and the Owner's Related Parties of and from all liability to the Builder, and to anyone claiming by, through, or under the Builder, by subrogation or otherwise, on account of any damage or loss, whether to persons or property, however caused.

ARTICLE 20 - GENERAL BOND REQUIREMENTS

20.1 General Bond Requirements

Recognizing the Project is a public project with a Construction Price which exceeds \$200,000, and as such is required to be bonded pursuant to 255.05, Florida Statutes, the Builder shall furnish payment and performance bonds on Owner's standard form covering the full and faithful performance of the Contract for Construction and the payment of obligations arising hereunder. Such bonds shall, in all respects, comply with Section 255.05, Florida Statutes.

20.2 Delivery of Bonds

The Builder shall deliver required bonds and powers of attorney to the Owner prior to commencement of the Work.

20.3 Requests for Copies of Bonds

Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract for Construction, the Builder shall promptly furnish a copy of the bonds or shall permit a copy to be made.

ARTICLE 21 – OWNER'S RIGHT TO STOP WORK

21.1 Cease and Desist Order

If the Builder fails or refuses to perform or fails to correct defective Work as required, or persistently fails to carry out the Work in accordance with the Contract for Construction,

the Owner may, by written notice, order the Builder to cease and desist in performing the Work or any portion of the Work until the cause for the order has been eliminated to the satisfaction of the Owner. Upon receipt of such instruction, the Builder shall immediately cease and desist as instructed by the Owner and shall not proceed further until the cause for the Owner's order has been corrected, no longer exists, or the Owner instructs that the Work may resume.

- 21.1.1 The Builder shall not be entitled to an adjustment in the time for performance or the Construction Price under this clause since such stoppages are considered to be the fault of the Builder.
- 21.1.2 The right of the Owner to stop Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Builder or others.
- 21.1.3 In the event the Owner issues instructions to cease and desist, and in the further event that the Builder fails and refuses with seven calendar days to provide adequate assurance to the Owner that the cause of such instructions will be eliminated or corrected, then the Owner shall have the right, but not the obligation, to carry out the Work or any portion of the Work with its own forces, or with the forces of another builder, and the Builder shall be responsible for the cost of performing such Work by the Owner.
- 21.1.4 The rights set forth herein are in addition to, and without prejudice to, any other rights or remedies the Owner may have against the Builder.

ARTICLE 22 – TERMINATION OR SUSPENSION OF CONTRACT FOR CONSTRUCTION

22.1 Termination for Cause by Owner

- 22.1.1 The Owner may terminate the Contract for Construction for cause if the Builder materially breaches the Contract for Construction by:
 - (i) refusing, failing, or being unable to properly manage or perform on any Project;
 - (ii) refusing, failing, or being unable to supply the Project with sufficient numbers of workers, properly skilled workers, proper materials to maintain applicable schedules;
 - (iii) refusing, failing, or being unable to make prompt payment to subcontractors or suppliers;
 - (iv) disregarding laws, ordinances, rules, regulations, or orders of any public authority or quasi-public authorities or Authorities Having Jurisdiction;
 - (v) refusing, failing, or being unable to substantially perform in accordance with the terms of the Contract for Construction as determined by the Owner, or as otherwise defined elsewhere herein; or

- (vi) refusing, failing, or being unable to substantially perform in accordance with the terms of any other agreement between the Owner and Builder.
- 22.1.2 Upon the occurrence of any of the events described in Paragraph 22.1.1, the Owner may give written notice to the Builder setting forth the nature of the default and requesting cure within seven calendar days from the date of notice. At any time after issuance of such notice, if the Builder fails to initiate the cure or if the Builder fails to expeditiously continue such cure until complete, the Owner may give written notice to the Builder of immediate termination, and the Owner, without prejudice to any other rights or remedies, may take any or all of the following actions:
 - (i) complete all or any part of the Work, including supplying workers, material and equipment which the Owner deems expedient to complete the Work;
 - (ii) contract with others to complete all or any part of the Work, including supplying workers, material, and equipment which the Owner deems expedient to complete the Work;
 - (iii) take such other action as is necessary to correct such failure;
 - (vi) take possession of all materials, tools, construction equipment, and machinery on the Site owned or leased by the Builder;
 - (v) directly pay the Builder's subcontractors and suppliers compensation due to them from the Builder;
 - (vi) finish the Work by whatever method the Owner may deem expedient; and
 - (vii) require the Builder to assign the Builder's right, title and interest in any or all of Builder's subcontracts or orders to the Owner.
- 22.1.3 If the Owner terminates the Contract for Construction for cause, and the Owner takes possession of all materials, tools, construction equipment, and machinery on the Site owned or leased by the Builder, the Builder's compensation shall be increased by fair payment, either by purchase or rental at the election of the Owner, for any materials, tools, construction equipment, and machinery items retained, subject to the Owner's right to recover from the Builder the Owner's damages resulting from the termination.
- 22.1.4 If the Owner terminates the Contract for Construction for cause, and it is subsequently determined by a court of competent jurisdiction that such termination was without cause, then in such event, said termination shall be deemed a termination for convenience as set forth in Paragraph 22.3.

22.2 Termination for Cause by Builder

22.2.1 The Builder may terminate the Contract for Construction for cause if the Owner materially breaches the Contract for Construction by:

- (i) refusing, failing, or being unable to make prompt payment to the Builder without just cause;
- (iv) disregarding laws, ordinances, rules, regulations or orders of any public authority of quasi-public authority or Authorities Having Jurisdiction; or
- (v) refusing, failing, or being unable to substantially perform in accordance with the terms of the Contract for Construction.
- 22.2.2 Upon the occurrence of any of the events described in Paragraph 22.2.1, the Builder may give written notice to the Owner setting forth the nature of the default and requesting cure within seven calendar days from the date of notice. If the Owner fails to cure the default within seven calendar days, the Builder, without prejudice to any rights or remedies, may give written notice to the Owner of immediate termination.

22.3 Termination or Suspension for Convenience

The Owner may at any time give written notice to the Builder terminating the Contract for Construction or suspending the Project, in whole or in part, for the Owner's convenience and without cause. If the Owner suspends the Project for convenience, the Builder shall immediately reduce its staff, services and outstanding commitments in order to minimize the cost of suspension.

22.4 Builder's Compensation When Builder Terminates for Cause or Owner Terminates for Convenience

If the Contract for Construction is (i) terminated by the Builder pursuant to Paragraph 22.2; (ii) terminated by the Owner pursuant to Paragraph 22.3; or (iii) suspended more than three months by the Owner pursuant to Paragraph 22.3, the Owner shall pay the Builder specified amounts due for Work actually performed prior to the effective termination date and reasonable costs associated with termination. The Owner may agree to additional compensation, if any, due to the Builder. Absent agreement on the additional amount due the Builder, the Owner shall pay the Builder:

- (i) reasonable costs incurred in preparing to perform the terminated portion of the Work, and in terminating the Builder's performance, plus a fair and reasonable allowance for overhead and profit thereon (such profit shall not include anticipated profit or consequential damages); provided, however, that if it appears that the Builder would not have profited or would have sustained a loss if the Work had been completed, no profit shall be allowed or included, and the amount of compensation shall be reduced to reflect the anticipated rates of loss, if any; and
- (ii) reasonable costs of settling and paying claims arising out of the termination of subcontracts or supplier orders. These costs shall not include amounts paid in accordance with other provisions hereof.

22.5 Builder's Compensation When Owner Terminates for Cause

If the Contract for Construction is terminated by the Owner for cause pursuant to Paragraph 22.1, no further payment shall be made to the Builder until Final Completion of the Project. At such time, the Builder shall be paid the remainder of the Construction Price less all costs and damages incurred by the Owner as a result of the default of the Builder,

including liquidated damages applicable thereto. The Builder shall additionally reimburse the Owner for any additional costs or expenses incurred.

22.6 Limitation on Termination Compensation

Irrespective of the reason for termination or the party terminating, the total sum paid to the Builder shall not exceed the Construction Price, as properly adjusted, reduced by the amount of payments previously made and penalties or deductions incurred pursuant to any other provision of the Contract for Construction, and shall in no event include duplication of payment.

22.7 Builder's Responsibility upon Termination

Irrespective of the reason for termination or the party terminating, if the Contract for Construction is terminated, the Builder shall, unless notified otherwise by the Owner,

- (i) immediately stop work;
- (ii) terminate outstanding orders and subcontracts;
- (iii) settle the liabilities and claims arising out of the termination of subcontracts and orders; and
- (iv) transfer title and deliver to the Owner such completed or partially completed Work, and, if paid for by the Owner, materials, equipment, parts, fixtures, information and such contract rights as the Builder has.

22.8 Lack of Duty to Terminate

The right to terminate or suspend the Work shall not give rise to a duty on the part of either the Owner or the Builder to exercise that right for the benefit of the Owner, the Builder or any other persons or entities.

22.9 Limitation on Termination Claim

If the Builder fails to file a claim within one year from the effective date of termination, the Owner shall pay the Builder only for services actually performed and expenses actually incurred prior to the effective termination date.

ARTICLE 23 - DISPUTE RESOLUTION

23.1 Mutual Discussion

In case of any dispute, claim, question or disagreement arising from or relating to the Project or arising out of the Contract for Construction or the breach thereof, the parties shall first attempt resolution through mutual discussion.

23.2 Facilitative Mediation

If the parties cannot resolve any dispute, claim, question, or disagreement arising from or relating to the Project or arising out of the Contract for Construction or the breach thereof through mutual discussion, the parties may in good faith participate in private, non-binding facilitative mediation seeking a just and equitable solution satisfactory to all parties.

- 23.2.1 All parties to a mediation shall promptly provide all other parties to the mediation with copies of essential documentation relevant to the support or defense of the matter being mediated.
- 23.2.2 The parties shall not be required to mediate for a period greater than ninety-one calendar days unless otherwise agreed to in writing by the parties. The parties shall share equally any administrative costs and fees of such proceedings, but shall each be responsible for their own expenses otherwise incurred.
- 23.2.3 In the event that the statute of limitations would run during the required mediation period, either party may institute litigation so as to avoid the running of such statute upon the condition that such party immediately seek a stay of such litigation pending the conclusion of the mediation period.
- 23.2.4 During the course of mediation, any party to the mediation may apply for injunctive relief from any court of competent jurisdiction until the mediation period expires or the dispute is otherwise resolved.
- 23.2.5 The Owner, the Professional, the Builder, and any other parties involved in any way in the design or construction of the Project are bound, each to each other, by this requirement to mediate prior to commencement of any litigation or administrative action, provided that they have signed the Contract for Construction or an agreement that incorporates the Contract for Construction by reference or signed any other agreement which binds them to mediate. Each such party agrees that it may be joined as an additional party to a mediation involving other parties under any such agreement. In the case where more than one mediation is begun under any such agreement and any party contends that the mediations are substantially related, the mediations may be conducted by the mediator selected in the first mediation which was commenced.
- 23.2.6 The mediation shall be conducted in Alachua County, Florida, unless agreed otherwise by the parties.

23.3 Conflicting Dispute Resolution Provisions

Neither party to the Contract for Construction shall enter into any contract with regard to the Project which directly or indirectly gives the right to resolve any dispute with, involving, or affecting the other to any other person or legal entity which is in conflict with the dispute resolution procedures required by this Article.

23.4 Arbitration Preclusion

In case of a dispute relating to the Project, or arising out of the Contract for Construction, no party to the Contract for Construction shall be required to participate in or be bound by, any arbitration proceedings.

23.5 Performance during Dispute Resolution

The Owner and the Builder agree that pending the resolution of any dispute, controversy, or question, the Owner and the Builder shall each continue to perform their respective obligations without interruption or delay, and the Builder shall not stop or delay the performance of the Work.

23.6 Litigation/Administrative Action

Disputes, claims, questions or disagreements involving monetary claims of \$200,000.00 or less may be conducted, at the Owner's option, pursuant to the Administrative Procedures Act, Chapter 120 Florida Statutes. All other claims, disputes and other matters shall be determined under the judiciary system of the State of Florida.

ARTICLE 24 - DAMAGES AND REMEDIES

24.1 Builder's Repair

The Builder shall, at its expense, promptly correct, repair, or replace all goods, products, materials, systems, labor and services which do not comply with the warranties and guarantees set forth in the Contract for Construction, or any other applicable warranty or guarantee.

24.2 Reimbursement

The Builder shall promptly reimburse the Owner for any expenses or damages incurred by the Owner as a result of (i) the Builder 's failure to substantially perform in accordance with the terms of the Contract for Construction; (ii) deficiencies or conflicts in the Construction Documents attributable to the Builder or of which the Builder was or should have been aware; (iii) breach of the warranties and guarantees set forth in the Contract for Construction or any other applicable warranty or guarantee; or (iv) other acts or omissions of the Builder. Reimbursements to the Owner made in accordance with this Article are separate and distinct from the assessment of liquidated damages, if any, as defined elsewhere in the Contract for Construction.

24.3 General Indemnity

Pursuant to Section 725.06(2), Florida Statutes, the Builder shall indemnify and hold Owner (including its officers and employees) and Owner's Related Parties harmless from and against all liabilities, damages, losses, and costs, including but not limited to, reasonable attorney's fees, to the extent caused by the negligence, recklessness, or intentional wrongful conduct of the Builder and persons employed or utilized by the Builder in the performance of the Work or under the Contract for Construction.

24.4 Intellectual Property Indemnity

To the fullest extent permitted by law, the Builder shall defend, protect, hold harmless, and indemnify the Owner and Owner's Related Parties from and against any and all liability, loss, claims, demands, suits, costs, fees and expenses (including actual fees and expenses of attorneys, expert witnesses, and other consultants), by whomsoever brought or alleged, for infringement of patent rights, copyrights, or other intellectual property rights, except with respect to designs, processes or products of a particular manufacturer expressly required by the Owner or Professional(s) in writing. However, if the Builder has reason to believe the use of a required design, process, or product is an infringement of a patent, copyright, or other intellectual property right, the Builder shall defend, protect, hold harmless, and indemnify the Owner and Owner's Related Parties as stated above, unless the Builder promptly notifies the Owner of that belief.

24.5 Non-Exclusivity of Owner's Remedies

The Owner's selection of one or more remedies for breach of the Contract for Construction contained herein shall not limit the Owner's right to invoke any other remedy available to the Owner under the Contract for Construction or by law.

24.6 Waiver of Damages

The Builder shall not be entitled to, and hereby waives, any monetary claims for or damages arising from or related to, lost profits, lost business opportunities, unabsorbed overhead, or any indirect or consequential damages.

ARTICLE 25 - MISCELLANEOUS PROVISIONS

25.1 Integration

The Contract for Construction represents the entire and integrated agreement between the Owner and the Builder, and supersedes all prior negotiations, representations or agreements, either written or oral, for the Project. The Contract for Construction may be amended only by written instruments signed by both the Owner and the Builder.

25.2 Severability

If any provision of the Contract for Construction, or the application thereof, is determined to be invalid or unenforceable, the remainder of that provision and all other provisions shall remain valid and enforceable.

25.3 Waiver

No provision of the Contract for Construction may be waived except by written agreement of the parties. A waiver of any provision on one occasion shall not be deemed a waiver of that provision on any subsequent occasion, unless specifically stated in writing. A waiver of any provision shall not affect or alter the remaining provisions of the Contract for Construction.

25.4 Strict Compliance

No failure of the Owner to insist upon strict compliance by the Builder with any provision of the Contract for Construction shall operate to release, discharge, modify, change or affect any of the Builder's obligations.

25.5 Third-Party Beneficiaries

The Contract for Construction shall inure solely to the benefit of the parties hereto and their successors and assigns, and, except as otherwise specifically provided in the Contract for Construction, nothing contained in the Contract for Construction is intended to or shall create a contractual relationship with, or any rights or cause of action in favor of, any third party against either the Owner or the Builder.

25.6 Assignment of Anti-Trust Claims

In consideration for the Contract for Construction, the Builder hereby conveys, sells, assigns and transfers to the Owner all of its right, title and interest in and to any and all causes of action it may now have or may hereafter acquire under the antitrust laws of the United States and the State of Florida for price fixing, relating to the goods or services purchased or acquired by the Owner under the Contract for Construction.

25.7 Drug Free and Tobacco-Free Workplace

Pursuant to 440.102(15), Florida Statutes, Builder shall implement, and cause its applicable subcontractors to implement, a drug-free workplace program. Additionally, the Builder shall enforce the Owner's tobacco-free policy.

25.8 Survival

All provisions of the Contract for Construction which contain continuing obligations shall survive its expiration or termination.

25.9 Independent Contractor

Builder is an independent contractor to Owner.

25.10 Public Records

Any books, documents, records, correspondence, or other information kept or obtained by the Owner or furnished by Builder to Owner in connection with the services contemplated herein are property of Owner.

- 25.10.1 Builder acknowledges and agrees that any and all such books, documents, records, correspondence or other information may be public records under Chapter 119, Florida Statutes
- 25.10.2 Builder agrees to promptly comply with any order of a Court having competent jurisdiction that determines that records maintained by Builder are "public records," which must be available to the public.
- 25.10.3 Builder acknowledges and agrees that any and all such books, documents, records, correspondence, or other information may also be subject to inspection and copying by members of the public pursuant to Chapter 119, Florida Statutes.
- 25.10.4 The Contract for Construction may be unilaterally canceled by the Owner for refusal by the Builder to allow public access to all documents, papers, letters, or other material subject to the provisions of Chapter 119, Florida Statutes, and made or received by the Builder in conjunction herewith.

25.11 Governing Law and Venue

The Contract for Construction shall be governed by, and construed under, the laws of the State of Florida, without regard to its choice of law provisions, and venue shall lie in the courts of Alachua County, Florida.

25.12 Sovereign Immunity

Builder acknowledges and agrees that nothing contained in the Contract for Construction shall be construed or interpreted as (i) denying to Owner any remedy or defense available to it under the laws of the State of Florida; (ii) consent of the Owner or the State of Florida or their agents and agencies to be sued; or (iii) a waiver of sovereign immunity of the Owner or of the State of Florida beyond the limited waiver provided in section 768.28, Florida Statutes.

division 01

GENERAL REQUIREMENTS

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Conformed Documents [11.01.2022]

SECTION 01 10 00 - PROJECT SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Owner-furnished products.
 - 4. Contractor-furnished products.
 - Access to site.
 - 6. Coordination with adjacent campus occupants.
 - 7. Work restrictions.
 - Specification and drawing conventions.

B. Related Section:

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

1.3 PROJECT INFORMATION

- A. Project Identification: UF IFAS NFREC Building 8003 Remodel; Project Number IFAS ?????
 - 1. Project Location:

UF IFAS North Florida Research and Education Center 155 Research Road Quincy, FL 32351

- B. Owner: University of Florida Institute of Food and Agricultural Sciences (UF IFAS)
 - 1. Owner's Representative:

Shawn Cody, Project Manager
UF IFAS Office of Facilities Planning & Operations
1390 Date Palm Drive
PO Box 110850
Gainesville, Florida 32611
ShawnCody@ifas.ufl.edu
904-729-2147

Conformed Documents [11.01.2022]

- 2. Additional Owner Contacts: University of Florida contacts are referenced here and in other applicable sections within the Project Manual.
 - EH&S Safety Coordinator: (352) 392-1591
 - b. EH&S Code Compliance Department: (352) 392-1904, www.ehs.ufl.edu
- C. Architect: BFrank Studio:

Beverly Frank, AIA, LEED AP - Principal 4836 West Gandy Blvd.
Tampa, Florida 33611
beverly@bfrankstudio.com
(813) 769-9378

- D. Other Owner Consultants: The Owner has retained the following design professionals under contract with the Architect who have prepared designated portions of the Contract Documents:
 - Mechanical, Electrical, Plumbing, Fire Protection and Technology Engineering: Craig Gulledge, Principal, Mitchell Gulledge Engineering, Inc.; 210 SW 4th Avenue, Gainesville, FL 32601; 352-745-3991
- E. Other Owner Consultants: The Owner has retained the following design professionals under contract directly with the Owner who have prepared designated portions of the Contract Documents:
 - 1. N/A

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of the Project is defined by the Contract Documents and consists of the following:
 - This project includes the remodel of approximately 1,500 SF to an existing 3,164 SF concrete masonry unit and wood frame building. The spaces both existing and new serve as enclosed office and open office space and work spaces. In addition to office and work area, the building will include a new unisex restroom, conference room, breakroom, janitor room, mechanical room, and electrical / IT room. Exterior sliding barn doors will be removed and replaced with new masonry infill. All exterior windows are to be removed and replaced.
- B. Type of Contract
 - 1. Project will be constructed under a single contract with a General Contractor.
- 1.5 OWNER-FURNISHED, OWNER-INSTALLED PRODUCTS
 - A. Owner will furnish and install products as indicated in the drawings. The Work includes, but is not limited to, storing, protecting, providing blocking, and coordination with Owner Sub-Contractors/ representatives to facilitate installing Owner-furnished, Owner-installed products.
- 1.6 OWNER-FURNISHED, CONTRACTOR-INSTALLED PRODUCTS

A. Owner will furnish products as indicated in the drawings. The Work includes, but is not limited to, receiving, unloading, handling, storing, protecting, and installing Owner-furnished products and making building services connections.

1.7 CONTRACTOR- FURNISHED, CONTRACTOR-INSTALLED PRODUCTS

A. Contractor will furnish and install products as indicated in the drawings. The Work includes, but is not limited to, receiving, unloading, handling, storing, protecting, and installing Contractor furnished products and making building services connections. All manufacturer supplied documentation and attic stock shall be turned over to Owner at Project closeout. All Work shown in the Drawings and Project Manual shall be considered part of the Work, unless noted otherwise.

1.8 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
 - Construction staging areas on Project site shall be kept to an absolute practical minimum.
 Office trailers shall be sized to accommodate only the personnel necessary to manage the Project.
- B. Use of Site: Limit use of Project site to areas within the Contract limits indicated on Architectural Site Plan. Do not disturb portions of Project site beyond areas in which the Work is indicated unless indicated in writing by the Owner and approved by the Authority Having Jurisdiction.
 - 1. Staging area layout shall be designed and proposed by the General Contractor and approved by the Owner prior to the Contractor's occupancy of the site.
 - 2. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations. Do not block or impede traffic at adjacent facilities at any time.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
 - c. Storage trailers may be used but shall be sized to accommodate only those materials necessary to facilitate Project progress and shall be removed when not in continuous use.

1.9 COORDINATION WITH ADJACENT BUILDINGS

- A. Measures for Occupant Protection at Adjacent Buildings: Reference section 01 50 00 Temporary Facilities and Controls for consideration of measures to ensure occupant protection during construction.
- B. Full Owner Occupancy: Owner will occupy adjacent building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, drives and other adjacent occupied or used facilities. Do not close or obstruct walkways, drives or other occupied or used facilities without written permission from Owner and approval of Authorities Having Jurisdiction.

- 2. Notify the Owner not less than 72 hours in advance of activities that will affect Owner's operations.
- 3. Any disruption of campus utilities must be reviewed and approved by the Owner prior to disruption. Any accidental disruption must be brought to the Owner's attention immediately.
- C. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
 - 1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 - 2. Obtain a Certificate of Occupancy from Authorities Having Jurisdiction before limited Owner occupancy.
 - 3. Contractor shall perform test and balance to ensure systems are operating correctly and efficiently prior to turning over to the Owner.
 - 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.10 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and other requirements of Authorities Having Jurisdiction.
- B. On-Site Work Hours: To be coordinated with Owner.
 - 1. The Contractor shall coordinate the Work with the University of Florida IFAS Project Manager, and shall schedule and carry out the Work such that the normal operations of the facility are given first priority. This applies particularly to utilities outages and restriction of access. Such construction operations shall frequently be carried on outside of normal working hours, and by overtime, weekend, and holiday work. It shall be the Contractor's responsibility to provide for this in the bid.
 - 2. Weekend/Holiday Hours: Permitted with prior Owner approval.
 - 3. Early Morning Hours: Permitted with prior Owner approval.
 - 4. Weekend/Holiday Hours: Permitted with prior Owner approval.
 - 5. Early Morning Hours: Permitted with prior Owner approval.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than three days in advance of proposed utility interruptions.
 - 2. "Exterior" utility outages where the means of disconnecting or valving-off the utility service is exterior to the building (or buildings being affected) shall be handled in accordance with the UF IFAS Project Manager prior to any necessary outages.
 - 3. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

- 1. Notify Owner not less than three days in advance of proposed disruptive operations.
- 2. The use of any "air hammers" or other impact equipment which will cause excessive noise or vibration shall be strictly prohibited during working hours and shall also be coordinated with adjacent operations.
- 3. Obtain Owner's written permission before proceeding with disruptive operations.
- 4. The use of any gasoline-powered equipment inside the building shall be strictly prohibited.
- 5. Except for special situations where prior approval from the Owner's Project Manager was granted, the use of power impact tools for demolition is prohibited inside occupied buildings.
- 6. Coordinate and schedule work requiring any utility interruptions with the owners project manager.
- E. Nonsmoking Site: Smoking is not permitted on site.
- F. Controlled Substances: Use of tobacco products and other controlled substances within the existing building is not permitted.
- G. Employee Screening: Comply with Owner's requirements regarding drug and background screening of Contractor personnel working on the Project site.
 - 1. Maintain list of approved screened personnel with Owner's Representative.

1.11 MISCELLANEOUS PROVISIONS

- A. Project Inspections: At project inspections, the Contractor shall be prepared to demonstrate all required equipment operations and shall provide all necessary tools and diagnostic equipment. Contact the University of Florida EH&S Code Compliance Department at (352) 392-1904 for Code Inspection Information. For all other inspection information refer to the UF EH&S website www.ehs.ufl.edu
- B. Refer to the Project Manual Appendix for University of Florida required forms or http://www.facilities.ufl.edu/projects/forms.php#forms
- C. Contractor shall provide a construction entrance to ensure no sedimentation is tracked off site. Erosion control measures shall be outlined in the Contractor's "Erosion Control Plan" as required in section 01 50 00 "Temporary Facilities and Controls" and shall be in place prior to start of any clearing or grubbing.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

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SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Documents affecting the work of this Section include other elements of the Contract for Construction, including the Owner/Contractor Agreement, the General Terms and Conditions, the University Design Guidelines, other sections of the Division 00 and Division 01 non-technical specifications, and the technical plans and specifications for all disciplines.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
 - Certain items may be specified in the Contract Documents by allowances. Allowances
 have been established in lieu of additional requirements and to defer selection of actual
 materials and equipment to a later date when direction will be provided to Contractor. If
 necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.
 - 2. Unit-cost allowances.
 - 3. Quantity allowances.
 - Contingency allowances.
 - 5. Testing and inspecting allowances.

C. Related Requirements:

1. Section 014000 "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.

1.3 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect from the designated supplier.

1.4 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.7 LUMP-SUM ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner and/or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.8 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
- B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.
- C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.
- D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.9 TESTING AND INSPECTING ALLOWANCES

- A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.
- B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.
- C. Costs of services not required by the Contract Documents are not included in the allowance.
- D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.10 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 - 3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
 - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
 - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Lump-Sum Allowance: Include an allowance of \$2,500 for replacement of damaged sod and landscaping around the existing building at project completion.

END OF SECTION 01 21 00

SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.

Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - EXECUTION (Not Used)

PART 3 - SCHEDULE OF ALTERNATES

- A. Alternate No. 1: Upgrade Construction in Future Build Out 100 and Remodel Space
 - Base Bid: Demising wall between Future Build out 100 and remodel space to be 6" metal stud and moisture resistant gypsum board on room 100 side with full thickness thermal / acoustical batt insulation from floor to roof deck. Provide building wrap (vapor barrier) on Room 100 side from floor to top of partition. Provide joint sealant top and bottom
 - 2. Alternate: Future build out Room 100 Demising wall between Future Build out 100 and remodel space to be 6" metal stud and 5/8" gypsum board both sides with full thickness thermal / acoustical batt insulation from floor to roof deck. Provide joint sealants top and bottom. Furnish and install 3-5/8" metal stud with 2" foil faced rigid insulation on existing / new exterior masonry walls with 5/8" moisture resistant gypsum board to top of masonry wall. Furnish and install 2" closed cell spray foam insulation on exposed roof deck with intumescent coating for ignition barrier. Provide sidewall supply & return to room 100 from Mechanical 195A with a ~150 cfm value assigned to each.
- B. Alternate No. 2: Carpet Upgrade in Conference Room 124
 - 1. Base Bid: Floor in Conference Room 124 to be sealed concrete as specified in all other areas of the remodel project.
 - 2. Alternate: Furnish and install new Carpet Tiles in Conference Room 124 in lieu of sealed concrete. BOD: Refer to Finish Schedule.
- C. Alternate No. 3: Wall Finish for Break Room 120 (Behind Water Coolers), Custodial Room 121, and Toilet Room 123.
 - 1. Base Bid: Wall finish on all walls in Break Room 120 (Behind Water Coolers), Custodial Room 121 and Toilet Room 123 Toilet Room 123 shall be Ceramic Tile CT-1 "Ceramic Technic's Inc., Studio Elements Basic (4" x 16") two colors with Schluter stainless steel cove base at wall perimeter. Refer to finish schedule.
 - 2. Alternate: Deductive alternate to furnish and install Fiberglass Reinforced Panels (FRP) on all walls in Break Room 120 (Behind Water Coolers), Custodial Room 121 and Toilet Room 123. Panels to be 4' x 10' with pebble finish. Furnish all accessories and transition strips to ensure a complete installation.
- D. Alternate No. 4: Office 110 Build Out
 - 1. Base Bid: Office No. 110 not in scope of project. Ceiling will remain exposed and finished to match remainder of exposed ceiling. Furnish and install four (4) Type "A" strip light fixtures.
 - 2. Alternate: Furnish and install all materials and labor as indicated on the documents to provide new office no. 110. This will include new gypsum board partitions to deck. New 2' x 2' acoustical lay in ceiling tile and grid. New 2' x 2' LED light fixtures with occupancy sensors and new mini split A/C system.

END OF SECTION 01 23 00

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Sections:

- 1. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
- 2. Divisions 02 through 33 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

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

1.4 SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.

c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

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

1.5 QUALITY ASSURANCE

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

1.6 PROCEDURES

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

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

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

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

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SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Sections:

1. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use forms acceptable to Architect.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

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

1.5 ADMINISTRATIVE CHANGE ORDERS

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

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

UF IFAS NFREC Building 8003 Remodel (2021-0011)

01 26 00 - 2 Contract Modification Procedures

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections:

- 1. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
- 2. Division 01 Section "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.
- 3. Division 01 Section "Submittal Procedures" for administrative requirements governing the preparation and submittal of the submittal schedule.

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. Cost-loaded Critical Path Method Schedule may serve to satisfy requirements for the schedule of values.
 - 1. Correlate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values using the owner approved template to the Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

3. Sub-schedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

- 4. Sub-schedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide sub-schedules showing values correlated with each element.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Arrange schedule of values consistent with format of AIA Document G703.
 - 3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment.
 - 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of Contract Sum.
 - Include separate line items under Contractor and principal subcontracts for project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
 - 5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 - 6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
 - 7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

8. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.

- 9. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
- 10. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and General Contractor and paid for by Owner.
 - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: Each progress-payment date is indicated in the Agreement. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 - 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 - 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 - 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 - 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
 - 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
 - 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 - 3. Provide summary documentation for stored materials indicating the following:

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

2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

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SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Administrative and supervisory personnel.
 - 3. Coordination drawings.
 - 4. Requests for Information (RFIs).
 - 5. Project Web site.
 - 6. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Sections:
 - Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information from each other during construction.

1.4 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.

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

1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings in accordance with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
 - 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

Use applicable Drawings as a basis for preparation of coordination drawings.
 Prepare sections, elevations, and details as needed to describe relationship of various systems and components.

- b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
- c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
- d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
- e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
- f. Indicate required installation sequences.
- g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
 - 1. Floor Plans and Reflected Ceiling Plans:
 - a. Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work.
 - b. Show locations of visible ceiling-mounted devices relative to all ceilings.
 - c. Show locations of all access panels.
 - d. Supplement plan drawings with section drawings where required to adequately represent the Work.
 - e. Show locations of all rated ceilings and walls and indicate dampers where required.
 - f. Show finished elevation of all ceilings as indicated on Architectural drawings and verify all clearances prior to installation of any Work.
 - 2. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
 - 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment.
 - 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 - 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 - 6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork and penetrations.
 - 7. Electrical Work: Show the following:

- a. Runs of vertical and horizontal conduit 1-1/4 inch diameter and larger.
- b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
- c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
- d. Location of pull boxes and junction boxes, dimensioned from column center lines.
- e. Location of all tented or rated fixtures at rated ceilings.
- 8. Fire Protection System: Show the following:
 - Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
- 9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility. If the Architect determines that the coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, the Architect will so inform the Contractor, who shall make changes as directed and resubmit.
- 10. Coordination Drawing Prints: Prepare coordination drawing prints in accordance with requirements of Division 01 Section "Submittal Procedures."
- C. Coordination Digital Data Files: Prepare coordination digital data files in accordance with the following requirements:
 - 1. File Preparation Format: DWG, Version AutoCAD 2017 or higher, operating in Microsoft Windows operating system and/or Revit 2019.
 - 2. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.
 - 3. Architect will furnish Contractor one set of digital data files of the Drawings for use in preparing coordination digital data files.
 - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to the Drawings.
 - b. Digital Data Software Program: The Drawings are available in Revit 2019 operating in Microsoft Windows operating system.
 - c. Contractor shall execute a data licensing agreement provided upon request.

1.6 KEY PERSONNEL

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

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form approved by the owner.

- Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
- 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 - 1. Project name.
 - 2. Project number.
 - 3. Date.
 - 4. Name of Contractor.
 - 5. Name of Architect and General Contractor.
 - 6. RFI number, numbered sequentially from pre-bid through construction (i.e. RFI-001)
 - RFI subject.
 - 8. Specification Section number and title and related paragraphs, as appropriate.
 - 9. Drawing number and detail references, as appropriate.
 - 10. Field dimensions and conditions, as appropriate.
 - 11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 - 12. Contractor's signature.
 - 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow (7) seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
 - 1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or inaccurately prepared RFIs.
 - 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 - Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."

- a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within (10) ten days of receipt of the RFI response.
- D. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within (7) seven days if Contractor disagrees with response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Software log with not less than the following:
 - 1. Project name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Architect.
 - 4. RFI number including RFIs that were dropped and not submitted.
 - 5. RFI description.
 - 6. Date the RFI was submitted.
 - 7. Date Architect's response was received.
 - 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 - 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

- A. General: General Contractor will schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 - Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Contractor, and Architect, within three days of the meeting.
- B. Preconstruction Conference: General Contractor will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
 - 1. Conduct the conference to review responsibilities and personnel assignments.
 - 2. Attendees: Authorized representatives of Owner, Contractor, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Owner's Event Schedule
 - c. Phasing.
 - d. Critical work sequencing and long-lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Procedures for processing field decisions and Change Orders.

- h. Procedures for RFIs.
- i. Procedures for testing and inspecting.
- j. Procedures for processing Applications for Payment.
- k. Distribution of the Contract Documents.
- I. Submittal procedures.
- m. Preparation of record documents.
- n. Use of the premises and existing building.
- o. Work restrictions.
- p. Working hours.
- q. Owner's occupancy requirements.
- r. Responsibility for temporary facilities and controls.
- s. Procedures for moisture and mold control.
- t. Procedures for disruptions and shutdowns.
- u. Construction waste management and recycling.
- v. Parking availability.
- w. Office, work, and storage areas.
- x. Equipment deliveries and priorities.
- y. First aid.
- z. Security.
- aa. Progress cleaning.
- 4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
 - Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, Contractor, and Owner's Commissioning Authority, of scheduled meeting dates
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility problems.
 - k. Time schedules.
 - Weather limitations.
 - m. Manufacturer's written recommendations.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.

- v. Coordination with other work.
- w. Required performance results.
- x. Protection of adjacent work.
- y. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
- 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
- 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: General Contractor will schedule and conduct a Project closeout conference, at a time convenient to Owner and Architect, but no later than 45 days prior to the scheduled date of Substantial Completion.
 - 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 - Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, General Contractor, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of record documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Submittal of written warranties.
 - d. Requirements for preparing operations and maintenance data.
 - e. Requirements for demonstration and training.
 - f. Preparation of Contractor's punch list.
 - g. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - h. Submittal procedures.
 - i. Coordination of separate contracts.
 - j. Owner's partial occupancy requirements.
 - k. Installation of Owner's furniture, fixtures, and equipment.
 - I. Responsibility for removing temporary facilities and controls.
 - 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: General Contractor will conduct progress meetings at weekly intervals.
 - 1. Coordinate dates of meetings with preparation of payment requests.
 - 2. Attendees: In addition to representatives of Owner, Contractor, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

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

- are required to ensure that current and subsequent activities will be completed within the Contract Time.
- b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
- c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
- 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Start-up construction schedule.
 - Contractor's construction schedule.
 - 3. Owner's event schedule.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Field condition reports.
 - 7. Special reports.

B. Related Sections:

- Division 01 Section "Submittal Procedures" for submitting schedules and reports.
- 2. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by Architect.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of the Project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

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

- I. Special Reports: Submit at time of unusual event.
- J. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
 - 1. Review software limitations and content and format for reports.
 - 2. Verify availability of qualified personnel needed to develop and update schedule.
 - 3. Discuss constraints, including phasing, work stages, area separations, interim milestones and partial Owner occupancy.
 - 4. Review delivery dates for Owner-furnished products.
 - 5. Review schedule for work of Owner's separate contracts.
 - 6. Review time required for review of submittals and resubmittals.
 - 7. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 8. Review sustainability requirements and tracking methods for sustainability criteria.
 - 9. Review time required for completion and startup procedures.
 - 10. Review and finalize list of construction activities to be included in schedule.
 - 11. Review submittal requirements and procedures.
 - 12. Review procedures for updating schedule.

1.6 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

- B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 - 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 - 4. Startup and Testing Time: Include not less than 15 days for startup and testing.
 - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Contractor's administrative procedures necessary for certification of Substantial Completion.
 - 6. Punch List and Final Completion: Include not more than 30 days for punch list and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - 1. Phasing: Arrange list of activities on schedule by phase.
 - 2. Work under More Than One Contract: Include a separate activity for each contract.
 - 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 - 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 - 5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 - 6. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 - 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.

- h. Installation.
- i. Tests and inspections.
- j. Adjusting.
- k. Curing.
- I. Startup and placement into final use and operation.
- 8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Permanent space enclosure.
 - c. Completion of mechanical installation.
 - d. Completion of electrical installation.
 - e. Substantial Completion.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- E. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.
 - 1. Refer to Division 01 Section "Payment Procedures" for cost reporting and payment procedures.
- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
 - 1. Unresolved issues.
 - 2. Unanswered RFIs.
 - 3. Rejected or unreturned submittals.
 - Notations on returned submittals.
- G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
- 2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)
 - A. General: Prepare network diagrams using AON (activity-on-node) format.
 - B. Start-up Network Diagram: Submit diagram within (14) fourteen days of date established for the Notice to Proceed. Outline significant construction activities for the first (90) ninety days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
 - C. CPM Schedule: Prepare Contractor's construction schedule using a cost-and resource-loaded time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than (60) sixty days after date established for the Notice to Proceed.

- a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.
- 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
- 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
- 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to correlate with Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the start-up network diagram, prepare a skeleton network to identify probable critical paths.
 - 1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testino
 - j. Punch list and final completion.
 - k. Activities occurring following final completion.
 - 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 - 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 - 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
 - 5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under principal subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, and demonstration and training (if applicable), in the amount of (5) five percentage percent of the Contract Sum.

- a. Each activity cost shall reflect an appropriate value subject to approval by Architect.
- b. Total cost assigned to activities shall equal the total Contract Sum.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
 - 1. Contractor or subcontractor and the Work or activity.
 - 2. Description of activity.
 - 3. Principal events of activity.
 - 4. Immediate preceding and succeeding activities.
 - 5. Early and late start dates.
 - 6. Early and late finish dates.
 - 7. Activity duration in workdays.
 - 8. Total float or slack time.
 - 9. Average size of workforce.
 - 10. Dollar value of activity (coordinated with the schedule of values).
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
 - 1. Identification of activities that have changed.
 - 2. Changes in early and late start dates.
 - 3. Changes in early and late finish dates.
 - 4. Changes in activity durations in workdays.
 - 5. Changes in the critical path.
 - 6. Changes in total float or slack time.
 - 7. Changes in the Contract Time.
- H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
 - 1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
 - In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
 - 3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
 - 4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.

2.3 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors at Project site.

- 2. List of separate contractors at Project site.
- 3. Approximate count of personnel at Project site.
- 4. Equipment at Project site.
- 5. Material deliveries.
- High and low temperatures and general weather conditions, including presence of rain or snow.
- 7. Accidents.
- 8. Meetings and significant decisions.
- 9. Unusual events (refer to special reports).
- 10. Stoppages, delays, shortages, and losses.
- 11. Meter readings and similar recordings.
- 12. Emergency procedures.
- 13. Orders and requests of authorities having jurisdiction.
- 14. Change Orders received and implemented.
- 15. Construction Change Directives received and implemented.
- 16. Services connected and disconnected.
- 17. Equipment or system tests and startups.
- 18. Partial completions and occupancies.
- 19. Substantial Completions authorized.
- B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
- C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

A. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule at each regularly scheduled progress meeting.
 - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.

- 3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.
 - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 32 00

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SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic demolition photographs.
 - 3. Final construction photographs.

B. Related Sections:

1. Division 02 Section "Selective Structure Demolition" for photographic documentation before selective demolition operations commence.

1.3 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files at each project meeting.
 - 1. Digital Camera: Minimum sensor resolution of 8 megapixels.
 - 2. Format: Minimum 1600 by 1200 pixels, 400 dpi minimum, in unaltered original files, with same aspect ratio as the sensor, uncropped, date- and time- stamped, in folder named by date of photograph, accompanied by key plan file.
 - 3. Identification: Provide the following information with each image description in file metadata tag:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Architect and General Contractor.
 - d. Name of Contractor.
 - e. Date photograph was taken.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - g. Unique sequential identifier keyed to accompanying key plan.

1.4 COORDINATION

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

1.5 USAGE RIGHTS

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

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

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

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 - 1. Date and Time: Include date and time in file name for each image.
 - 2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect and General Contractor.
- C. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points.
 - 1. Flag construction limits before taking construction photographs.
 - 2. Take a minimum of 20 photographs to show existing conditions adjacent to property before starting the Work.
 - 3. Take a minimum of 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
 - 4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

D. Architect Directed Construction Photographs: From time to time, Architect will instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.

- E. Time-Lapse Sequence Construction Photographs: Take (10) ten photographs as indicated, to show status of construction and progress since last photographs were taken.
 - 1. Frequency: Take photographs weekly.
 - 2. Vantage Points: Following suggestions by Architect and Contractor, photographer to select vantage points. During each of the following construction phases, take not less than (2) two of the required shots from same vantage point each time to create a time-lapse sequence as follows:
 - a. Commencement of the Work, through completion of subgrade demolition.
 - b. Above-grade temporary infill framing.
 - c. Any below grade utility work that will require future connections.
 - d. Interior demolition.

END OF SECTION 01 32 33

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SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Sections:

- 1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the schedule of values.
- 2. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
- 3. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
- 4. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
- 5. Division 01 Section "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Architect and additional time for handling and reviewing submittals required by those corrections.

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

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
 - 1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Digital Drawing Software Program: The Contract Drawings are available in AutoCad 2019 and Revit 2020.
 - c. Contractor shall execute a data licensing agreement in the form of Agreement for each discipline.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

- 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 - 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
 - Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- D. Identification and Information: Place a permanent label or title block on each paper copy submittal item for identification.
 - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 - 2. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Name of subcontractor.
 - f. Name of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - I. Other necessary identification.
- E. Identification and Information: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.

- 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
- 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
- 4. Include the following information on an inserted cover sheet:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Contractor.
 - e. Name of firm or entity that prepared submittal.
 - f. Name of subcontractor.
 - g. Name of supplier.
 - h. Name of manufacturer.
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - I. Related physical samples submitted directly.
 - m. Other necessary identification.
- 5. Include the following information as keywords in the electronic file metadata:
 - a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- F. Options: Identify options requiring selection by the Architect.
- G. Deviations: Identify deviations from the Contract Documents on submittals.
- H. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
 - 1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
- I. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.
 - 1. Transmittal Form: Use form included in Project Manual, Appendix A.
 - On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

- J. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- K. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- L. Use for Construction: Use only final submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Post electronic submittals as PDF electronic files directly to Architect's Information Exchange site specifically established for Project.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Action Submittals: Submit three paper copies of each submittal, unless otherwise indicated. Architect will return two copies.
 - 3. Informational Submittals: Submit two paper copies of each submittal, unless otherwise indicated. Architect will not return copies.
 - 4. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
 - 5. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
 - 6. Test and Inspection Reports Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.

- 2. Mark each copy of each submittal to show which products and options are applicable.
- 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
- 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
- 5. Submit Product Data before or concurrent with Samples.
- 6. Submit Product Data in the following format:
 - a. PDF electronic file to the greatest extent possible.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based upon Architect's digital data drawing files is otherwise permitted.
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 11 by 17 inches but no larger than 30 by 42 inches.
 - 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file to the greatest extent possible.
 - b. Three opaque copies of each submittal. Architect will retain two copies; remainder will be returned.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Attach label on unexposed side of Samples that includes the following:

- a. Generic description of Sample.
- b. Product name and name of manufacturer.
- c. Sample source.
- d. Number and title of applicable Specification Section.
- 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
- 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project record sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 - 1. Type of product. Include unique identifier for each product indicated in the Contract Documents.
 - 2. Manufacturer and product name, and model number if applicable.
 - 3. Number and name of room or space.
 - 4. Location within room or space.
 - 5. Submit product schedule in the following format:
 - a. PDF electronic file to the greatest extent possible.

F. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

- G. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."
- H. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."
- I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:
 - Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
 - 4. Submit subcontract list in the following format:
 - a. PDF electronic file.
- J. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."
- K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.
- M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- Q. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- R. Product Test Reports: Submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

S. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

- 1. Name of evaluation organization.
- 2. Date of evaluation.
- 3. Time period when report is in effect.
- 4. Product and manufacturers' names.
- 5. Description of product.
- 6. Test procedures and results.
- 7. Limitations of use.
- T. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."
- U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- W. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- X. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If products indicated are an exterior assembly without a state of Florida Notice of Product Approval, signed and sealed engineered shop drawings must be provided reflecting the assembly's performance and design criteria meet or exceed that indicated by the Florida Building Code.
 - 2. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally-signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Division 01 Section "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
 - 1. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 2. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
 - 3. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
 - Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01 33 00

SECTION 01 35 16 - ALTERATION PROJECT PROCEDURES

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 special procedures for alteration work.

1.3 DEFINITIONS

- A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.
- B. Consolidate: To strengthen loose or deteriorated materials in place.
- C. Design Reference Sample: A sample that represents the Architect's pre-bid selection of work to be matched; it may be existing work or work specially produced for the Project.
- D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.
- F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.
- G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.
- H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.
- I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.
- J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.
- K. Retain: To keep existing items that are not to be removed or dismantled.
- L. Strip: To remove existing finish down to base material unless otherwise indicated.

1.4 COORDINATION

- A. Alteration Work Subschedule: A construction schedule coordinating the sequencing and scheduling of alteration work for entire Project, including each activity to be performed, and based on Contractor's Construction Schedule. Secure time commitments for performing critical construction activities from separate entities responsible for alteration work.
 - 1. Schedule construction operations in sequence required to obtain best Work results.
 - 2. Coordinate sequence of alteration work activities to accommodate the following:
 - a. Owner's continuing occupancy of portions of existing building.

- b. Owner's partial occupancy of completed Work.
- c. Other known work in progress.
- d. Tests and inspections.
- 3. Detail sequence of alteration work, with start and end dates.
- 4. Utility Services: Indicate how long utility services will be interrupted. Coordinate shutoff, capping, and continuation of utility services.
- 5. Use of elevator and stairs.
- 6. Equipment Data: List gross loaded weight, axle-load distribution, and wheel-base dimension data for mobile and heavy equipment proposed for use in existing structure. Do not use such equipment without certification from Contractor's professional engineer that the structure can support the imposed loadings without damage.
- B. Pedestrian and Vehicular Circulation: Coordinate alteration work with circulation patterns within Project building(s) and site. Some work is near circulation patterns. Circulation patterns cannot be closed off entirely and in places can be only temporarily redirected around small areas of work. Plan and execute the Work accordingly.

1.5 PROJECT MEETINGS FOR ALTERATION WORK

- A. Preliminary Conference for Alteration Work: Before starting alteration work, General Contractor will conduct conference at Project site.
 - 1. Attendees: Representatives of Owner, Contractor, Architect, and Contractor, shall be represented at the meeting.
 - 2. Agenda: Discuss items of significance that could affect progress of alteration work, including review of the following:
 - Alteration Work Subschedule: Discuss and finalize; verify availability of materials, specialists' personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Fire-prevention plan.
 - c. Governing regulations.
 - d. Areas where existing construction is to remain and the required protection.
 - e. Hauling routes.
 - f. Sequence of alteration work operations.
 - g. Storage, protection, and accounting for salvaged and specially fabricated items.
 - h. Existing conditions, staging, and structural loading limitations of areas where materials are stored.
 - i. Qualifications of personnel assigned to alteration work and assigned duties.
 - j. Requirements for extent and quality of work, tolerances, and required clearances.
 - k. Embedded work such as flashings and lintels, special details, collection of waste, protection of occupants and the public, and condition of other construction that affects the Work or will affect the work.
 - 3. Reporting: General Contractor will record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.
- B. Coordination Meetings: Conduct coordination meetings specifically for alteration work at weekly intervals. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

 Attendees: In addition to representatives of Owner, Architect, and Contractor, each specialist, supplier, installer, and other entity concerned with progress or involved in planning, coordination, or performance of alteration work activities shall be represented at these meetings. All participants at conference shall be familiar with Project and authorized to conclude matters relating to alteration work.

- 2. Agenda: Review and correct or approve minutes of previous coordination meeting. Review other items of significance that could affect progress of alteration work. Include topics for discussion as appropriate to status of Project.
 - a. Alteration Work Subschedule: Review progress since last coordination meeting. Determine whether each schedule item is on time, ahead of schedule, or behind schedule. Determine how construction behind schedule will be expedited with retention of quality; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities are completed within the Contract Time.
 - b. Schedule Updating: Revise Contractor's Alteration Work Subschedule after each coordination meeting where revisions to schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each entity present, including review items listed in the "Preliminary Conference for Alteration Work" Paragraph in this article and the following:
 - 1) Interface requirements of alteration work with other Project Work.
 - 2) Status of submittals for alteration work.
 - 3) Access to alteration work locations.
 - 4) Effectiveness of fire-prevention plan.
 - 5) Quality and work standards of alteration work.
 - 6) Change Orders for alteration work.
- 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.6 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property.
 - 1. Carefully dismantle and salvage each item or object in a manner to prevent damage and protect it from damage, then promptly deliver it to Owner where directed at Project site.

1.7 INFORMATIONAL SUBMITTALS

- A. Alteration Work Subschedule:
 - 1. Submit alteration work subschedule within 30 days of date established for commencement of alteration work.
- B. Preconstruction Documentation: Show preexisting conditions of adjoining construction and site improvements that are to remain, including finish surfaces, that might be misconstrued as damage caused by Contractor's alteration work operations.

- C. Alteration Work Program: Submit 30 days before work begins.
- D. Fire-Prevention Plan: Submit 30 days before work begins.

1.8 QUALITY ASSURANCE

- A. Specialist Qualifications: An experienced firm regularly engaged in specialty work similar in nature, materials, design, and extent to alteration work as specified in each Section and that has completed a minimum of five recent projects with a record of successful in-service performance that demonstrates the firm's qualifications to perform this work.
 - Field Supervisor Qualifications: Full-time supervisors experienced in specialty work similar in nature, material, design, and extent to that indicated for this Project. Supervisors shall be on-site when specialty work begins and during its progress. Supervisors shall not be changed during Project except for causes beyond the control of the specialist firm.
 - Construct new mockups of required work whenever a supervisor is replaced.
- B. Alteration Work Program: Prepare a written plan for alteration work for whole Project, including each phase or process and protection of surrounding materials during operations. Show compliance with indicated methods and procedures specified in this and other Sections. Coordinate this whole-Project alteration work program with specific requirements of programs required in other alteration work Sections.
 - 1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
 - 2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.
- C. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.
- D. Safety and Health Standard: Comply with ANSI/ASSE A10.6.

1.9 STORAGE AND HANDLING OF SALVAGED MATERIALS

- A. Salvaged Materials:
 - Clean loose dirt and debris from salvaged items unless more extensive cleaning is indicated.
 - 2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area designated by Owner.
 - 5. Protect items from damage during transport and storage.
- B. Salvaged Materials for Reinstallation:
 - 1. Repair and clean items for reuse as indicated.

- 2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
- 3. Protect items from damage during transport and storage.
- 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.
- C. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.
- D. Storage: Catalog and store items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.
 - 1. Identify each item for reinstallation with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
 - 2. Secure stored materials to protect from theft.
 - 3. Control humidity so that it does not exceed 85 percent. Maintain temperatures 5 deg F (3 deg C) or more above the dew point.

E. Storage Space:

- 1. Owner will arrange for limited on-site location(s) for free storage of salvaged material. This storage space [includes] [does not include] security[and climate control] for stored material.
- 2. Arrange for off-site locations for storage and protection of salvaged material that cannot be stored and protected on-site.

1.10 FIELD CONDITIONS

- A. Survey of Existing Conditions: Record existing conditions that affect the Work by use of measured drawings and preconstruction photographs.
 - 1. Comply with requirements specified in Section 013233 "Photographic Documentation."
- B. Discrepancies: Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.
- C. Size Limitations in Existing Spaces: Materials, products, and equipment used for performing the Work and for transporting debris, materials, and products shall be of sizes that clear surfaces within existing spaces, areas, rooms, and openings, including temporary protection, by 12 inches (300 mm)] or more.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration work.
 - 1. Use only proven protection methods, appropriate to each area and surface being protected.
 - 2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration work is being performed.
 - 3. Erect temporary barriers to form and maintain fire-egress routes.
 - 4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during alteration work.
 - 5. Contain dust and debris generated by alteration work, and prevent it from reaching the public or adjacent surfaces.
 - 6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
 - 7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
 - 8. Provide supplemental sound-control treatment to isolate demolition work from other areas of the building.
- B. Temporary Protection of Materials to Remain:
 - 1. Protect existing materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
 - 2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration work program.
- C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.
- D. Utility and Communications Services:
 - 1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by alteration work before commencing operations.
 - 2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration work.
 - 3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.
- E. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.
 - 1. Prevent solids such as adhesive or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from alteration work.

2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

F. Existing Roofing: Prior to the start of work in an area, install roofing protection as indicated on Drawings.

3.2 PROTECTION FROM FIRE

- A. General: Follow fire-prevention plan and the following:
 - Comply with NFPA 241 requirements unless otherwise indicated. Perform duties titled "Owner's Responsibility for Fire Protection."
 - 2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.
 - a. If combustible material cannot be removed, provide fire blankets to cover such materials.
- B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:
 - 1. Obtain Owner's approval for operations involving use of welding or other high-heat equipment. Use of open-flame equipment is not permitted. Notify Owner at least 72 hours before each occurrence, indicating location of such work.
 - 2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
 - 3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
 - 4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
 - 5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
 - 6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:
 - a. Train each fire watch in the proper operation of fire-control equipment and alarms.
 - b. Prohibit fire-watch personnel from other work that would be a distraction from firewatch duties.
 - c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
 - d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work in each area to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
 - e. Maintain fire-watch personnel at each area of Project site until 60 minutes after conclusion of daily work.
- C. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in

- each work area. Ensure that nearby personnel and the fire-watch personnel are trained in fire-extinguisher and blanket use.
- D. Sprinklers: Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to sprinklers, shield them temporarily with guards.
 - 1. Remove temporary guards at the end of work shifts, whenever operations are paused, and when nearby work is complete.

3.3 PROTECTION DURING APPLICATION OF CHEMICALS

- A. Protect motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm or spillage resulting from applications of chemicals and adhesives.
- B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in alteration work program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.
- C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.
- D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.
- E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.4 GENERAL ALTERATION WORK

- A. Have specialty work performed only by qualified specialists.
- B. Ensure that supervisory personnel are present when work begins and during its progress.
- C. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation photographs. Comply with requirements in Section 013233 "Photographic Documentation."
- D. Perform surveys of Project site as the Work progresses to detect hazards resulting from alterations.
- E. Contractor is to thoroughly clean all the existing building post demolition and prior to commencing new work and shall include removal of any water damaged elements or evidence of pest infestations. This shall apply to areas that are immediately visible such as existing wood columns; roof rafters and decking; wood joists and studs; as well as areas that are not immediately visible but are so upon demolition activities.
- F. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, moisture intrusion or from structural defects including cracks, movement, or distortion.
 - 1. Do not proceed with the work in question until directed by Architect.

END OF SECTION 01 35 16

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Commissioning Authority, or Authorities Having Jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or General Contractor.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

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

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.
 - 3. Provide delegated design signed and sealed shop drawings for those exterior assemblies not accompanied by Notice of Florida Product Approval.

1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
 - 2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than the day of the preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 - 1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.

- 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
- Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by the Commissioning Authority, if applicable.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, and telephone number of technical representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 6. Statement whether conditions, products, and installation will affect warranty.
 - 7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

- Name, address, and telephone number of factory-authorized service representative making report.
- 2. Statement that equipment complies with requirements.
- 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
- 4. Statement whether conditions, products, and installation will affect warranty.
- 5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.

2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.
 - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, Commissioning Authority if applicable, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
 - 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 5. Obtain Owner and Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.

- 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
- 7. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.

1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
 - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 - 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority if applicable, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect, Commissioning Authority, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.

- 2. Description of the Work tested or inspected.
- 3. Date test or inspection results were transmitted to Architect.
- 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's, Commissioning Authority's, and Contractor's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

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SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

- 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.
- D. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 45 29 STRUCTURAL TESTING AND INSPECTIONS

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 requirements for quality assurance and quality control to be completed by the Testing Laboratory, Contractor, and/or the Geotechnical Engineer for the following structural items:
 - 1. Concrete Reinforcing.
 - 2. Cast-in-Place Concrete.
 - 3. Cold-Formed Metal Framing.
 - 4. Metal Building Systems.
 - 5. Earthwork.

B. Related Requirements:

Specification 014000 "Quality Requirements" for other independent testing agency procedures and administrative requirements.

1.3 PRICE AND PAYMENT PROCEDURES

A. Unit Prices:

 Cost Proposal: The Testing Laboratory's proposal to the Owner shall contain unit price stipulations for specified tests and inspections and on an hourly basis for personnel. A total estimated price shall also be submitted.

B. Measurement and Payment

- Payment of the Testing Laboratory: The Owner will pay for the initial Laboratory services for inspection and testing of materials for compliance with the requirements of the Contract Documents.
- 2. Payment for Substitution Testing: The Contractor shall arrange for and pay for any additional samples and tests above those required by the Contract Documents as requested by the Contractor for his convenience in performing the work.
- 3. Payment for Retesting: When initial tests indicate work does not comply with the requirements of the Contract Documents, the Contractor shall be liable to the Owner for the cost for any additional inspections, sampling, testing, and retesting done by the Testing Laboratory.
- 4. Payment by Contractor: The Contractor shall furnish and pay for the following items if required:
 - a. Soil survey of the location of borrow soil materials, samples of existing soil materials, and delivery to the Contractor's Testing Laboratory.
 - b. Samples of concrete aggregates and delivery to the Contractor's Testing Laboratory.
 - c. Concrete mix designs as prepared by his concrete supplier.
 - d. Site-situated storage boxes for concrete cylinders

- e. Concrete coring, tests of below strength concrete, and load tests, if ordered by the Owner, Architect, or Engineer.
- f. Certification of reinforcing steel and prestressing steel mill order.
- g. Certification of structural steel mill order.
- h. Certification of portland cement, lime, fly ash.
- i. Certification of welders and preparation of Welding Procedure Specifications.
- j. Tests, samples, and mock-ups of substitute material where the substitution is requested by the Contractor and the tests are necessary in the opinion of the Owner, Architect or Engineer to establish equality with specified items.
- k. The making and testing of concrete cylinders for the purpose of evaluating strength at time of form stripping or for post-tensioning or the time spent evaluating the in situ strength of concrete using the Maturity Method.
- Any other tests when such costs are required by the Contract Documents to be paid by the Contractor.
- 5. Payment for Tests of Suspected Deficient Work: If, in the opinion of the Building Official, Owner, Architect, or Engineer, any of the work of the Contractor is not satisfactory, the Contractor shall furnish and pay for all tests that the Owner, Architect, or Engineer deem advisable to determine its proper construction. The Owner shall pay all costs if the tests prove the questioned work to be satisfactory.

1.4 OWNER RESPONSIBILITIES

- A. The Owner shall engage a Geotechnical Engineer to provide inspection services for the foundations as outlined below in Article 3.4.
- B. The Owner shall provide a copy of the project plans and specifications to the Testing Laboratory prior to the start of construction and prior to any preinstallation meetings.

1.5 CONTRACTOR RESPONSIBILITIES

- A. The Contractor shall not engage the same Testing Laboratory for construction services as the Owner has for Structural Testing Laboratory Services as defined herein unless agreed to by the Owner.
- B. Furnishing Samples and Certificates: The Contractor shall provide to the laboratory certificates and representative samples of materials proposed for use in the work in quantities sufficient for accurate testing as specified.
- C. Furnishing Casual Labor, Equipment and Facilities: The Contractor shall furnish casual labor, equipment, and facilities as required for sampling and testing by the laboratory and otherwise facilitate the required inspections and tests.

1.6 TESTING LABORATORY RESPONSIBILITIES

- A. The Testing Laboratory shall sample and test materials as they are being installed for compliance with specified acceptance criteria. The Testing Laboratory will report and interpret the test results. The Laboratory shall monitor and report on the installation of construction work and shall perform tests on the completed construction as required to indicate Contractor's compliance with the various material specifications governing this work.
- B. The Testing Laboratory shall provide inspections on the following items:
 - 1. Welding of reinforcing steel.
 - 2. Inspection of structural steel, bolting, and welding material.
 - 3. Welding of structural steel.
 - 4. High-strength bolting.
 - 5. Compacted earth fill.

C. Notification of Deficiencies in the Work: The Testing Laboratory shall notify the Architect, Engineer, and Contractor within 24 hours of discovery of observed irregularities and deficiencies of the Work and other conditions not in compliance with the requirements of the Contract Documents. Notification shall be by telephone or e-mail and then in writing.

- D. Accounting: The Testing Laboratory shall be responsible for separating and billing costs attributed to the Owner and costs attributed to the Contractor.
- E. Monitoring Product and Material Certifications: The Testing Laboratory shall be responsible for monitoring the submittals of product and material certifications from manufacturers and suppliers as specified in the Specifications and shall report to the Owner, Architect, and Engineer when those submittals are not made in a timely manner.
- F. Limitations of Authority: The Testing Laboratory is not authorized to revoke, alter, relax, enlarge upon, or release any requirements of the Specifications or to approve or accept any portion of the work or to perform any duties of the General Contractor and his Subcontractors.

1.7 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

- 1. The Testing Laboratory shall cooperate with the Architect, Engineer, and Contractor and provide qualified personnel promptly on notice.
- 2. The Contractor shall cooperate with Testing Laboratory personnel and provide access to the work and to manufacturers' operations.
- 3. Notification of Source Change: The Contractor shall be responsible for notifying the Owner, Architect, Engineer, and Testing Laboratory when the source of any material is changed after the original tests or inspections have been made.

B. Scheduling:

 Advance Notice: The Contractor shall be responsible for notifying the Testing Laboratory sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests. Failure to sufficiently notify may result in additional costs incurred by the Testing Laboratory that may be back-charged to the Contractor by the Owner.

1.8 SUBMITTALS

A. Quality Control Reports:

- 1. Information on Reports: The Testing Laboratory shall submit copies of reports of inspections and tests promptly. The reports shall contain at least the following information:
 - a. Project name.
 - b. Date report issued.
 - c. Testing Laboratory name and address.
 - d. Name and signature of inspector/technician.
 - e. Date of inspection and/or sampling.
 - f. Date of test.
 - g. Identification of product and Specification section.
 - h. Location in the project.
 - i. Identification of inspection or test.
 - j. Record of weather conditions and temperature (if applicable).
 - k. Results of test regarding compliance with Contract Documents.
- 2. Copies: The Laboratory shall send signed copies of test and inspection reports to the following parties:

- a. Two copies to the Owner or his/her representative.
- b. Two copies to the General Contractor.
- c. One copy to the Architect.
- d. One copy to the Engineer of Record.
- B. Discrepancy Log: The Testing Laboratory shall create and maintain a log of all discrepancies throughout the duration of the project.
 - 1. Information on Log: This log shall include, but is not limited to:
 - a. Discrepancy date.
 - b. Description of discrepancy.
 - c. Drawing and/or detail reference.
 - d. Description of as-built condition.
 - e. Description of any remedial work performed.
 - f. Status of discrepancy.
 - 2. Submission Schedule: This log shall be submitted to the Architect/Engineer on a periodic basis for review and comment. Upon completion of the Project, this log shall be submitted in its entirety as an attachment to the final signed report described below under Certifications.
- C. Certification: Upon completion of the job, the Laboratory shall furnish to the Owner, Architect, and Engineer of Record, a statement signed by a licensed professional engineer that, to the best of their knowledge, required tests and inspections were made in accordance with the requirements of the Contract Documents.

1.9 QUALITY ASSURANCE

- A. Qualifications of Testing Laboratory:
 - The Testing Laboratory shall meet the basic requirements of ASTM E 329 and shall submit to the Owner, Architect, and Engineer evidence of current accreditation from the American Association for Laboratory Accreditation, the AASHTO Accreditation Program or the "NIST" National Voluntary Laboratory Accreditation Program.
 - 2. The Testing Laboratory shall be an Approved Agency by the Building Official to perform Special Inspections and other tests and inspections as outlined in the applicable building code.
 - 3. Tests and inspections shall be conducted in accordance with specified requirements, and if not specified, in accordance with the applicable standards of the American Society for Testing and Materials or other recognized and accepted authorities in the field.
 - 4. Qualifications of Welding Inspectors
 - a. Inspectors performing visual weld inspection shall meet the requirements of AWS D1.1 Section 6.1.4. Inspectors shall have current certification as an AWS Certified Welding Inspector (CWI). Assistant inspectors, if any, shall be supervised by an Inspector and shall be qualified by training and experience to perform the specific functions to which they are assigned.
 - b. Inspectors performing nondestructive examinations of welds other than visual inspection (MT, PT, UT, and RT) shall meet the requirements of AWS D1.1, Section 6.14.6.
- B. The Contractor shall not engage the same testing laboratory for construction services as the Owner has for quality assurance testing, unless agreed to by the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCOPE OF WORK

A. The work to be performed by the Testing Laboratory shall be as specified in this Section of the Specification and as determined in meetings with the Owner, Architect, and Engineer.

3.2 CONCRETE REINFORCING

A. Quality Assurance:

- 1. Review the Welding Procedure Specification (WPS) submitted by the contractor for any reinforcing steel other than ASTM A 706 that is proposed to be welded for consistency with acceptable welding practices and AWS.
- 2. Review welder qualifications by certification or verify by retesting. Obtain welder certificates.

3.3 CAST-IN-PLACE CONCRETE

A. Quality Assurance:

- 1. Concrete Mix Designs: The Testing Laboratory shall review the submitted mix designs for conformance to the specifications and for suitability for use in the project.
- 2. Preinstallation Meetings: The Testing Laboratory shall attend the preinstallation meetings as noted in Specification 033000 "Cast-in-Place Concrete."
- B. Field Testing: The following tests shall be completed by the Testing Laboratory:
 - 1. During Concrete Placement:
 - a. Record the amount of water added and note if it exceeds the amount allowed to be added shown in the approved mix design.
 - b. Mold concrete test cylinders as specified below in Paragraph 3.a.
 - c. Perform tests to determine slump, concrete temperature, unit weight, and air entrainment as specified below.
 - d. Record information for concrete test reports as specified below.
 - e. Pick up and transport to Laboratory cylinders cast the previous day.

2. After Concrete Placement:

- a. Investigation of Low Strength Concrete Test Results:
 - Cost of Investigations for Low Strength Concrete: The Contractor shall reimburse the Owner for the costs of investigations of low strength concrete, as defined in Part I above.
 - 2) Scope of Investigations: See Specification Section 033000 "Cast-In-Place Concrete" for the investigations that may be required by the Engineer. The Testing Laboratory will conduct these investigations if required.
- b. Post-Installed Anchors in Concrete:

- 1) Verify that all drilled holes for adhesive anchors are within six degrees of perpendicular to the surface of the concrete member.
- c. Testing of Non-Shrink Grout for Base Plates:
 - Compressive Strength Tests: Compressive strength of grout shall be determined by testing grout cubes according to the requirements of ASTM C 109 - Modified. Test one set of three cubes at one day, and one set of three cubes at 28 days.
 - 2) Frequency of Testing: One set of cubes (6 cubes) shall be made for every ten base plates and bearing plates or fraction thereof but not less than one set for each day's operation. One set of cubes shall be made for each day's operation of grouting wall panels.

3. Standards for Concrete Tests:

- a. Concrete Test Cylinders: Mold and test concrete cylinders as described below:
 - 1) Cylinder Molding and Testing: Cylinders for strength tests shall be molded and Laboratory cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39. Cylinders may be either 6" in diameter by 12" or 4" in diameter by 8", however, the diameter of the cylinder shall be at least three times the nominal maximum size of the coarse aggregate in the mix tested. All of the cylinders for each class of concrete shall be of the same dimension for all sets of that class.
 - 2) Field Samples: Field samples for strength tests shall be taken in accordance with ASTM C 172 at the point of placement.
 - 3) Quantity of Cylinders: Each set of test cylinders shall consist of a minimum of four standard test cylinders. If concrete strength for form stripping is to be determined using field-cured cylinders, one additional cylinder per set will be required for formed slab and pan-formed beam floors for the purpose of evaluating the concrete strength at the time of form stripping. This cylinder shall be stored on the floor where form removal is to occur under the same exposure conditions as the floor concrete. The cylinder shall be cured under field conditions in accordance with ASTM C 31. Field-cured test cylinders shall be molded at the same time and from the same samples as laboratory-cured test specimens. The Contractor shall reimburse the Owner for the cost of making and testing these cylinders.
 - 4) Frequency of Testing: A set of test cylinders shall be made according to the following minimum frequency guidelines:
 - a) One set for each class of concrete taken not less than once a day.
 - b) Spread Footings: One set for each 50 cubic yards or fraction thereof.
 - c) All Other Concrete: A minimum of one set for each 150 cubic yards or fraction thereof but not less than one set for each 5,000 square foot of area for walls.
 - d) No more than one set of cylinders at a time shall be made from any single truck.
 - e) If the total volume of concrete is such that the frequency of testing as specified above would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.
 - f) The above frequencies assume that one batch plant will be used for each pour. If more than one batch plant is used, the frequencies cited above shall apply for each plant used.
 - 5) The cylinders shall be numbered, dated, and the point of concrete placement in the building recorded.

6) For concrete specified on the drawings to reach the required strength at 28 days, break one cylinder of the set at seven days, two 6" by 12" cylinders or three 4" by 8" cylinders at 28 days, and keep one in reserve for testing at the Engineer's direction.

- 7) Cylinder Storage Box: The Contractor shall be responsible for providing a protected concrete cylinder wooden storage box at a point on the job site mutually agreeable with the Testing Laboratory for the purpose of storing concrete cylinders until they are transported to the Laboratory. The box shall be constructed and equipped to maintain the environment specified for initial curing in ASTM C 31.
- 8) Transporting Cylinders: The Testing Laboratory shall be responsible for transporting the cylinders to the Laboratory in a protected environment such that no damage or ill effect will occur to the concrete cylinders including loss of moisture, freezing temperatures or jarring.
- 9) Information on Concrete Test Reports: The Testing Laboratory shall make and distribute concrete test reports after each job cylinder is broken. Such reports shall contain the following information:
 - a) Truck number and ticket number.
 - b) Concrete Batch Plant.
 - c) Mix design number.
 - d) Accurate location of pour in the structure.
 - e) Strength requirement.
 - f) Date cylinders made and broken.
 - g) Technician making cylinders.
 - h) Concrete temperature at placing.
 - i) Air temperature at point of placement in the structure.
 - j) Amount of water added to the truck at the batch plant and at the site and whether or not it exceeds the amount allowed by the mix design.
 - k) Slump.
 - I) Unit weight.
 - m) Air content.
 - n) Cylinder compressive strengths with type of failure if concrete does not meet Specification requirements. Seven day breaks are to be flagged if they are less than 60% of the required 28 day strength. 28 day breaks are to be brought to the attention of the Architect and Engineer in writing if either cylinder fails to meet specification requirements.
- b. Slump Tests: Slump Tests (ASTM C 143) shall be completed at the beginning of concrete placement for each batch plant and for each set of test cylinders made. The slump test shall be made from concrete taken from the end of the concrete truck chute. The concrete shall be considered acceptable if the slump is within the slump tolerance noted on the mix design submittal form for that class of concrete.
- c. Air Entrainment: Air entrainment tests (ASTM C 231 or C 173, C 173 only for lightweight concrete) shall be made at the same time slump tests are made as cited above. Samples for air entrainment tests shall be taken at the point of
- d. Concrete Temperature: Concrete temperature at placement shall be measured (ASTM C 1064) at the same time slump tests are made as cited above.
- 4. Evaluation and Acceptance of Concrete:
 - a. Strength Test: A strength test shall be defined as the average strength of two six inch cylinder breaks or three four inch cylinder breaks from each set of cylinders tested at the time indicated above.
 - b. Acceptance Criteria: The strength level of an individual class of concrete shall be considered satisfactory if both of the following requirements are met:

- 1) The average of all sets of three consecutive strength tests equal or exceed the required f'c.
- 2) No individual strength test falls below the required f'c by more than the greater of 10% of f'c or 500 PSI.
- c. If either of the above Acceptance Criteria requirements is not met, the Testing Laboratory shall immediately notify the Engineer by telephone. Steps shall immediately be taken to increase the average of subsequent strength tests.
- C. Causes for Rejection of Concrete: The Contractor shall reject concrete delivered to the site for any of the following reasons:
 - 1. Wrong class of concrete (incorrect mix design number).
 - 2. Environmental Conditions: Environmental condition limits shall be as follows unless appropriate provisions in concreting practices have been made for cold or hot weather:
 - a. Cold Weather: Air temperature must be 40°F and rising or the average daily temperature cannot have been lower than 40°F for 3 consecutive days unless the temperature rose above 50°F for at least one-half of any of those 24 hour periods.
 - b. Hot Weather: Environmental conditions must be such that cause an evaporation rate from the concrete surface of 0.2 lb./sq. ft./hr. or less as determined by Figure 2.1.5 in ACI 305R-91. Concrete may be placed at other environmental condition ranges only with approval of the job inspector for the Testing Laboratory or other duly appointed representative.
 - 3. Concrete with temperatures exceeding 95°F shall not be placed in the structure.
 - 4. Air contents outside the limits specified in the mix designs.
 - 5. Slumps outside the limits specified.
 - 6. Excessive Age: Concrete shall be discharged within 90 minutes of plant departure or before it begins to set if sooner than 90 minutes unless approved by the Laboratory job inspector or other duly appointed representative.
- D. Concrete Batch Trip Tickets: Concrete batch trip tickets shall be collected and retained by the Contractor. Compressive strength, slump, air, and temperature tests shall be identified by reference to a particular trip ticket. Tickets shall contain the information specified in ASTM C 94. Each ticket shall also show the amount of water that may be added in the field for the entire batch that will not exceed the specified water cement ratio for the design mix. The Contractor and Testing Laboratory shall immediately notify the Architect/Engineer and each other of tickets not meeting the criteria specified.

3.4 STRUCTURAL STEEL

A. Scope of Work:

1. Contract Obligations:

- a. Owner Responsibility: The Owner shall pay for initial shop and field inspections and tests as required during the fabrication and erection of the structural steel.
- b. Testing Laboratory Responsibility: The inspection by the Testing Laboratory of the Fabricator's work shall be in sequence, timely, and performed in such a manner so that corrections can be made without delaying the progress of the work. Inspections shall be performed by qualified technicians with a minimum of two years of experience in structural steel testing and inspection. Refer to Paragraph 1.9A.4 for special requirements for welding inspectors. The Testing Laboratory shall provide test reports of inspections. All test reports shall indicate types and locations of defects found during inspection,

the measures required and performed to correct such defects, statements of final approval of welding and bolting of shop and field connections, and other fabrication and erection data pertinent to the safe and proper welding and bolting of shop and field connections. Weld inspection reports shall be signed by an inspector with current certification as an AWS Certified Welding Inspector (CWI). In addition to the parties listed in this Specification the Fabricator and Erector shall receive copies of the test reports.

c. Rejection of Material or Workmanship: The Owner, Architect, Engineer, and Testing Laboratory reserve the right to reject any material or workmanship not in conformance with the Contract Documents at any time during the progress of the work. However, this provision does not allow waiving the obligation for timely, in sequence inspections.

B. Quality Assurance:

- 1. Verify the fabrication shop's certification from AISC.
- Review field welder qualifications by certification or verify by retesting. Obtain welder certificates.
- C. Source Testing: The Testing Laboratory shall provide the following tests at the designated fabrication shops:
 - 1. Test welds completed in the shop according to Paragraph G "Weld Testing" below.
 - Test bolted connections completed in the shop according to Paragraph I "High-Strength Bolt Testing."
 - 3. Process Monitoring:
 - a. Provide continuous or periodic monitoring of welding as described below in Paragraph F "Weld Inspection and Process Monitoring."
 - b. Provide continuous or periodic monitoring of bolting as described below in Paragraph H "High-Strength Bolt Inspection and Process Monitoring" of high strength bolt installation in pre-tensioned or slip-critical joints using turn-of-the-nut without matchmarking or calibrated wrench method of bolt installation.
 - c. Provide periodic verification of specified camber of steel beams.
- D. Field Testing: The Testing Laboratory shall provide the following tests in the field:
 - 1. Test welds completed in the field according to Paragraph G "Weld Testing:" below.
 - 2. Test bolted connections completed in the field according to Paragraph I "High-Strength Bolt Testing."
 - Perform bend tests on completed shear connectors attached to beams as required according
 to procedures outlined in AWS D1.1. In addition, perform field bend tests on an additional 2%
 of completed shear connectors on each beam but not less than one connector per beam.
 - 4. Testing of Non-Shrink Grout for Base Plates, Bearing Plates, and Precast Wall Panels:
 - a. Compressive Strength Tests: Compressive strength of grout shall be determined by testing grout cubes according to the requirements of ASTM C 109 Modified. Test one set of three cubes at one day, and one set of three cubes at 28 days.
 - b. Frequency of Testing: One set of cubes (6 cubes) shall be made for every ten base plates and bearing plates or fraction thereof but not less than one set for each day's operation. One set of cubes shall be made for each day's operation of grouting wall panels.
- E. Field Inspection: The Testing Laboratory shall provide the following inspections in the field:
 - 1. Inspect galvanized HSS and other cold-worked structural steel members for cracking or other damage resulting from galvanizing process. Endeavor to complete inspections

- prior to erection of these members. Immediately notify Contractor and Architect/Engineer of any irregularities discovered.
- 2. Provide continuous or periodic monitoring of field welding as described below in Paragraph F "Weld Inspection and Process Monitoring."
- Provide continuous or periodic monitoring of field bolting as described below in Paragraph H
 "High-Strength Bolt Inspection and Process Monitoring" of high-strength bolt installation in
 pre-tensioned or slip-critical joints using turn-of-the-nut without matchmarking or calibrated
 wrench method of bolt installation.
- 4. Inspect welded or bolted connections that were completed, but not inspected, in the shop. Perform inspections according to Paragraph F "Weld Inspection and Process Monitoring" and/or Paragraph H "High-Strength Bolt Inspection and Process Monitoring" as appropriate.
- Obtain the planned erection procedure, and review with the Erector's supervisory personnel.
- 6. Check the installation of base plates for proper leveling, grout type, and grout application.
- Check structural steel as received in the field for possible shipping damage, workmanship, and identification marking to conform to AISC 360 for structural steel and specified ASTM standards for other steel.
- 8. Verify that surveys are occurring as specified to check plumbness and frame alignment as erection progresses. Review the submitted survey report.
- Periodically inspect the steel frame for such items as bracing and stiffening details, member locations, and joint details at each connection for compliance with approved construction documents.
- 10. Inspect 100% of the column compression and base joints for verification that gaps in contact bearing do not exceed 1/16 inch. Gaps greater than 1/16 inch but less than 1/4 inch shall be reported to the Owner and Engineer for assessment. All gaps greater than 1/4 inch shall be shimmed according to Specification 05 12 00 "Structural Steel Framing."
- 11. Endeavor to guard the Owner against the Contractor cutting, grinding, reaming, or making any other field modification to structural steel without the prior approval of the Engineer.

 Report any noted unauthorized modifications to the Owner and Engineer.
- F. Weld Inspection and Process Monitoring: The Testing Laboratory shall make the following inspections of the welds and welding processes. Welds performed in the fabricating shop may be inspected in the field unless continuous monitoring of the welding process is herein specified or if access in the field due to other work or shop finishes makes field inspection impractical:
 - Approve Welding Procedure Specifications submitted by the Contractor. Approve any changes submitted by the Contractor to any WPS that has already been approved. Obtain the Welding Procedure Qualification Record (WPQR) for each successful WPS qualification.
 - 2. Periodically verify welding electrodes to be used and other welding consumables as the job progresses.
 - 3. Periodically observe joint preparation, assembly practice, welding techniques including preheating and sequence, and the performance of welders with sufficient frequency to assure compliance with code and contract document requirements. Check preheating to assure conformance with AWS D1.1, Section 5.6. Verify procedure for control of distortion and shrinkage stresses.
 - Periodically provide visual inspection of the root pass of partial and complete joint penetration welds.
 - 5. Visually inspect 100 % of welds for proper size, length, location, and weld quality in accordance with AWS D1.1 requirements. Unless specifically noted otherwise, all welding shall be considered statically loaded nontubular connections.
 - 6. Visually inspect 100% of the welds of anchors to embedded plates that are to be cast into concrete elements.
 - 7. In addition to the inspections above, perform the following:
 - a. Periodically monitor welding of single pass fillet welds that are less than or equal to

- 5/16 inch.
- b. Periodically monitor the welding of headed study to floor beams.
- c. Periodically monitor the welding of anchors to embedded plates that are to be cast into concrete elements.

G. Weld Testing:

- 1. Perform nondestructive examination services using a qualified technician with the necessary equipment to perform the following:
 - a. Nondestructive examination conducted in accordance with the specific requirements for the item being examined including radiographic (RT), ultrasonic (UT), magnetic particle (MT), or dye-penetrant inspection (PT). Nondestructive inspection procedures shall conform to AWS D1.1.
 - b. Interpret, record, and report results of the nondestructive tests.
 - c. Mark for repair, any area not meeting Specification requirements. Correction of rejected welds shall be made in accordance with AWS D1.1.
 - d. Re-examine repair areas and interpret, record, and report the results of examinations of repair welds.
 - e. Verify that quality of welds meet the requirements of AWS D1.1.
- Fillet Welds: Provide the following:
 - a. MT test a minimum of 10% of the length of each fillet weld exceeding 5/16".
- 3. Partial Joint Penetration (PJP) Welds, including Flare-Bevel Groove Welds: Provide the following:
 - a. MT test a minimum of 25% of the length of each PJP weld exceeding 5/16" effective throat-
 - b. Periodic MT testing of representative PJP welds 5/16" and less but need not exceed 10% of all such welds, except as required for high rejection rates as indicated in the following paragraph.
 - c. Increase MT testing rate for welders having a high rejection rate as required to ensure acceptable welds.
- 4. Complete Joint Penetration (CJP) Welds: Provide the following:
 - a. All CJP welds exceeding 5/16" thickness shall be 100% UT tested per AWS D1.1 Clause 6 Part F. The Testing Laboratory shall review the CJP joints to determine where geometry or accessibility precludes the use of standard scanning patterns per AWS D1.1 Clause 6 Part F. At these locations the testing laboratory shall develop and submit for approval a written testing procedure in accordance with AWS D1.1 Annex S.
 - b. Periodic MT testing of representative CJP welds 5/16" and less not to exceed 10% of all such welds, except as required for high rejection rates as indicated in the following paragraph.
 - c. Increase MT testing rate for welders having a high rejection rate as required to ensure acceptable welds.
- 5. Acceptance Criteria:
 - a. Visual, MT, PT shall be per AWS D1.1 Table 6.1.
 - b. UT testing shall be per AWS D1.1 6.13.1 and Table 6.2.
- 6. Welds of Anchors to Embedded Plates:

- a. Headed Studs: Perform field bend tests according to AWS D1.1 on 2% of the studs welded to plates, but not less than one stud per plate.
- b. Deformed Bar Anchors: Perform MT testing on 10% of deformed bar anchors larger than 5/8" diameter.
- 7. The costs of repairing defective welds and the costs of retesting by the Testing Laboratory providing services for the Owner shall be borne by the Contractor. If removal of a backing strip is required by the Testing Laboratory to investigate a suspected weld defect, such cost shall be borne by the Contractor.
- H. High-Strength Bolt Inspection and Process Monitoring: The Testing Laboratory shall perform the following inspections for connections joined with high-strength bolts. Bolting performed in the shop may be inspected in the field unless continuous monitoring of the bolting operation is specified herein:
 - Observe preinstallation verification testing of the pretensioning method to be used in accordance with the requirements of the "Specification for Structural Joints Using High-Strength Bolts".
 - 2. Check daily the calibration of impact wrenches used in field bolted connections.
 - 3. Inspect bolt installation for 100% of high strength bolted connections according to inspection procedures outlined in the "Specification for Structural Joints Using High-Strength Bolts".
 - 4. Monitoring of Bolting Installation:
 - a. Periodic Monitoring: All other joint types and bolt installation methods shall be monitored on a periodic basis.
- I. High-Strength Bolt Testing: The Testing Laboratory shall perform the following tests for connections joined with high-strength bolts:
 - Perform Arbitration Testing according to procedures outlined in the "Specification for Structural Joints using High-Strength Bolts" when a disagreement exists between the Testing Laboratory and the Fabricator as to the minimum tension of installed bolts that have been inspected according to paragraph below.

3.5 STEEL DECKING

A. Field Inspection:

- 1. Check steel deck as received in the field for possible shipping damage, workmanship, and identification marking to conform to specified ASTM standards for steel deck.
- Periodically monitor the method of attaching the steel floor and roof decking to the structural frame.
- 3. Visually inspect 100% of the welding or other attachment method of steel deck to the structure and at sidelaps.

3.6 EARTHWORK

A. Field Testing:

- 1. Compacted Fill:
 - a. Verification of Fill Material: Perform classification and testing to verify that the fill material to be used complies with the project specifications.

- b. Field Density Testing: Perform field density testing as described below:
 - 1) Field density tests shall be run according to ASTM D 2937 or ASTM D 6938 as applicable.
 - 2) Acceptance Criteria: The results of field density tests by the Laboratory will be considered satisfactory if the average of any three consecutive tests has a value not less than the required density with no single test falling more than 2 percent below the required density and the moisture content conforms to the requirements of the specification.
 - 3) Test Frequency for Paved Areas and Building Slab Subgrade:
 - a) Make at least one field density test of the natural subgrade for every 2500 square feet of paved area or building slab but in no case less than three tests.
 - b) In each compacted fill layer or lift, make one field density test for every 2500 square feet of building slab or paved area but in no case less than three tests.
 - 4) Test Frequency for Compacted Fill beneath Column and Wall Footings and Mat Foundations: Make at least one field density test in each compacted fill layer or lift for each column footing, one for each twenty-five lineal feet of wall and one for each 2,500 square feet of mat foundation area or fraction thereof.
 - c. Report Copies: Moisture-density curves and results of field density tests shall be submitted to the parties specified earlier in this section.
 - d. Additional Testing: If reports by the Laboratory indicate field densities lower than specified, additional tests will be run by the Laboratory with at least the frequencies scheduled above on recompacted fill and/or natural subgrade. The Testing Laboratory shall notify the Contractor on a timely basis for any required retesting so as not to delay the work. The costs of such tests shall be liable to the Owner for repayment by the Contractor.
- 2. Spread (Excavated) Footings
 - a. Concrete Cylinders: Make and test concrete cylinders as specified for Cast-in-Place Concrete.
- B. Field Inspection by the Testing Laboratory:
 - 1. The Testing Laboratory shall provide inspection of materials used in foundation elements as described below.
 - 2. Compacted Fill:
 - a. Subgrade below Compacted Fill: Observe and verify that the subgrade below compacted fill has been properly prepared before compact fill construction begins.
 - b. During placement and compaction of fill, determine that the material being used and the maximum lift thickness comply with the specifications.
- C. Foundation Inspection by the Geotechnical Engineer: The Geotechnical Engineer of Record shall provide inspection service for the following items before and during foundation installation as appropriate for the foundation type. The Geotechnical Engineer shall submit written field inspection reports promptly after inspection to the parties listed above and report his findings after each inspection by telephone or e-mail to the Engineer.
 - 1. Spread (Excavated) Footing:
 - a. Subgrade: Verify that foundation bearing conditions are consistent with soil report

tests and that the footing is being installed in the proper soil strata at the proper elevation. Make recommendations regarding adjustment to subgrade or bearing elevation if subgrade is not adequate to support footing.

END OF SECTION 01 45 29

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Sections:
 - 1. Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Phasing Plan: Show sequencing and staging for the Work including impact to existing facilities operation and egress during renovation work and new construction.
- C. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
 - 1. Civil Engineering is provided under Owner's Other Consultant Contract. Refer to Civil Drawings and requirements for additional information.
- D. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage, including delivery, handling, and storage provisions for materials subject to water absorption or water damage, discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged Work.
 - 1. Indicate sequencing of work that requires water and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

E. Dust-Control and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust-control and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

- 1. Locations of dust-control partitions at each phase of the work.
- 2. HVAC system isolation schematic drawing.
- 3. Location of proposed air filtration system discharge.
- 4. Other dust-control measures.
- 5. Waste management plan.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top rails.
- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10 mils minimum thickness, with flame-spread rating of 15 or less per ASTM E 84.
- C. Dust Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.
- D. Plywood: If required for temporary protection, shall be fire resistant and shall not be installed in a manner that permanently damages existing building components to remain. Any such damage shall be repaired immediately by the Contractor.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

- B. Common-Use Field Office: Sized to accommodate only the personnel necessary to manage the Project. Keep office clean and orderly.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations only as necessary to facilitate Project progress.
 - 1. To be removed when not in continuous use.
 - 2. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures. Coordinate with Authority Having Jurisdiction.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - 3. Modify HVAC equipment to pressurize occupied area(s) and prevent migration of offensive materials from work area(s). Blank-off outside air intakes and return diffusers to prevent distribution of offensive materials into occupied area(s).
 - 4. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction and clean HVAC system as required in Division 01 Section "Closeout Procedures".
- C. Air Filtration Units: HEPA primary and secondary filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Coordinate all connections to utility systems with USFSP Physical Plant.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to municipal system or private system indicated as directed by Authorities Having Jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with approved coordination drawings.
 - Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area using HEPA-equipped air filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 - 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dustproducing equipment. Isolate limited work within occupied areas using portable dust containment devices.
 - 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 - 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

- 2. Install lighting for Project identification sign.
- J. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.
 - 1. At each telephone, post a list of important telephone numbers.
 - Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Architect's office.
 - e. Engineers' offices.
 - f. Owner's office.
 - 2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
- K. Electronic Communication Service: Provide an area within the primary field office adequate for use by Architect and Owner to access project electronic documents and maintain electronic communications, including network connectivity.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 - 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
 - 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 - 2. Recondition base after temporary use, including removing contaminated material, regrading, proof-rolling, compacting, and testing.
- C. Traffic Controls: Comply with requirements of Authorities Having Jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
 - 3. Control traffic to/from the work area(s) and occupied area(s) to prevent disturbances.
- D. Parking: Contractor shall restrict parking to locations designated by the Owner.

E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

- 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
- 2. Remove snow and ice as required to minimize accumulations.
- F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification signs per Owner's guidelines.
 - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - 3. Maintain and touchup signs so they are legible at all times.
- G. Waste Disposal Facilities: Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."
- H. All demolition trash and rubble shall be removed daily from the interior of the building in covered, rubber-tired carts. Carts shall have resilient bumpers or edges to prevent damage to walls, doors, and other building finishes.
- I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- J. Existing Elevator Use: Not Applicable.
- K. Temporary Stairs: Not Applicable.
- L. Existing Stair Usage: Not Applicable.
- M. Temporary Use of Permanent Stairs: Not Applicable.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Division 01 Section "Summary."
- B. Temporary Erosion and Sedimentation Control: Comply with requirements of 2003 EPA Construction General Permit or Authorities Having Jurisdiction, whichever is more stringent.
 - 1. Refer to Owner's Other Consultant for work related to Civil Engineering.
- C. Stormwater Control: Comply with requirements of Authorities Having Jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.

- 1. Refer to Section "Termite Control" for additional requirements.
- E. Site Enclosure Fence: Prior to commencing earthwork, furnish and install site enclosure fence in a manner that will prevent entry of the public into the Work and Storage Area (Work and Storage Area is the assigned outside area used to access the Work, park vehicles directly engaged with the Work, and temporary storage, i.e. storage while being delivered).
 - 1. Extent of Fence: The Contractor shall use six-foot high chain link fencing mounted on fixed posts of metal or wood (or other fencing approved by the Owner/ Project Manager) for temporary parking and work area; however, any open trenches, or other hazards, shall be enclosed in a fixed wire fence or wooden barricades with flashing lights. The responsibility for any injuries occurring at the Contractor's construction site shall be the Contractor's.
 - 2. Isolate the project area(s) from the occupied areas(s) with barricades, green woven fabric visual barrier.
 - 3. The Contractor shall provide and maintain necessary barriers and protective devices to control public access into work areas and to contain all work and storage areas such that adjoining facilities, including walkways, corridors, stairs and doorways remain accessible for the Owner's use. Orange plastic visual barriers are preferred.
 - 4. Access gates must be supervised by Contractor's personnel and shall be locked when site is not occupied.
 - 5. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- F. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
 - 1. Florida statutes 812.04 and 810.09 require that construction area fences be clearly labeled "WARNING" (white on red) "This area is a designated construction site. Anyone trespassing on this property shall, upon conviction, be guilty of a felony." Signs (black on white) shall be approximately 14" x 18".
- H. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction and requirements indicated on Drawings.
 - 1. Construct covered walkways using scaffold or shoring framing.
 - 2. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
 - 3. Paint and maintain appearance of walkway for duration of the Work.

J. ADA Compliant Paths: At all times during construction, the Contractor shall maintain safe, clean, ADA/ building code compliant paths of travel for pedestrians and bicyclists.

- 1. Temporary, alternate paths of travel may be established with formal request and written approval by Owner.
- K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather-tight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- L. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
 - 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
 - 2. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant treated plywood.
 - 3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 - 4. Insulate partitions to control noise transmission to occupied areas.
 - 5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 - 6. Protect air-handling equipment.
 - 7. Provide walk-off mats at each entrance through temporary partition.
- M. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.
- N. Site Maintenance: Construction, staging, and parking sites shall be kept clean at all times and policed by Contractor personnel on a daily basis.
 - 1. Cleaning activities shall extend to streets surrounding construction site and shall include daily sweeping to remove dirt/mud tracked out of site by personnel and equipment.
 - 2. All demolition trash and rubble shall be removed daily from the interior of the building in covered, rubber-tired carts. Carts shall have resilient bumpers or edges to prevent damage to walls, doors, and other building finishes.

3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.
 - 2. Protect stored and installed material from flowing or standing water.
 - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 - 4. Remove standing water from decks.
 - 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - 2. Keep interior spaces reasonably clean and protected from water damage.
 - 3. Periodically collect and remove waste containing cellulose or other organic matter.
 - 4. Discard or replace water-damaged material.
 - 5. Do not install material that is wet.
 - 6. Discard, replace or clean stored or installed material that begins to grow mold.
 - 7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - 2. Use permanent HVAC system to control humidity.
 - 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsumbased products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record daily readings over a forty-eight hour period. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.

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

- C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.
- D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 56 39 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. Refer to Owner's Other Consultants drawings for Civil Engineering (not a part of these Construction Documents) for coordination and additional information.

1.2 SUMMARY

- A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.
- B. Related Sections:
 - 1. Division 01 Section "Temporary Facilities and Controls" for temporary site fencing.

1.3 DEFINITIONS

- A. Caliper: Diameter of a trunk measured by a diameter tape at 6 inches above the ground for trees up to, and including, 4-inch size; and 12 inches above the ground for trees larger than 4-inch size.
- B. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.
- C. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and indicated on Drawings
- D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type of the following:
 - 1. Organic Mulch: 1-quart volume of organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
 - 2. Protection-Zone Fencing: Assembled Samples of manufacturer's standard size made from full-size components.
 - 3. Protection-Zone Signage: Full-size Samples of each size and text, ready for installation.
- C. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

- 1. Species and size of tree.
- 2. Location on site plan. Include unique identifier for each.
- 3. Reason for pruning.
- 4. Description of pruning to be performed.
- 5. Description of maintenance following pruning.
- D. Qualification Data: For qualified arborist and tree service firm.
- E. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.
- F. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.
- G. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.
 - 1. Use sufficiently detailed photographs or videotape.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

1.5 QUALITY ASSURANCE

- A. Arborist Qualifications: Certified Arborist as certified by ISA.
- B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.
- C. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:
 - a. Construction schedule. Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
 - b. Enforcing requirements for protection zones.
 - c. Arborist's responsibilities.
 - d. Field quality control.

1.6 PROJECT CONDITIONS

- A. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.

- 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- B. Do not direct vehicle or equipment exhaust toward protection zones.
- C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil: Natural or cultivated top layer of the soil profile or manufactured topsoil; containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inch in diameter; and free of weeds, roots, and toxic and other nonsoil materials.
 - 1. Obtain topsoil only from well-drained sites where topsoil is 4 inches deep or more; do not obtain from bogs or marshes.
- B. Topsoil: Imported or manufactured topsoil complying with ASTM D 5268.
- C. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:
 - 1. Type: Wood and bark chips
 - 2. Size Range: 3 inches maximum, 1/2 inch minimum
 - 3. Color: Natural.
- D. Protection-Zone Fencing: Fencing fixed in position and meeting one of the following requirements
 - 1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch maximum opening in pattern and weighing a minimum of 0.4 lb/ft.; remaining flexible from minus 60 to plus 200 deg F; inert to most chemicals and acids; minimum tensile yield strength of 2000 psi and ultimate tensile strength of 2680 psi; secured with plastic bands or galvanized-steel or stainless-steel wire ties; and supported by tubular or T-shape galvanized-steel posts spaced not more than 8 feet apart.
 - a. Height: 6 feet.
 - b. Color: High-visibility orange, nonfading.
 - 2. Gates: Single swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones; leaf width 36 inches (914 mm).
- E. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering and as follows:
 - 1. Size and Text: TREE PROTECTION ZONE- NO VEHICULAR ACCESS
 - 2. Lettering: 3-inch high minimum, white characters on red background.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

B. For the record, prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

- A. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Tie a 1-inch blue-vinyl tape around each tree trunk at 54 inches above the ground.
- B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
- C. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated.
 - Apply 4-inch average thickness of organic mulch. Do not place mulch within 6 inches of tree trunks.

3.3 TREE- AND PLANT-PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected area except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
 - 1. Chain-Link Fencing: Install to comply with ASTM F 567 and with manufacturer's written instructions.
 - 2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.
 - 3. Access Gates: Install where access is required. Adjust to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect. Install one sign spaced approximately every 20 feet (6 m) on protection-zone fencing, but no fewer than (4) four signs with each facing a different direction.
- C. Maintain protection zones free of weeds and trash.
- D. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

E. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.

- 1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
- 2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

- A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Division 31 Section "Earth Moving."
- B. Trenching near Trees: Where utility trenches are required within protection zones, hand excavate under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.
- C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction and as required for root pruning.
- D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

- A. Prune roots that are affected by temporary and permanent construction. Prune roots as follows:
 - 1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
 - 2. Cut Ends: Coat cut ends of roots more than 1-1/2 inches in diameter with an emulsified asphalt or other coating formulated for use on damaged plant tissues and that is acceptable to arborist.
 - 3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - 4. Cover exposed roots with burlap and water regularly.
 - 5. Backfill as soon as possible according to requirements in Division 31 Section "Earth Moving."
- B. Root Pruning at Edge of Protection Zone: Prune roots 12 inches inside of the protection zone, by cleanly cutting all roots to the depth of the required excavation.
- C. Root Pruning within Protection Zone: Clear and excavate by hand to the depth of the required excavation to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

3.6 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as follows:

- Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
- 2. Pruning Standards: Prune trees according to ANSI A300 (Part 1) and the following:
 - a. Type of Pruning:
 - 1) Cleaning.
 - 2) Thinning.
 - 3) Raising.
 - 4) Reduction.
- 3. Cut branches with sharp pruning instruments; do not break or chop.
- 4. Do not apply pruning paint to wounds.
- B. Chip removed branches dispose of off-site.

3.7 REGRADING

- A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
- B. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.
 - 1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.
- C. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
- D. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

3.8 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

- A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.
 - 1. Submit details of proposed root cutting and tree and shrub repairs.

2. Have arborist perform the root cutting, branch pruning, and damage repair of trees and shrubs.

- 3. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
- 4. Perform repairs within 24 hours.
- Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Architect.
- B. Trees: Remove and replace trees indicated to remain that are more than 50 percent dead or in an unhealthy condition or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.
 - 1. Provide new trees of same size and species as those being replaced for each tree that measures 6 inches or smaller in caliper size.
 - 2. Provide one new tree of 6-inch caliper size for each tree being replaced that measures more than 6 inches in caliper size.
 - 3. Plant and maintain new trees as specified in Landscape Drawings.
- C. Soil Aeration: Where directed by Architect, aerate surface soil compacted during construction. Aerate 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch diameter holes a minimum of 12 inches deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 01 56 39

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SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Sections:

- 1. Division 01 Section "Substitution Procedures" for requests for substitutions.
- 2. Division 01 Section "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.

- Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
 - c. Product must meet or exceed warranty requirements for the basis-of-design.
 - d. If delegated design, Contractor shall be responsible for verifying Notice of Florida Product Approval or signed and sealed shop drawings verifying that the assembly meets Florida Building Code requirements.
 - e. Assemblies regulated by Florida Building Code or NFPA requirements for loading criteria requirements or flame and smoke developed index must be accompanied by delegated design submittals.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
- B. All products must be installed per Manufacturer's requirements to achieve fully warranted and/or code mandated requirements.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.

- 2. Store materials in a manner that will not endanger Project structure.
- 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
- 4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
- 5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
- 6. Protect stored products from damage and liquids from freezing.
- 7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Refer to Divisions 02 through 33. Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - 4. Where products are accompanied by the term "as selected," Architect will make selection.
 - 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

7. Provide products that meet or exceed the sustainability criteria for the project.

B. Product Selection Procedures:

Products:

a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered, unless otherwise indicated.

2. Manufacturers:

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

2.2 COMPARABLE PRODUCTS

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

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.

- 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
- 3. Evidence that proposed product provides specified warranty.
- 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
- 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

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SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Sections:

- 1. Division 01 Section "Submittal Procedures" for submitting surveys.
- 2. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
- 3. Division 01 Section "Construction Waste Management and Disposal"
- 4. Division 07 Section "Penetration Firestopping" for patching penetrations in fire- or smokerated construction.

1.3 DEFINITIONS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor.
- B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

- 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
- 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
- 3. Products: List products to be used for patching and firms or entities that will perform patching work.
- 4. Dates: Indicate when cutting and patching will be performed.
- 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate how long services and systems will be disrupted.
- D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- E. Final Property Survey: Submit 3 copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from the Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Communication systems.
 - h. Conveying systems.
 - i. Electrical wiring systems.
 - j. Operating systems of special construction.
 - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance

or decreased operational life or safety. Other construction elements include but are not limited to the following:

- a. Water, moisture, or vapor barriers.
- b. Membranes and flashings.
- c. Exterior Pre-Cast Panel construction.
- d. Equipment supports.
- e. Piping, ductwork, vessels, and equipment.
- f. Noise- and vibration-control elements and systems.
- 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
 - 1. For projects requiring compliance with sustainable design and construction practices and procedures, utilize products for patching that comply with requirements of Division 01 Section "Sustainable Design Requirements."
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

- 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
- 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - Recommended corrections.
 - 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Isolate the project area(s) from the occupied area(s) with barricades, plastic sheeting or temporary walls. The Contractor shall provide and maintain necessary barriers and protective devices to control public access into work areas and to contain all work and storage areas such that adjoining facilities, including walkways, corridors, stairs and doorways remain accessible for the Owner's usage. Orange plastic visual barriers are preferred
- B. Protect contiguous and nearby structures from danger by temporary covers, shoring, bracing, and supports. Repair or replace items damaged during the performance of the work.
- C. Where pedestrian or vehicle driver safety is endangered in the area of the demolition and removal work, erect barricades with flashing lights. Control traffic to/from the work area(s) and occupied area(s) to prevent disturbances.
- D. Modify HVAC equipment to pressurize occupied area(s) and prevent migration of offensive materials from work area(s). Blank-off outside air intakes and return diffusers to prevent distribution of offensive materials into occupied area(s).
- E. All demolition trash and rubble shall be removed daily from the interior of the building in covered,

- rubber-tired carts. Carts shall have resilient bumpers or edges to prevent damage to walls, doors, and other building finishes.
- F. The use of any "air hammers" or other impact equipment which will cause excessive noise or vibration shall be strictly prohibited during working hours. Contractor to coordinate work that may result in excessive noise with the Owner.
- G. The use of any gasoline-powered equipment inside the building shall be strictly prohibited.
- H. Except for special situations where prior approval from the Owner was granted, the use of power impact tools for demolition is prohibited inside occupied buildings.
- I. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with Authorities Having Jurisdiction.
- J. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- K. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- M. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect according to requirements in Division 01 Section "Project Management and Coordination."
- N. Surface and Substrate Preparation: Comply with manufacturer's recommendations for preparation of substrates to receive subsequent work.
- O. The Contractor shall coordinate the scope of work with the Owner's event schedule, and shall schedule and carry out the Work such that normal operations of the Owner are given first priority. This applies particularly to utilities outages and restriction of access. Such construction operations shall frequently be carried on outside of normal working hours, and by overtime, weekend and holiday work. It shall be the Contractor's responsibility to provide for this in bidding.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 3. Inform installers of lines and levels to which they must comply.
 - 4. Check the location, level and plumb, of every major element as the Work progresses.

5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.

- 6. Close site surveys with an error of closure equal to or less than the standard established by Authorities Having Jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.

4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.

- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect but within the range allowable by the Florida Building Code including the Accessibility Code.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Temporary Support: Provide temporary support of work to be cut.
- C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements of Division 01 Section "Summary."

- E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - Clean piping, conduit, and similar features before applying paint or other finishing materials
 - b. Restore damaged pipe covering to its original condition.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 - 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an evenplane surface of uniform appearance.

5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Utilize containers intended for holding waste materials of type to be stored.
 - 4. Coordinate progress cleaning for joint-use areas where more than one installer has worked.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls." Division 01 Section "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 01 Section "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.11 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 00

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SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.

B. Related Requirements:

 Section 024119 "Selective Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements, and for disposition of hazardous waste.

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 7 days of date established for the Notice to Proceed.

1.5 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate

quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Use Waste Log Form approved by the owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - 1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - 2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control, as required.

3.2 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Remove waste materials from Owner's property and legally dispose of them.
- D. All demolition trash and rubble shall be removed daily from the interior of the building in covered, rubber-tired carts. Carts shall have resilient bumpers or edges to prevent damage to walls, doors, and other building finishes.

END OF SECTION 01 74 19

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.

B. Related Sections:

- 1. Division 01 Section "Photographic Documentation" for submitting final completion construction photographic documentation.
- 2. Division 01 Section "Execution" for progress cleaning of Project site.
- 3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
- 4. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
- 5. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
- 6. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete with request.
 - 1. Contractor shall obtain, refer to and complete Owner required checklists for Substantial Completion.
 - 2. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 3. Advise Owner of pending insurance changeover requirements.
 - 4. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 5. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

- 6. Prepare and submit Project Record Documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
- 7. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
- 8. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
- 9. Complete startup testing of systems.
- 10. Submit test/adjust/balance records.
- 11. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
- 12. Advise Owner of changeover in heat and other utilities.
- 13. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- 14. Complete final cleaning requirements, including touchup painting.
- 15. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

1.4 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:
 - 1. Contractor shall refer to and complete Owner required checklists for Final Completion.
 - 2. Submit a final Application for Payment according to Division 01 Section "Payment Procedures
 - Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 - 4. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 - 5. Submit pest-control final inspection report and warranty.
 - 6. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 - 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 - 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Contractor.
 - d. Page number.

- 4. Submit list of incomplete items in the following format:
 - a. Excel (tabular format) spreadsheet organized by room number and location within each room (i.e. north, south, east, west walls; ceiling; floor, etc.).
 - b. PDF electronic file for final, consolidated punch-list.

1.6 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual and deliver to Owner and Architect in searchable and tabularized PDF (digital format)

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Follow IFAS and/or UF guidelines for Green Clean products.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

c. Rake grounds that non- planted and non-paved to a smooth, even-textured surface.

- d. Remove tools, construction equipment, machinery, and surplus material from Project site.
- e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
- f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
- g. Sweep concrete floors broom clean in unoccupied spaces.
- h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
- Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
- j. Remove labels that are not permanent including any adhesive.
- k. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
- I. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- m. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
- n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- o. Ensure all plumbing lines are flushed to produce required flow and drainage for both potable water lines and sanitary sewer. Contractor to ensure no construction debris enters the sanitary lines at any time.
- p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- q. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
 - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report upon completion of cleaning.
- r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
- s. Leave Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Construction Waste Management and Disposal."

END OF SECTION 01 77 00

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing manuals required to be provided by the Builder and its subcontractors to provide instructions and other information necessary for the Owner's long term care, maintenance, repair, and operation of installed products, materials, equipment, and systems including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Product maintenance manuals.
 - Systems and equipment maintenance manuals.

B. Related Sections:

- 1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
- 2. Divisions 02 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

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

1.4 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual specification sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. PDF electronic file. Assemble each manual into a composite electronically-indexed file. Submit on digital media acceptable to Architect.

 Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically-linked operation and maintenance directory.

- b. Enable inserted reviewer comments on draft submittals.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect and Commissioning Agent will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Agent will return copy with comments.
 - 1. Correct or modify each manual to comply with Architect's Comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Commissioning Agent's Comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

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

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

- 1. Title page.
- 2. Table of contents.
- Manual contents.
- B. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name and contact information for Contractor.
 - 6. Name and contact information for Architect.
 - 7. Name and contact information for Commissioning Agent.
 - 8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 - 9. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
 - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 2. File Names and Bookmarks: Enable bookmarking of individual documents based upon file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel upon opening file.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
 - 1. Type of emergency.
 - 2. Emergency instructions.
 - 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

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

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 - 2. Performance and design criteria if Contractor is delegated design responsibility.
 - 3. Operating standards.
 - 4. Operating procedures.
 - 5. Operating logs.
 - 6. Wiring diagrams.
 - 7. Control diagrams.
 - 8. Piped system diagrams.
 - 9. Precautions against improper use.
 - 10. Precaution against use of specific cleaners or treatments for finishes.
 - 11. Precaution for storage of spare parts and/or attic stock materials.
 - 12. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
 - Product name and model number. Use designations for products indicated on Contract Documents.
 - 2. Manufacturer's name.
 - 3. Equipment identification with serial number of each component.
 - 4. Equipment function.
 - 5. Operating characteristics.
 - 6. Limiting conditions.
 - 7. Performance curves.
 - 8. Engineering data and tests.
 - 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:

- 1. Startup procedures.
- 2. Equipment or system break-in procedures.
- 3. Routine and normal operating instructions.
- 4. Regulation and control procedures.
- Instructions on stopping.
- 6. Normal shutdown instructions.
- 7. Seasonal and weekend operating instructions.
- 8. Required sequences for electric or electronic systems.
- 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed; and, identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, spare parts/attic stock and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
 - 6. Spare part or attic stock availability.
- D. Create an inventory of all attic stock in tabular format including the following:
 - 1. Designation as indicated in Drawings.
 - Material type
 - 3. Room number/ location(s) of installation
 - 4. Description, Size and Color
 - 5. Manufacturer and contact information:
 - a. Include original vendor/supplier contact information
 - 6. Quantity of attic stock
 - 7. Storage location of attic stock (as directed by Owner).
- E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.

- 4. Schedule for routine cleaning and maintenance.
- 5. Repair instructions.
- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard and special maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include tabular lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

- G. Attic Stock List and Source Information: Include tabular lists of attic stock identified and crossreferenced with designation from drawings and room numbers where materials are installed. Cross reference to maintenance and warranty information and location of attic stock for future use.
- H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

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

and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

- 1. Do not use original project record documents as part of operation and maintenance manuals.
- 2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."
- G. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
 - Miscellaneous record submittals.

B. Related Sections:

- 1. Division 01 Section "Execution" for final property survey.
- 2. Division 01 Section "Closeout Procedures" for general closeout procedures.
- 3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
- 4. Divisions 02 through 33 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set(s) of marked-up record prints and digital copies.
 - 2. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal: Submit one paper copy set of marked-up record prints and one set(s) of plots from corrected record digital data files as well as the digital files. Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
- B. Record Specifications: Submit one paper copy and digital copies of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one paper copy and digital copies of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy of each submittal.

E. Reports: Submit written report weekly indicating items incorporated in Project record documents concurrent with progress of the Work, including modifications, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding archive photographic documentation.
 - 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - I. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 - 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up record prints.
 - 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 - 5. Mark important additional information that was either shown schematically or omitted from original Drawings.

- 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
 - 1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
 - 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 - 3. Refer instances of uncertainty to Architect for resolution.
 - 4. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.
 - a. Refer to Division 01 Section "Submittal Procedures" for requirements related to use of Architect's digital data files.
 - b. Architect will provide data file layer information. Record markups in separate layers.
- C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
 - 1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
 - 2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- D. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
 - 1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 - 2. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 - 3. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

- 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
- 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
- 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
- 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
- 5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as scanned PDF electronic file(s) of marked up paper copy of Specifications.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Product Data as paper copy.
 - 1. Include record Product Data directory organized by specification section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

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

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and modifications to project record documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 01 78 39

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SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training video recordings.
 - Provision and inventory of attic stock.

B. Related Sections:

1. Divisions 02 through 33 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 INFORMATIONAL SUBMITTALS

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

1.4 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

- C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 3. Review required content of instruction.
 - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

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

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.

- 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 - h. Attic stock quantities and stock location.
- 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
- 4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - I. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.

- f. Procedures for routine maintenance.
- g. Instruction on use of special tools.
- h. Attic stock quantities and data to acquire additional material if required.
- 8. Repairs: Include the following:
 - Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
 - 2. Owner will furnish an instructor to describe Owner's operational philosophy.
 - 3. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - Schedule training with Owner, through Architect, with at least seven days' advance notice.
- D. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 01 79 00

section 02

DEMOLITION

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SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

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

B. Related Requirements:

- 1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
- 2. Section 015639 "Temporary Tree and Plant Protection" for temporary protection of existing trees and plants that are affected by selective demolition.
- 3. Section 017300 "Execution" for cutting and patching procedures.
- 4. Section 013516 "Alteration Project Procedures" for general protection and work procedures for alteration projects.
- 5. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse or store for re-use/ re-installation.
 - 1. Salvage all accessories and trim needed for re-use/re-installation.
 - 2. Advise Owner and Architect if any components intended for salvage and re-use are damaged or otherwise unacceptable for re-installation.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

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

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- D. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- E. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.
- F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- G. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
 - Provide tab delineated format as indicated in section 01 33 00 "Submittal Procedures".

1.8 QUALITY ASSURANCE

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

1.9 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - Before selective demolition, Owner will remove the following items as indicated in section
 0:
 - a. 01 35 16 "Alteration Project Procedures" and as indicated in the Contract Drawings.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 - 3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
- F. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12 inches (300 mm) or more.
- G. Storage or sale of removed items or materials on-site is not permitted.
- H. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding.

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.11 COORDINATION

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs or video, and templates.
 - 1. Comply with requirements specified in Section 013233 "Photographic Documentation."
 - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 PREPARATION

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

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

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

3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

- 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
- 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
 - 6. Maintain adequate ventilation when using cutting torches.
 - 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 10. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area designated by Owner.
 - 5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

- 1. Clean and repair items to functional condition adequate for intended reuse.
- 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
- 3. Protect items from damage during transport and storage.
- 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.
- F. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Contract Drawings and specifications for new roofing requirements.
 - 1. Remove existing roof membrane, flashings, copings, and roof accessories.
 - 2. Remove existing roofing system down to substrate.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.] [and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.

3.8 CLEANING

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

END OF SECTION 02 41 19

section 03

CONCRETE

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SECTION 03 36 50 - STAINED AND SEALED CONCRETE FLOOR FINISH

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. A. Drawings and general provisions of the 100% Construction Documents, of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Colored concrete stain and the application to the following:
 - a. Concrete slab floors; refer to the finish schedule.
 - 2. Seal coats.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C920: Standard Specification for Elastomeric Joint Sealants.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's specifications and technical data including the following.
 - 1. Detailed specifications of construction and fabrication.
 - 2. Manufacturer's installation instructions.
- B. Quality Control Submittals:
 - 1. Statement of installer's qualifications.
 - a. Indicate listing of past-completed projects, including project name, address, and name and telephone number of individual project representative.
 - b. Statement of compliance with regulatory requirements specified in this and related Sections.
 - c. Name, address, and telephone of manufacturer's representative who will be performing manufacturer's field service specified under PART 3 of this Section.
- C. Samples for Verification: Verification Samples: 8 inch by 8-inch preliminary samples of specified colors for Architect's review.
 - 1. Resubmit samples until stain color design, for each location, is achieved.
 - 2. Provide a list of dilution rates and application method for each sample.
 - 3. Label each sample indicating location in the Project.

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- 4. Submit samples on concrete substrates for Architect's review of color only.
- D. Contract Closeout Submittals:
 - Operation and maintenance data. Include cleaning and maintenance data, and suggested materials

1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Not less than 10 years experience in the actual production of specified products.
- B. Installer's Qualifications: Firm experienced in installation of systems similar in complexity to those required for this Project, plus the following:
 - 1. Acceptable to or licensed by manufacturer.
 - 2. Not less than 5 years experience with systems.
 - 3. Successfully completed not less than 5 comparable scale projects using this system.
- C. Mock-Up or Field Sample: Prepare field sample at Project Site for Architect's review and to establish requirements for ratings and finish texture.
 - 1. Correct areas, modify method of installation, or adjust finish as directed by Architect to comply with specified requirements.
 - 2. Maintain mock-ups and field samples accessible throughout the Work to serve as a standard of quality for this Section.
 - 3. Field sample shall be stained and sealed in the presence of Architect, and shall consist of the following.
 - a. Field sample shall be stained and sealed by individual workers who will be performing Work for finished floors.
 - b. 4 feet by 4 feet sample of slab cast under Section 03 30 00, including specified concrete stain materials, seal coat materials, and proposed installation methods for each color selected by Architect.
 - c. Indicate proposed range of color, texture and workmanship to be expected in completed Work.
 - 4. Obtain acceptance of Architect of mock-up before start of Work of this Section.

D. Pre-installation conference:

- 1. Convene pre-installation conference one week prior to commencing Work of this Section.
- 2. Contractor shall be presiding officer at conference.
- 3. Conference shall be attended by Contractor, subcontractor, Architect, and representative of manufacturer of floor stain and seal coat.
- 4. Purpose of conference will be to review contract requirements and discuss schedules, work procedures, proposed materials and quality control.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver products in original unopened packaging with legible manufacturer's identification.
- B. Storage and Protection: Comply with manufacturer's recommendations.

1.7 PROJECT CONDITIONS

- A. Environmental Requirements: Maintain ambient temperature between 50 and 90 degrees F. during and 48 hours after installation.
- B. Protection: Precautions shall be taken to avoid damage or contamination of any surfaces near the work zone. Protect completed stain work from moisture or contamination.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers and Products:
 - 1. H&C: Infusion Reactive Concrete Stain.
 - 2. L.M. Scofield Company: Lithochrome Tintura.
 - 3. QC Construction Products: Cemtint.

2.2 FLOOR FINISH MATERIALS

- A. Floor Stain: Water based solution of metallic salts containing no resin.
 - 1. Colors (based on H&C Infusion Reactive Concrete Stains):
- B. Seal Coat: Water based modified methyl-methacrylate clear emulsion.
 - 1. Maximum volatile organic compound (VOC): 350 grams per liter.
 - 2. Basis of Design: H&C Colortop, water-based, 2-part polyurethane clearcoat.
 - 3. Prepare floor according to manufacturer requirements and use clear coat only where indicated in drawings.

C. Application Equipment:

- 1. Floor stain: Type recommended by floor stain manufacturer.
- 2. Seal coat: Airless sprayer or lambswool applicator recommended by seal coat manufacturer; manufacturer recommended based on application of "Shargrip" non-slip additive; required for clear finish coats.
- D. Joint Sealant: Polyurethane base, 3 part elastomeric sealant, complying with ASTM C920, Type M, Grade NS, Class 25, Use NT, M, A, and O.
 - 1. Color: Match chemically stained concrete.
 - 2. Basis of Design: L.M. Scofield Company: Lithoseal Trafficalk-3G.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper and timely completion.

- 1. Verify that freshly placed concrete has been properly finished.
- 2. Do not proceed until unsatisfactory conditions have been corrected.
- 3. Commencement of work indicates acceptance of satisfactory conditions by the Installer.

3.2 PREPARATION

A. Preparation:

- 1. Notify Architect and floor stain manufacturer's representative not less than 3 days prior to commencement of Work of this Section.
 - a. Provide exact date and time Work will commence.

2. New Concrete:

- a. Newly placed concrete shall be sufficiently cured to allow concrete to become reactive, minimum 28 days.
- b. Do not use liquid curing materials. Cure concrete flatwork with new, unwrinkled, non-staining, high quality curing paper. Do not overlap curing paper.
- c. Surfaces shall be cured using the same method and different sections (pours) chemically stained when the concrete is the same age.
- d. Immediately prior to chemically staining, thoroughly clean the concrete. Sweep surfaces, the pressure wash or scrub using a rotary floor machine. Use suitable, high-quality commercial detergents to facilitate cleaning. Rinse surfaces after cleaning until rinse water is completely clean. Allow floor to dry completely prior to application of floor stain.
- e. Concrete surfaces must be uniformly slip-resistant and profiled to meet a Concrete Surface Preparation (CSP) profile of 1-2 per ICRI guidelines.
- f. Some concrete may require abrading to open the surface and make it sufficiently penetrable. In these instances the concrete surface must be sanded using an 60-80 mesh-sanding screen or a grit brush. After sanding, all residue must be removed by power vacuuming. The surface should then be pressure washed or scrubbed using a rotary floor machine.
- g. For preparation, the sandblaster should be capable of producing a light, uniform sandblast and be equipped with a dust collector.
- h. For preparation, the pressure washer should be equipped with a fan tip and have a minimum pressure capability of 4000 psi (14 MPa). Hot water capability may facilitate cleaning of existing concrete.
- i. Acid washing may be required when the above surface preparation does not yield adequate penetration or if there are excessive alkali deposits or surface discoloration. The reacted residue must be abraded using a low-speed floor machine equipped with a 60 mesh screen or a grit brush and then thoroughly rinsed until the rinse water is clear and free of solids, a minimum of two times. After rinsing, neutralize any remaining acid residue by washing with a solution of baking soda (sodium bicarbonate) and water. (Test pH of floor should be 7 or higher.)

- B. Protection: Protect surfaces not being treated, including finish Work of other Sections.
 - 1. Remove protection when Work of this Section is complete.

3.3 INSTALLATION OF FLOOR STAIN

A. Saw-cut Joints:

- 1. Saw-cut joints in patterns indicated on the Drawings.
- 2. Joints shall be straight and true without deviation for its entire length.
- Joint size:
 - a. 1/8 inch wide by minimum 1/4 inch deep.
- 4. Change saw blades as necessary to prevent edge chipping of joints.

B. Preparation:

- 1. Clean floors using commercial rotary floor machine, brushes, and cleaning agents as recommended by floor stain manufacturer.
- 2. Remove dirt, oil, grease, adhesives, curing membranes, and other contaminants from floor surface.
- 3. Rinse floor to produce a clean surface.
- 4. Allow floors to dry prior to installation of floor stain.
- C. Install floor stain on sections of concrete poured at different times when concrete has cured the same number of days.
- D. Apply first coat of floor stain at coverage rate recommended by the manufacturer.
 - Do not splash stain solution or allow to puddle.
 - 2. Provide temporary dams or other recommended methods to prevent flow of stain across joints and bleeding into other colors.
- E. Remove stain residue immediately prior to application of second coat of floor stain.
 - 1. Apply second coat of floor stain at coverage rate recommended by the manufacturer, or as required to match approved field sample.
 - 2. Do no splash stain solution or allow to puddle.
 - 3. Provide temporary dams or other recommended methods to prevent flow of stain across joints and bleeding into other colors.
 - 4. Remove stain residue by wet scrubbing using commercial rotary floor machine, brushes, and cleaning agents as recommended by floor stain manufacturer.
 - 5. Allow floors to dry prior to installation of floor sealer.

3.4 INSTALLATION OF JOINT SEALANT

- A. Clean and prepare joints, only where indicated on the Drawings to receive joint sealant, in accordance with manufacturer's instructions. Saw-cut joints shall be left open, without joint sealant, unless specifically noted otherwise.
 - 1. Remove loose materials and foreign matter, which might impair adhesion of sealant.
 - 2. Etch concrete surfaces as recommended by sealant manufacturer.
 - 3. Clean and prime joints in accordance with manufacturer's instructions.
- B. Verify joint backing and release tapes are compatible with sealants.

- C. Install in accordance with manufacturer's instructions.
 - 1. Measure joint dimension, and size materials to achieve width/depth ratio recommended by sealant manufacturer.
 - a. Install joint backing using blunt instrument to avoid puncturing backing material, to achieve a neck dimension no greater than 1/3 the joint width.
 - b. Do not leave voids or gaps between ends of joint backing units.
 - 2. Install bond breaker tape at locations where joint backing cannot be used.
 - 3. Install sealant in uniform, continuous ribbons without gaps, air pockets, ridges, or sags with complete "wetting" of joint bond surfaces equally of opposite sides.
 - 4. Tool joints concave, slightly below adjoining surfaces.
 - Where horizontal joints are between horizontal and vertical surfaces, tool joint to a slight cove so joint will not trap moisture or dirt.
 - 5. Install sealant to depths recommended by sealant manufacturer.
 - 6. Do not allow sealants or compounds to overflow or spill onto adjoining surfaces, or to migrate into voids of adjoining surfaces.
 - 7. Cure sealants in accordance with sealant manufacturer's instructions.

3.5 INSTALLATION OF SEAL COATS

A. Preparation:

- 1. Clean floors using pressure washer or commercial rotary floor machine, brushes, and cleaning agents as recommended by seal coat manufacturer.
- 2. Remove dirt, oil, grease, adhesives, curing membranes, and other contaminants from floor surface.
- 3. Rinse floor to produce a clean surface.
- 4. Allow floors to dry prior to installation of seal coats.
- B. Apply first coat of floor sealer in accordance with manufacturer's instructions.
 - 1. Apply at the following rates.
 - a. Airless sprayer: Between 300 and 400 square feet per gallon.
 - b. Lambswool applicable: Between 800 and 1000 square feet per gallon.
 - 2. Maintain a wet edge at all times.
 - 3. Allow floors to completely dry prior to installation of second coat, but not less than 24 hours.
- C. Apply second coat of floor sealer at 90 degrees to the direction of the first coat.
 - 1. Apply at the following rates.
 - a. Airless sprayer: Between 1000 to 1600 square feet per gallon.
 - b. Lambswool applicable: Between 1000 and 1600 square feet per gallon.
 - Maintain a wet edge at all times.

3.6 PROTECTION

A. Protect work of other trades, whether being stained or not, against damage from stain operation. Correct damage by cleaning, repairing, replacing, and restain, as approved by Architect, and leave in an undamaged condition.

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- B. Prohibit traffic on floor finish for 72 hours after completion of installation.
 - 1. Provide "Wet Paint" signs to protect newly coated finishes.
- C. Cover flooring with protective covering.
 - 1. 1/8-inch hardboard over 6-mil poly.
 - 2. Tape joints using duct tape.
 - 3. Maintain protective covering until Substantial Completion.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.7 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Provide on-site, full-time instructions and supervision by floor stain and seal coat manufacturer's representative, during excecution of Work of this Section.

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section 04

MASONRY

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SECTION 04 22 13 - STRUCTURAL REINFORCED CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.2 SUMMARY

- A. Section includes all labor, materials, services, equipment, and hardware necessary for and incidental to the installation of all reinforced masonry construction as indicated on the drawings and specified herein.
 - 1. Reinforced unit masonry construction includes reinforced concrete masonry including concrete-filled masonry beams, columns, pilasters, lintels, and soffits.
 - 2. Accessories include, but are not necessarily limited to ties, horizontal and vertical reinforcement, anchors to the structure, and control joints.
 - 3. The masonry contractor shall install all accessory items that are required in the work and supplied by others, including: bolts, nailing blocks, inserts, anchors, flashing, steel lintels, expansion joints, conduits, cast-stone trim, hollow-metal door frames, etc.
 - 4. Types of masonry work required include concrete masonry units.

B. Related Requirements:

- 1. Specification 014000 "Quality Requirements" for requirements of material testing and inspection.
- 2. Specification 014529 "Structural Testing and Inspections" for testing and inspection requirements associated with structural reinforced concrete unit masonry.

1.3 PRICE AND PAYMENT PROCEDURES

A. Alternates:

- 1. Products Requiring International Code Council (ICC) Evaluation Service Reports:
 - a. For those products listed in Part 2 as requiring Evaluation Service Reports (ESRs), alternate products that do not have ESRs will be considered by the Engineer only if valid research reports or test data from an independent and approved agency is provided and use of the product receives prior approval from the Building Official.

1.4 REFERENCES

A. Definitions:

- 1. CMU(s): Concrete masonry unit(s).
- 2. Professional Engineer: A professional engineer who is licensed to practice engineering in the state where the project is located and who is experienced in providing engineering

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services of the kind indicated. Engineering services are defined as those performed for projects with concrete formwork that are similar to that indicated for this Project in material.

B. Reference Standards:

- 1. Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:
 - a. ACI 117, "Specification for Tolerances for Concrete Construction and Materials."
 - b. TMS 602/ACI 530.1/ASCE 6, "Building Code and Specification for Masonry Structures."
 - ANSI/AWS D1.4, "Structural Welding Code Reinforcing Steel."

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

- 1. Quality Control: The Contractor is responsible for quality control, including workmanship and materials furnished by subcontractors and suppliers.
- Document Conflict and Precedence: In case of conflict among documents, including architectural and structural drawings and specifications, notify the Architect/Engineer prior to submitting proposal. In case of conflict between and/or among the structural drawings and specifications, the strictest interpretation shall govern, unless specified otherwise in writing by the Architect/Engineer.
- 3. Materials and installed work may require testing and retesting, as directed by the governing building code or the Architect/Engineer, at any time during progress of work.
 - a. The Contractor shall provide adequate notification to the Owner's Testing Agency of construction operations including the project schedule to allow the Testing Agency to schedule inspections. Failure to notify sufficiently may result in additional costs incurred by the Testing Laboratory that may be back-charged to the Contractor by the Owner.
 - b. The Contractor shall cooperate with laboratory personnel, provide access to the work, and provide access to manufacturer's operations.
 - c. The Contractor shall make adequate arrangement with the Owner's Testing Agency for inspection of material stockpiles and facilities.
 - d. The Contractor shall provide to the laboratory certificates and representative samples of materials proposed for use in the work in quantities sufficient for accurate testing as specified.
 - e. The Contractor shall furnish casual labor, equipment, and facilities as required for sampling and testing by the laboratory and otherwise facilitate the required inspections and tests.
 - f. Inspection or testing by the Owner does not relieve the Contractor of his responsibility to perform the Work in accordance with the Contract Documents. Tests not specifically indicated to be done at the Owner's expense, including retesting of rejected materials and installed work, shall be done at the Contractor's expense. See Structural Testing and Inspections section of the Specifications.

1.6 PERFORMANCE REQUIREMENTS

A. Provide structural concrete unit masonry that develops the net area compressive strengths at 28 days as indicated on the drawings.

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1. Determine net-area compressive strength of masonry from average net area compressive strengths of masonry units and mortar types (unit strength method) according to Tables 1 and 2 in TMS 602/ACI 530.1/ASCE 6.

2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

1.7 PRECONSTRUCTION TESTING

- A. Masonry Preconstruction Testing Service: Employ and pay for the services of an independent testing laboratory acceptable to Architect and experienced in performing types of preconstruction masonry tests indicated. The testing laboratory shall meet the basic requirements of ASTM E 329 and have current accreditation from either the American Association for Laboratory Accreditation, the AASHTO Accreditation Program, or the "NIST" National Voluntary Laboratory Accreditation Program.
 - 1. Preconstruction Verification by Unit Strength Method
 - a. Concrete Masonry Units: For each type of concrete masonry wall construction shown on the structural or architectural drawings, submit results of tests conducted in accordance with ASTM C 140 that demonstrate that the strength of the concrete masonry units are consistent with required compressive strength of the masonry construction shown on the drawings.
 - b. Mortar: Submit the proportions of the mortar mix to verify compliance with the specified type.
 - 2. Grout Demonstration Panel: If the proposed grouting procedures, construction techniques, and grout space geometry, including such items as maximum grout pour and grout lift heights and consolidation techniques, do not conform to the requirements of TMS 602/ACI 530.1/ASCE 6, construct a grout demonstration panel prior to masonry construction.
 - 3. Masonry work will not begin until test results are submitted to and approved by the Architect/Engineer.

1.8 RESPONSIBILITY

A. Responsibility for Design of Formwork: The design, construction, and safety of all formwork shall be the responsibility of the Contractor. The Contractor shall employ a Professional Engineer who is experienced in the design of formwork to design all formwork and formwork removal. All forms, shores, reshores, backshores, falsework, bracing, and other temporary supports shall be engineered to support all loads imposed including the wet weight of concrete, construction equipment, live loads, lateral loads due to wind and wet concrete imbalance. The Contractor shall also be responsible for determining when temporary supports, shores, reshores, backshores, and other bracing may be removed safely.

1.9 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each type of masonry unit, accessory, and other manufactured products, including certifications that each type complies with specified requirements. Provide certification of pull-out strength of all masonry ties and anchors. Submit certification of compliance with required standards for all masonry units.
- B. Shop Drawings: Show fabrication and installation details for the following:

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 Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars and for templates for layout of dowels for columns and pilasters. Comply with the fabrication tolerances of ACI 315, "Details and Detailing of Concrete Reinforcement." Show bar schedules, diagrams of bent bars, stirrup spacing, lateral ties and other arrangements and assemblies as required for fabrication and placement of reinforcement for unit masonry work.

- 2. Formwork Drawings: Formwork drawings, prepared under the supervision of and sealed by the Formwork Design Engineer, shall be submitted for Owner's record and shall be reviewed by the Engineer for conformance to structural layout only. Such shop drawings shall indicate types of materials, sizes, lengths, connection details, design allowance for construction loads, anchors, form ties, shores, braces, construction joints, reveals, camber, openings, formwork coatings, and all other pertinent information.
- C. Certificates: Prior to delivery, submit to Architect/Engineer certificates attesting compliance with the applicable specifications for grades, types or classes of all products included in these specifications.
 - All materials required for mortar and grout including type, source, brand, and name of manufacturer.
 - 2. Each combination of masonry unit type and mortar type. Include statement of net area compressive strength of masonry units, mortar type and net compressive strength of masonry determined according to Table 2 in TMS 602/ACI 530.1/ASCE 6.
 - 3. Mill Certificates: Steel producer's certificates of mill analysis, tensile and bend test for reinforcing steel required for project.
- D. Design Mixtures: Submit for each concrete mixture as specified herein.
 - 1. Mortar mix proportions for type of mortar required to achieve specified compressive strength of masonry.
 - 2. Mix designs and mortar tests performed in accordance with ASTM C 270
 - 3. Grout mix proportions according to ASTM C476 for the types of grout required for the work.
 - 4. Mix designs and grout tests performed in accordance with ASTM C 476.
- E. Temporary Structure Design Submittals: Submit the following items for the Owner's records:
 - 1. Design Calculations: Prepared and sealed by the Formwork Design Engineer.
- F. Qualification Statements: Submit welding certificates.
- G. Grout Demonstration Panel: If the proposed grouting procedures, construction techniques, and grout space geometry, including such items as maximum grout pour and grout lift heights and consolidation techniques, do not conform to the requirements of TMS 602/ACI 530.1/ASCE 6, construct a grout demonstration panel prior to masonry construction.

1.10 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Licensed Professionals: The Formwork Design Engineer retained by the Contractor shall be a Professional Engineer registered in the state where the project is located and shall be experienced in the design of concrete formwork.

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B. Single Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.

- C. Single Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.
- D. Design, provide and install bracing that will assure stability of masonry during construction.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry materials to project in undamaged condition.
- B. Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion or other causes. During freezing weather, protect masonry units with tarpaulins or other suitable material. If units become wet, do not install until they are dry.
- C. At the time of delivery, the linear shrinkage of masonry units shall not exceed 0.065 percent.
- D. Store cementitious materials and masonry units off the ground, under cover and in dry location. All materials must be protected from wetting by capillary action, rain, or snow, and protected from mud, dust, or other materials and contaminants likely to cause staining or defects.
- E. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying in dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
- F. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- G. Store masonry accessories, including metal items, in such a way as to prevent corrosion or accumulation of dirt and oil.

1.12 PROJECT CONDITIONS

- A. Protection of Work: The Contractor shall construct and maintain temporary protection as required to permit continuous progress of the work. During erection, cover top of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
 - 2. Where one wythe of multiwythe masonry walls is completed in advance of the other wythes, secure cover a minimum of 24 inches down the face next to unconstructed wythe and hold cover in place.
- B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

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C. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.

- 1. When ambient temperature exceeds 100 degrees F or 90 degrees F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.
- 2. Comply with hot-weather preparation and construction provisions of TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. See Section 04 22 00 for the specifications for concrete masonry units.
- B. Provide units complying with the characteristics indicated below for type, size, strength, and weight.
 - 1. Hollow Loadbearing Block: ASTM C 90 Normalweight.
 - 2. Solid Loadbearing Block: ASTM C 90 Normalweight.
 - 3. Unit Compressive Strength: Provide units with a minimum average net-area compressive strength of 1,900 psi.
 - 4. Unit Compressive Strength: Provide units with a minimum net area compressive strength sufficient to produce masonry assemblies having the required strength as determined by Prism Tests but not less than 1,900 psi.
 - 5. Size: Manufacturer's standard units with nominal face dimensions of 16" long x 8" high (15-5/8" x 7-5/8" actual) x thicknesses indicated unless shown otherwise on the drawings.

2.2 CONCRETE AND MASONRY LINTELS

- A. General: Provide one of the following consistent with the span and reinforcing tables on the drawings:
 - 1. Manufactured Concrete Masonry Lintels: ASTM C 1623, matching Concrete Masonry Units in color, texture and density classification.
 - 2. Precast Concrete Lintel Units: Solid or U-shaped, grout-filled. Comply with the requirements of Division 03, "Cast-in-Place Concrete", reinforced with mild reinforcing steel or prestressed with prestressing cables.
 - 3. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam Concrete Masonry Units with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.3 STRUCTURAL STEEL LINTELS

- A. All hot-rolled steel plates and shapes shall be new steel conforming to ASTM A 6.
- B. Comply with the provisions of the following ASTM Specifications as appropriate for the grades and types, and at the locations as specified on the drawings:

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- 1. Structural Steel Wide Flange Shapes: High Strength Steel, ASTM A 992.
- 2. Structural Steel Channels: Carbon Steel, ASTM A 36.
- 3. Structural Steel Plates: Carbon Steel, ASTM A 36.
- 4. Square and Rectangular HSS: ASTM A 500, Grade B (Fy = 46 ksi).

2.4 MORTAR AND GROUT MATERIALS

- A. Do not use calcium chloride in mortar or grout.
- B. See specification section 04 22 00 for mortar specifications.
- C. Mortar: ASTM C 270, Proportion Specification, Type S, limiting cementitious materials to those described below:
 - 1. Portland Cement-Lime
 - 2. Mortar Cement
- D. Grout: Provide grout that conforms to either of the two requirements below:
 - 1. ASTM C 476, Proportion Specification
 - The material requirements of ASTM C 476; attains the specified compressive strength or 2000 psi, whichever is greater, at 28 days when tested in accordance with ASTM C 1019; has a slump flow of 24 in. to 30 in. as determined by ASTM C 1611; and has a Visual Stability Index (VSI) less than or equal to 1 as determined in accordance with ASTM C1611.
 - 3. Grout consistency is to be coarse grout unless fine grout is required by TMS 602/ACI 530.1/ASCE 6 based on minimum grout space dimensions coupled with maximum pour heights or unless a stricter requirement is defined by the local code.

2.5 REINFORCING STEEL

A. Uncoated Steel Reinforcing Bars: ASTM A 615, Grade 60.

2.6 JOINT REINFORCEMENT, TIES, AND ANCHORING DEVICES

- A. General:
 - 1. Comply with requirements indicated below for basic materials and with requirements indicated under each form of joint reinforcement, tie and anchor for size and other characteristics.
 - Manufacturers:
 - a. Subject to compliance with requirements, provide products of one of the following:
 - 1) Wire-Bond.
 - 2) Dur-O-Wall, Inc.
 - 3) Hohmann & Barnard, Inc.
 - 4) National Wire Products Corp.
 - 5) Heckman Building Products
 - b. Other manufacturers shall be used only with Engineer approval. The Contractor shall submit technical literature for all reinforcing units.

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3. Finishes: Provide reinforcement, ties, and anchors specified in subsequent paragraphs that are made from materials or that have the finishes that comply with the subparagraphs below, depending on the finish specified, unless otherwise indicated.

- Mill Galvanized Finishes
 - 1) Joint Reinforcement: ASTM A 641 (0.1 ounces per square foot).
 - 2) Sheet-metal ties and anchors: ASTM A 653 G60.
- b. Hot-Dip Galvanized Finishes
 - 1) Joint Reinforcement, Wire Ties, Wire Anchors: ASTM A 153, (1.5 ounces per square foot).
 - 2) Sheet-metal Ties and Anchors: ASTM A 153, Class B.
 - 3) Steel Plates and Bars: ASTM A 123 or ASTM A 153, Class B.
- c. Epoxy Coatings:
 - 1) Joint Reinforcement: ASTM A 884, Class A, Type 1 greater than or equal to 7 mils.
 - 2) Wire Ties and Anchors: ASTM A 889, Class C 20 mils.
 - Sheet-metal Ties and Anchors: 20 mils per surface or manufacturer's specification.
- d. Stainless Steel: AISI Type 304 or Type 316.
- B. Joint Reinforcement: ASTM A 951: Welded-wire units prefabricated with deformed continuous side rods and plain cross rods in straight lengths of not less than 10 feet, with prefabricated corner and tee units, and complying with the requirements indicated below:
 - 1. Materials and Finishes:
 - a. Galvanized: ASTM A 82.
 - b. Epoxy: ASTM A 82.
 - c. Stainless Steel: ASTM A 580.
 - 2. Width: Fabricate joint reinforcement in units with widths a minimum of 2" less than nominal width of walls. Provide mortar coverage over joint reinforcement of not less than 5/8" on ioint faces exposed to exterior and 1/2" elsewhere.
 - 3. Wire Size for Side and Cross Rods:
 - a. 9 gauge diameter for both side rods and cross rods.
 - b. 0.1875" diameter (W2.8) for side rods and 9 gauge diameter for cross rods.
 - c. 0.1875" diameter (W2.8.) for both side and cross rods.
 - 4. For single-wythe masonry provide either ladder or truss type with single pair of side rods and cross wires in ladder-type or points of connection in truss-type reinforcement spaced no more than 16 inches on center horizontally.
 - 5. For multi-wythe masonry provide ladder type with cross rods spaced not more than 16" on center, horizontally, and number of side rods as follows:
 - a. One side rod for each face shell of concrete masonry units in either wythe more than 4 inches in thickness plus one side rod for each wythe of concrete masonry units 4 inches or less in width.

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- b. Adjustable (two-piece) type, ladder design, with one side rod at each face shell of backing wythe and with separate ties that extend into facing wythe. Ties have two hooks that engage eyes or slots in reinforcement and resist movement perpendicular to wall. Ties extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face. The maximum clearance between connecting parts of the ties is 1/16".
- C. Bent Wire Ties: Provide individual prefabricated bent-wire units complying with requirements indicated below:
 - Materials and Finishes:
 - a. Galvanized: ASTM A 82.
 - b. Epoxy: ASTM A 82.
 - c. Stainless Steel: ASTM A 580.
 - 2. Wire Size: 0.1875" diameter.
 - 3. Length: Provide units of length indicated but not less than that required for embedment of at least 1 1/2" into the mortar bed of solid units or solid grouted hollow units and for a minimum of 1/2" embedment of tie end into outer face shells of hollow units, with not less than 5/8" mortar cover on exterior face joints, 1/2" elsewhere.
 - 4. Tie Shape for Hollow Masonry Units Laid with Cells Vertical: Rectangular with ends welded closed and not less than 4" wide.
 - 5. Tie Shape for Solid Masonry Units or hollow units laid with cells horizontal: Z-shaped ties with ends bent 90° to provide hooks not less than 2" long.
 - 6. Type for Masonry Where Coursing Between Wythes Align: Unit ties bent from one piece of wire.
 - 7. Type for Masonry Where Coursing Between Wythes Does Not Align: Adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4". The maximum clearance between connecting parts of the tie shall be 1/16".
- D. Adjustable Anchors: Where adjustable anchors are indicated for connecting masonry to structural framework, provide 2-piece assemblies as described below which permit vertical or horizontal differential movement between wall and framework parallel to, but resist tension and compression forces perpendicular to, plane of wall.
 - 1. Materials and Finishes:
 - a. Galvanized: ASTM A 82 for wire and ASTM A 1008 for sheet metal.
 - b. Epoxy: ASTM A 82 for wire and ASTM A 1008 for sheet metal.
 - c. Stainless Steel: ASTM A 580 for wire and ASTM A 480 and ASTM A 240 for sheet metal.
 - 2. For anchorage to concrete framework, provide manufacturer's standard anchors with dovetail anchor section formed from 0.0966" thick sheet metal and triangular-shaped wire tie section sized to extend within 1" of masonry face.
 - 3. For anchorage to steel framework provide manufacturer's standard anchors with crimped 1/4" diameter wire anchor section for welding to steel and triangular-shaped wire tie section sized to extend within 1" of masonry face.
 - 4. Wire Size for triangular section: 0.1875" diameter.
- E. Rigid Anchors: Provide straps of form and length indicated, fabricated from sheet metal strips of following width and thickness, unless otherwise indicated. Typical length to be 24" plus 2" long, 90° bends at ends.
 - Material and Finishes:

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- a. Galvanized: ASTM A 1008.
- b. Epoxy: ASTM A 1008.
- c. Stainless Steel: ASTM A 480 and ASTM A 240.

Width: 1-1/2".
 Thickness: 1/4".

- F. Unit Type Masonry Inserts in Concrete: Furnish cast iron or malleable iron inserts of type and size indicated.
- G. Dovetail Slots: Furnish dovetail slots, with filler strips, of slot size indicated, fabricated from 0.0336" (22 gage) sheet metal, ASTM A 1008, Hot-dip galvanized.

H. Postinstalled Anchors:

- 1. ICC Approval: Only anchors evaluated by the ICC Evaluation Service, Inc. (ICC-ES) with a published Evaluation Report specifically addressing anchorage to hollow or fully grouted concrete masonry shall be approved for use.
- 2. Type:
 - a. Hollow Concrete Masonry: Anchors into or through hollow concrete masonry units shall be the chemical type used with a galvanized or stainless steel screen tube that allows the chemical adhesive to create a key within the hollow cell of the unit.
 - b. Fully Grouted Concrete Masonry: Anchors into fully grouted masonry shall be either chemical anchors or expansion anchors specifically approved by ICC-ES for use in fully-grouted concrete masonry.

3. Finish:

- a. Interior Exposure: All anchors, nuts and washers for use in interior environments free of potential moisture shall be manufactured from carbon steel, zinc plated in accordance with Federal Specification QQ-Z-325C, Type II, Class 3.
- b. Exterior or Exposed Use: All anchors, nuts, and washers for use in exposed or potentially wet environments, or for attachment of exterior cladding materials shall be galvanized or stainless steel. Galvanized anchors, nuts and washers shall conform to ASTM A 153. Stainless steel anchors shall be manufactured from 300 series stainless steel and nuts and washers from 300 series or Type 18-8 stainless steel.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

- A. Non-Metallic Expansion Joint Strips: Premolded, flexible cellular neoprene rubber filler strips complying with ASTM D 1056, Grade RE 41E1, capable of compression up to 35%, of width and thickness indicated.
- B. Premolded Control Joint Strips: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
 - 1. Premolded PVC Control Joint Strips. Strips shall be polyvinyl chloride complying with ASTM D 2287, Type PVC 654-4 with a durometer hardness of 90.
- C. Weepholes: Cotton Cord: Sash cord of length required to produce 2" exposure on exterior and 18" in cavity between wythes.

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PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

- A. Protection of Work: The Contractor shall construct and maintain temporary protection as required to permit continuous progress of the work. During erection, cover top of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
 - 2. Where one wythe of multiwythe masonry walls is completed in advance of the other wythes, secure cover a minimum of 24 inches down the face next to unconstructed wythe and hold cover in place.
- B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
- C. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
 - 1. When ambient temperature exceeds 100 degrees F or 90 degrees F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.
 - 2. Comply with hot-weather preparation and construction provisions of TMS 602/ACI 530.1/ASCE 6.

3.2 INSTALLATION - GENERAL

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Inspect surfaces that are to support masonry work to assure completion to proper lines and grades and are free of dirt and other deleterious material. Do not begin work until surfaces not properly prepared have been satisfactorily corrected.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
 - 2. Verify that foundations or other supporting surfaces are within specified tolerances.
 - 3. Verify that reinforcing dowels are properly spaced.
 - 4. Examine rough-in and built-in construction to verify actual locations of piping connections.
- B. The horizontal and vertical spacing between anchors tying the masonry wall to the structural frame shall be as indicated on the drawings. Intersecting walls may substitute for an anchor.
- C. Cleaning Reinforcing: Before placing, remove loose rust, ice and other coatings from reinforcing.
- D. Installation of Masonry, General:
 - 1. Build cavity and composite walls, floors and other masonry construction to the full thickness shown. Build single-wythe walls (if any) to the actual thickness of the masonry units, using units of nominal thickness indicated.

2. Build chases and recesses as shown or required for the work of other trades. Provide not less than 8" of masonry between chase of recess and jamb of openings, and between adjacent chases and recesses.

- 3. Leave openings for equipment to be installed before completion of masonry work. After installation of equipment, complete masonry work to match work immediately adjacent to the opening.
- 4. Cut masonry units using motor-driven dry-cutting or water-cooled saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous patterns and to fit adjoining work. Use full-size units without cutting where possible.
- 5. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Do not install cracked, broken, or chipped masonry units exceeding ASTM allowances.
- F. Protect sills, ledges, and offsets from mortar droppings or other damage during construction. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface. Remove misplaced mortar or grout immediately. Protect face materials against staining. Protect door jambs and comers from damage during construction.
- G. Prevent grout or mortar or soil from staining the face of masonry to be left exposed or painted. Immediately remove grout or mortar in contact with such masonry.
- H. Mixing Mortar and Grout: Comply with the requirements of TMS 602/ACI 530.1/ASCE 6.

3.3 CONSTRUCTION TOLERANCES

- A. Comply with tolerance in TMS 602/ACI 530.1/ASCE 6 and the following.
- B. For conspicuous vertical lines such as external corners, reveals, expansion and control joints, do not exceed 1/4" in any story or 20 feet maximum, nor 1/2" maximum.
- C. For vertical alignment of exposed head joints do not vary from plumb by more than 1/4" in 10 feet, nor 1/2" maximum.
- D. Variation from Level: For conspicuous horizontal lines such as exposed lintels, sills, parapets, and reveals, do not exceed 1/4" in any bay or 10 feet maximum, nor 1/2" maximum. For top surface of bearing walls do not exceed 1/8" between adjacent floor elements in 10 feet or 1/16" within width of a single unit.

3.4 LAYING MASONRY WALLS

- A. Do not wet concrete masonry prior to laying up units unless written permission is obtained from the Engineer.
- B. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate location of openings, movement-type joints, returns and offsets. Avoid the use of less-than-half-size units, particularly at corners, jambs and wherever possible at other locations.
- C. Lay-up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other work.
- D. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern. Do not use units with less than nominal 4" horizontal face dimensions at corners or jambs.

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- One-half running bond with vertical joint in each course centered on units in courses above and below.
- E. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2". Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4" horizontal face dimensions at corners or jambs.
- F. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third unit for one-third running bond. Do not tooth. Clean exposed surfaces at set masonry and remove loose masonry units and mortar prior to laying fresh masonry.
- G. Built-in Work: Install bolts, anchors, nailing blocks, inserts, frames, vent flashings, conduit, and other built-in items specified under this and other sections of these specifications as masonry work progresses. Avoid cutting and patching. Solidly grout spaces around built-in items. Provide joints around exterior framed openings 1/4" to 3/8" wide, raked and tooled smooth to a uniform depth of 3/4", ready for caulking by others. Build chases, do not cut. Consult other trades in advance and make provisions for installation of their work to avoid cutting and patching. Install chases minimum of one full masonry unit length from jambs.
 - 1. Fill in space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
 - 2. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core, unless detailed otherwise.
 - 3. Fill cores in hollow concrete masonry units with grout to supporting beam or slab below under bearing plates, beams, lintels, posts and similar items, unless otherwise indicated.
- H. Corners: Provide interlocking masonry unit bond in each course at corners, unless otherwise shown.
 - 1. For horizontally reinforced masonry, provide continuity at corners with prefabricated "L" units, in addition to masonry bonding.
- I. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes and space as follows:
 - 1. Provide individual metal ties at not more than 16" o.c. vertically.
 - 2. Provide continuity with horizontal joint reinforcement using prefabricated "T" units.
- J. Intersecting Load-bearing Walls: If carried up separately, block or tooth vertical joint with 8" maximum offsets and provide rigid steel anchors spaced not more than 4'-0" o.c. vertically, or omit blocking and provide rigid steel anchors at not more than 2'-0" o.c. vertically. If used with hollow masonry units, embed ends in mortar-filled cores.

3.5 MORTAR BEDDING AND JOINTING

- A. Provide uniform nominal joint thickness of 3/8" for concrete masonry units, unless noted otherwise on the drawings.
- B. Lay solid masonry units and fully-grouted hollow CMU with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Do not furrow bed joints or slush head joints.

C. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and in all courses of piers, columns and pilasters, and where adjacent to cells of cavities to be reinforced or filled with concrete or grout. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.

- D. Joint Profile: Provide weather-proof, concave, tooled joints in exposed surfaces when mortar is thumbprint hard, using round jointing tool. Strike joints flush in surfaces to be plastered, stuccoed, or covered with other material or surface-applied finish other than paint. Concave tool exterior joints below grade. Remove mortar protruding into cells or cavities to be grouted. Do not permit mortar droppings to block weep holes. Do not fill horizontal joints between top of masonry partitions and underside of concrete or steel construction with mortar unless specifically shown on the drawings. If not shown otherwise, provide 1" clear joint to be filled with caulk. Keep movement joints clean of all mortar and debris. For tuckpointing, rake mortar joints to a depth of 1/2 to 3/4 in., saturate with clean water, fill solidly with pointing mortar, and tool to match existing joints.
- E. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners of jambs to shift adjacent stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.
- F. Collar Joints: Unless otherwise required, After each course is laid, fill the vertical longitudinal joint between wythes solidly with mortar (grout if walls are grouted) for the following masonry work:
 - 1. All multi-wythe walls of concrete masonry units in which the collar joint between wythes is less than 3/4".
 - 2. All below grade conditions.

3.6 CONSTRUCTION STABILITY

- A. Design, provide and install bracing that will assure stability of masonry during construction.
- B. Allow 16 hours to elapse after completion of masonry columns and walls before placing floor or roof construction loads. Allow an additional 48 hours before applying concentrated loads such as girders, beams, or trusses.

3.7 STRUCTURAL BONDING OF MULTI-WYTHE MASONRY

- A. Where Horizontal Joints Align:
 - 1. Tie wythes together with continuous horizontal joint reinforcing, installed in mortar joints at not more than 16" o.c. vertically.
 - 2. Alternatively, use bent wire ties, providing one for every 4.5 sq. ft. of wall area but spaced no greater apart than 36" horizontally and 24" vertically.
- B. Where Horizontal Joints do not Align:
 - 1. Tie wythes together with adjustable, two-piece, ladder-type horizontal joint reinforcing placed in the mortar joint of the thicker wall at no more than 16" vertically.
 - 2. Alternatively, use adjustable bent wire ties. providing one for every 1.77 sq. ft. and spaced no greater than 16" horizontally and vertically.
 - 3. Bed joints of opposing wythes shall not be farther apart vertically than 1-1/2" either direction.

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C. Openings: Provide additional ties around openings greater than 16' in either direction within 12" of the opening and around the perimeter at a maximum of 3'-0" on center.

D. Provide ties within 12" of unsupported edges at a maximum of 24" vertically.

3.8 CAVITY WALLS

- A. Keep cavity clean of mortar droppings and other materials during construction. Strike joints facing cavity flush.
- B. Provide weep holes in head joints in first course immediately above all flashing. Leave head joint free and clean of mortar or install weep hole tube in head joint. Space weep holes 32" on center maximum for concrete unit masonry. Keep weep holes and area above

3.9 HORIZONTAL JOINT REINFORCEMENT

A. General:

- 1. Provide continuous horizontal joint reinforcement as indicated. Install longitudinal side rods in mortar for their entire length with a minimum cover of 5/8" on exterior side of walls, 1/2" elsewhere. Lap reinforcing a minimum of 6" at splices.
- 2. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- Reinforce walls with continuous horizontal joint reinforcing unless specifically noted to be omitted.
- 4. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.
- 5. Space continuous horizontal reinforcement as follows:
 - a. For multi-wythe walls (solid or cavity) space horizontal reinforcement 16" o.c. vertically.
 - b. For single-wythe walls, space reinforcement at 16" o.c. vertically, unless otherwise indicated.
 - c. For parapets, space reinforcement at 8" o.c. vertically, unless otherwise indicated. d. For perforated masonry screen walls, space reinforcement at every other course vertically, not to exceed 16" o.c., unless otherwise indicated.
 - e. For concrete masonry cantilever walls and fences, space reinforcement at 8" o.c. vertically, unless otherwise indicated.
 - f. For walls utilizing a stack bond pattern, space reinforcement at 8" o.c. vertically, unless otherwise indicated.
- 6. Reinforce masonry openings greater than 1'-0" wide, with horizontal joint reinforcement placed in two horizontal joints approximately 8" apart, immediately above the lintel and immediately below the sill. Extend reinforcement a minimum of 2'-0" beyond jambs of the opening except at control joints. Horizontal joint reinforcement interrupted by the jamb of an opening shall have the cross rod or side rod bent and hooked at the jamb. Provide an additional rectangular adjustable tie at the jamb for each joint not containing the normal horizontal reinforcing unit.
- 7. Provide reinforcement at openings in addition to other specified wall reinforcement.

3.10 PLACING REINFORCEMENT

A. General: Clean reinforcement of loose rust, mill scale, earth, ice or other materials which will reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not shown on drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes.

- B. Position reinforcement accurately at the spacing indicated. Prior to grouting, support and secure vertical bars against displacement. Vertical bars shall be held in position at the top and bottom and at intervals not exceeding 8'-0" with a minimum clearance of 1/4" if fine grout is used or 1/2" if coarse grout is used from the face of the masonry and not less than one bar diameter or 1" (whichever is greater) between adjacent bars.
- C. For columns, piers and pilasters, provide a clear distance between vertical bars as indicated, but not less than 1-1/2 times the nominal bar diameter or 1-1/2", whichever is greater. Provide lateral ties as indicated.
- D. All dowels shall be grouted into a cell even if the dowel is in an adjacent cell to the vertical steel. Unless detailed otherwise on the drawings, dowels shall be the same size and number as the vertical steel. Unless noted otherwise provide a lap length of dowels to vertical reinforcement equal to 50 times the nominal dowel diameter.
- E. All horizontal reinforcing steel shall be placed in continuous bond beam or lintel block units and shall be solidly grouted in place. Maintain a minimum of one bar diameter or 1" (whichever is greater) clearance between adjacent bars and a minimum of 1/4" clearance if fine grout is used or 1/2" if coarse grout is used from the face of the masonry. Horizontal reinforcement may be placed as the masonry work progresses.
- F. Splice reinforcement bars where shown; do not splice at other points unless acceptable to the Engineer. Where splices occur, adjacent splices shall be staggered so that no more than 25% of the total number of bars is spliced at any one point with a minimum stagger between splices in adjacent bars of at least the lap length. Provide lapped splices, unless otherwise indicated. In splicing vertical bars or attaching to dowels, lap ends, place in contact and wire tie. Minimum lap splice length shall be 50 bar diameters unless indicated otherwise.
- G. Where reinforcement is prefabricated into cage units before placing, fabricate units with vertical reinforcement bars and lateral ties of the size and spacing indicated.
- H. Conduits are not permitted to be placed in cells containing reinforcing bars.

3.11 FORMWORK AND SHORES

- A. Temporary Formwork: Provide formwork and shores as required for temporary support of reinforced masonry elements.
- B. Construct formwork to conform to shape, line and dimensions shown. Make sufficiently tight to prevent leakage of mortar, grout, or concrete (if any). Brace, tie and support as required to maintain position and shape during construction and curing of reinforced masonry.
- C. Formwork shall be designed and shop drawings prepared by a registered professional engineer in the state where the project is located.
- D. Formwork shall not be removed until the reinforced masonry member has cured sufficiently to carry its own weight and any other loads that may be placed on it during construction. Allow not

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less than the following minimum time to elapse after completion of the member before removing shores or forms provided adequate curing conditions have been obtained during the curing period:

- 1. Lintels and beams: 10 days.
- 2. Reinforced masonry soffits: 7 days.

3.12 GROUTING

- A. General: Where detailed, grout in reinforced masonry walls, columns, and pilasters. Fully grout vertical cells of concrete masonry containing steel reinforcement.
- B. Specification: Comply with the requirements of TMS 602/ACI 530.1/ASCE 6 for cleanouts, grout space preparation, and grout placement, including minimum grout space, maximum pour height, maximum lift height and consolidation.
 - 1. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
 - 2. Place grout in lintels or beams over openings in one continuous pour.
 - 3. Where bond beam occurs more than one course below top of pour and vertically reinforced cells are present above the bond beam, fill bond beam course to within 1-1/2" of the top of the bond beam.
 - 4. When more than one pour is required to complete a given section of masonry, extend reinforcement beyond masonry as required for splicing. Pour grout to within 1-1/2" of top course of first pour. After grouted masonry is cured, lay masonry units and place reinforcement for second pour section before grouting. Repeat sequence if more pours are required.

3.13 CONTROL AND EXPANSION JOINTS

- A. General: Provide vertical and horizontal expansion, control and isolation joints in masonry where shown. Build-in related items as the masonry work progresses.
- B. Where control joints are not indicated on the drawings the Contractor shall submit a proposed control joint layout for Architect and Engineer approval. General guidelines for control joint locations are as follows:
 - 1. At major changes in wall height.
 - 2. At changes in wall thickness.
 - 3. At corresponding control joints in foundations, floor, or roof construction.
 - 4. At one or both sides of wall openings (masonry veneer only).
 - 5. Near wall intersections.
 - At column centerlines.
- C. Maximum Spacing: Maximum control joint spacing in concrete masonry construction shall be such that the ratio of wall length to height shall not exceed 1.5 with a maximum spacing of 25 feet.
- D. Form control joints in concrete masonry as follows:
 - 1. Fit bond-breaker strips into hollow contour in ends of concrete masonry units on one side of control joint. Fill resultant core with grout and rake joints in exposed faces.
 - 2. Install preformed control-joint gaskets designed to fit standard sash block.

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3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake joint.

- 4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete.
- E. Build in horizontal pressure relieving joints where indicated; construct joints by inserting non-metallic compressible joint filler of width required to permit installation of sealant and backer rod.
- F. Provide continuous bond break at steel columns and members.
- G. Provide pressure-relieving joints by adhering a continuous 3/8" thick neoprene pad below shelf angles supporting masonry veneer.
- H. Leave joints around outside perimeters of exterior doors, window frames and other wall openings:
 - 1. Depth: Uniform 3/4 in. (19mm).
 - 2. Width: 1/4 in. (6.4 mm) to 3/8 in. (9.5mm).

3.14 LINTELS

- A. Install precast concrete lintels where indicated. Vertical jamb reinforcing to be continuous through bearing end of lintel.
- B. Install steel lintels where indicated.
- C. Provide masonry lintels where shown and wherever openings of more than 2'-0" for block size units are shown without structural steel or other supporting lintels.
 - 1. For hollow concrete masonry unit walls, use specially formed U-shaped lintel units with reinforcement bars placed as shown filled with coarse grout.
- D. Provide minimum bearing as noted on the drawings.

3.15 PARGING

- A. Parge walls where indicated with Type S or N mortar, in thickness indicated. Thickness: Not less than 1/2".
- B. Trowel finish to a smooth, dense surface. Form a wash at top of parging and a cove at bottom. Where parging is applied in 2 coats, roughen first coat when partially set, let harden for 24 hours and moisten prior to application of second coat.
- C. Damp cure parging for at least 24 hours and protect until cured.

3.16 REPAIR, POINTING AND CLEANING

- A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing:

1. During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Pointup all joints including corners, openings and adjacent work to provide a neat, uniform appearance, prepared for application of sealants. If the repairs must be made after the mortar has hardened, the joint must be raked or chiseled out to a depth of about 1/2" thoroughly wetted, and repointed with fresh mortar.

- 2. To prehydrate mortars, thoroughly mix all ingredients except water in proportions used for original mortar mix; then mix again, adding only enough water to produce a damp unworkable mix which will retain its form when pressed into a ball. After 1 to 2 hours, add sufficient water to bring it to the proper consistence; that is conventional masonry mortars.
- C. Final Cleaning: After mortar is thoroughly set and cured, dean masonry as follows:
 - Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film or waterproof masking tape.
 - 4. Saturate wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clean water.
 - 5. Clean concrete unit masonry to comply with masonry manufacturer's directions and NCMA Tek 8-2 bulletin.

D. Protection and Cleanup:

- 1. Provide final protection and maintain conditions in a manner acceptable to Installer, which ensure unit masonry work being without damage and deterioration at time of substantial completion.
- 2. Leave work area and surrounding surfaces clean and free of mortar spots, droppings, and broken masonry.

3.17 COLD AND HOT WEATHER REQUIREMENTS

- A. Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.
- B. Maintain materials and surrounding air temperature to minimum 40 degrees F (5 degrees C) prior to, during, and 48 hours after completion of masonry work.
- C. Maintain materials and surrounding air temperature to maximum 90 degrees F (32 degrees C) prior to, during, and 48 hours after completion of masonry work.

3.18 FIELD QUALITY CONTROL

A. Field Testing and Inspection: Refer to Specification 01 45 29 "Structural Testing and Inspections" for testing and inspection requirements associated with structural concrete unit masonry.

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section 05

METALS

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SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

DESCRIPTION OF WORK

- B. Extent of cold-formed metal framing used as structural support for loadbearing support for any doors or other components as shown on the drawings.
- C. Types of cold-formed metal framing units include the following: Ceiling or soffits framing.

QUALITY ASSURANCE

- D. AISI, "North American Specification for the Design of Cold-Formed Steel Structural Members."
- E. AISI, "Standard for Cold-Formed Steel Framing General Provisions."
- F. AWS D1.1, "Structural Welding Code Steel.
- G. AWS D1.3, "Structural Welding Code Sheet Steel.
- H. Professional Engineer Qualification: A professional engineer who is legally qualified to practice in jurisdiction where project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this project in material, design and extent.
- I. Product Certification: Manufacturer's material certification or data from a independent testing agency that is qualified according to ASTM E 329 indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and metallic-coating thickness
- J. Fire-Rated Assemblies: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

SUBMITTALS

K. Product Data: Submit manufacturer's product information, certification, and installation instructions for each type of cold-formed metal framing and accessory indicated. Include test reports and published allowable loads for all fasteners used.

L. Shop Drawings: Submit shop drawings for all cold-formed metal framing used to support exterior cladding, floor or roof framing, ceiling or soffit framing and load-bearing support framing for any floor or roof areas. Shop drawings shall indicate placing of all framing members showing type, size, member thickness, number, location and spacing. They shall also indicate supplemental strapping, bracing, splices, bridging, accessories and details required for proper installation. Shop drawings must indicate type of fastening system used along with size and number of fasteners.

Welded connections shall show size and length of welds for all connections.

Screwed connections shall show type, size, and number of screws for all connections. Submit manufacturer's data giving strength values for screws used.

Connections using anchors shall show product name, embedment, edge distance and spacing. Shop drawings submitted must be prepared under the supervision of and sealed by a professional engineer licensed in the state where the project is located.

M. Calculations: Submit calculations for all cold-formed metal that are prepared and sealed by a professional engineer licensed in the state where the project is located. Calculations shall indicate sizing of members supporting the loads as indicated on the drawings and the design of connections indicating method of connection and

Size and length of all welds for welded connections.

Type, size, number and capacity of all screwed connections.

N. Deflection Limits: Design framing to withstand loads without deflections greater than the following:

Brick back-up: L/600 Stucco back-up: L/600 EIFS back-up: L/360

Back-up for flexible materials: L/240

- O. Welding certificates.
- P. Qualification data for professional engineer.

DELIVERY AND STORAGE

- Q. Protect metal framing units from corrosion, deformation, and other damage during delivery storage and handling.
- R. Deliver to project site in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade.
- S. Store off ground in a dry ventilated space or protect with suitable waterproof coverings.

PART 2 - PRODUCTS

MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering coldformed metal framing shall be members of the Steel Stud Manufacturer's Association unless otherwise agreed to by the Engineer.

SYSTEM COMPONENTS

B. With each type of metal framing indicated on the Architectural or Structural Drawings, provide manufacturer's standard steel studs, joists, rafters, runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners and accessories as recommended by the manufacturer for applications indicated, as needed to provide a complete cold-formed metal framing system.

GRADES OF STEEL

- C. Steel Sheet: ASTM A 1003, Structural Grade, Type H, metallic coated, of grade ST33H or ST50H as required by performance or as indicated and coated with G60 galvanized coating.
- D. Steel Sheet for Vertical Deflection Clips: ASTM A 653, structural steel, zinc coated with G60 galvanized coating and grade as required by structural performance or as indicated.
- E. Minimum Base Metal Thickness: 43 mil for brick back-up, 33 mil for other applications.
- F. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

TYPES

- G. Structural Stud/Joist (S-Section): Steel studs of size and thickness as required by structural performance or as indicated, with minimum 1.625" flange and flange return lip.
- H. Track (T-Section): Standard tracks of size, shape, and thickness as required by structural performance or as indicated, with a minimum flange width of 1.25 inches with no return flange lip.
- I. Channel (U-Section): Standard U-section of size, shape, and thickness as required by structural performance or as indicated, with a flange width of 0.500 inches with no return flange lip.
- J. Furring Channel (F-Section): Standard F-section (hat-shaped) of size, shape, and thickness as required by structural performance or as indicated.

FRAMING ACCESSORIES

- K. Fabricate steel-framing accessories from steel sheet, ASTM A 1003, Structural Grade, Type H, metallic coated of same grade and coating weight used for framing members
- L. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated or as required for structural performance, as follows:

Supplementary framing.

Bracing, bridging, and solid blocking.

Web stiffeners.

Anchor clips.

End clips.

Foundation clips.

Gusset plates.

Stud kickers, knee braces, and girts.

Joist hangers and end closures.

Hole reinforcing plates.

Backer plates.

ANCHORS, CLIPS, AND FASTENERS

- M. Hot-rolled Steel Shapes and Clips: ASTM A 36, zinc coated by hot-dip process according to ASTM A 123.
- N. Anchor Rods: ASTM F 1554, Grade 36, threaded carbon-steel, hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153, Class C.
- O. Anchoring to Concrete: See Cast-In-Place Concrete Section for acceptable anchoring processes and products.
- P. Powder-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- Q. Screws: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
- R. Welding Electrodes: E 60 XX, Comply with AWS standards.

MISCELLANEOUS MATERIALS

- S. Galvanizing Repair Paint: Galvanizing repair paint shall be "ZRC Cold Galvanizing Compound" as manufactured by ZRC Chemical Products or a paint complying with SSPC-Paint 20.
- T. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- U. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, non-corrosive, non-staining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time. The grout strength shall be twice the compressive strength of the supporting concrete but need not be greater than 8000 psi nor shall it be less than 5000 psi.
- V. Shims: Load bearing, high-density multi-monomer plastic, non-leaching.
- W. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

FABRICATION

- X. General: Framing components may be prefabricated into panels prior to erection. Fabricate panels plumb, square, true to line and braced, reinforced, and stiffened to resist handling, delivery, and erection stresses. Perform lifting of prefabricated panels in a manner to prevent damage or permanent distortion. All load-bearing stud framing must be fabricated into panels and must be compressed to eliminate gaps at ends of studs.
- Y. Connections:

Type: Fasten cold-formed metal components by any of the following methods or as indicated on the drawings.

welded screwed

clinch fastening

riveting

Wire tying of framing components shall not be permitted

Design Forces: Connections of members shall develop the full allowable tensile force of the members connected unless calculations are submitted substantiating lower forces.

Design Forces: Connections of members shall develop the forces indicated on the drawings.

Welded Connections: Connection of cold-formed metal components may be made using arc welding methods. All welding shall be performed in accordance with the American Welding Society, AWS D1.3. Welding process along with weld sizes and lengths necessary to develop the member forces specified shall be shown on the shop drawings. Protection of the weld area after welding shall be accomplished using a zinc-rich galvanizing repair paint.

Screwed Connections: Connection of cold-formed metal components may be made using self-drilling self-tapping screws. Screw type and size along with the number of screws required to resist the member forces specified shall be shown on the shop drawings. Screw penetration into joined members shall be a minimum of three exposed screw threads.

- Z. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
 - Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - Squarenenss: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

INSPECTION AND PREPARATION

- A. Pre-Installation Conference: Prior to start of installation of metal framing systems, meet at project site with installers of other work including door and window frames and mechanical and electrical work. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing work.
- B. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- D. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fireresistive materials from damage.
- E. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

F. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

INSTALLATION

- G. Install cold-formed metal framing systems according to AISI's "Standard for Cold-formed Steel Framing General Provisions" and to manufacturer's printed or written instructions and recommendations.
- H. Runner Tracks: Install continuous tracks sized to match studs. Align tracks accurately to layout at base and tops of studs. Secure tracks as recommended by stud manufacturer for type of construction involved, except do not exceed 24" o.c. spacing for nail or powder-driven fasteners, or 16" o.c. for other types of attachment. Abutting pieces of track shall be securely spliced together. Provide fasteners at corners and ends of tracks.
- I. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements. Splices in axially loaded stud systems shall not be permitted. Splices in other work shall not be permitted unless the splice has been engineered and detailed on the shop drawings.
- J. Provide four (4) studs at each intersecting wall and three (3) studs at each corner minimum.
- K. Where stud system abuts structural columns or walls, including masonry walls, anchor ends of stiffeners to supporting structure.
- L. Install supplementary framing, blocking and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with stud manufacturer's recommendations and industry standards in each case, considering weight or loading resulting from item supported.
- M. Installation of Wall Stud System: Load-bearing studs shall be seated firmly against the track webs with a gap not exceeding 1/8 inch. Connect load-bearing studs to top and bottom runner tracks by either welding or screw fastening as specified at both inside and outside flanges. Install studs at spacing to align directly under joist spacing above but do not exceed 16 inches for load-bearing walls or as shown on the drawings. Install studs at spacing as shown on the drawings or as required to resist structural loads for non-load-bearing walls,
- N. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support using drift clips, vertical deflection clips, or deflection tracks. Frame wall openings larger than 2'-0" square with double stud at each jamb of frame except where more than 2 are either shown or indicated in manufacturer's instructions. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes or by welding, and space jack studs same as full-height studs of wall. Secure stud system wall opening frame in manner indicated.
- O. Frame both sides of expansion and control joints, with separate studs; do not bridge the joint with components of stud system.
- P. Horizontal Bridging:
 - Horizontal bridging shall consist of a channel (U-section) attached to each stud using a manufacturer's clip angle. At stud walls 8 inches or deeper, horizontal shall consist of flat strapping screwed to both flanges of stud wall, and to blocking at 8'-0" on center.

- Install horizontal bridging in all non-loadbearing exterior cladding stud systems, spaced (vertical distance) at not more than 4'-0" o.c.
- Install horizontal bridging in all loadbearing stud systems spaced (vertical distance) at not more than 4'-0" o.c. Provide positive screwed or welded connection at each stud intersection. Provide stud bracing during construction as required for studs to carry construction loads.
- Q. Sheathing Attachment: Provide attachment of interior and exterior sheathing and wall material to each stud in accordance with structural drawings.
- R. Installation of Joists: Install level and plumb, complete with bracing and reinforcing as indicated on drawings. Provide not less than 1-1/2" end bearing.
 - Reinforce ends with end clips, steel hangers, steel angle clips, steel stud section, or as otherwise recommended by joist manufacturer and as indicated on the drawings.
 - Where required, reinforce joists at interior supports with single short length of joist section located directly over interior support, snap-on shoe, 30% side-piece lapped reinforcement, or other method recommended by joist manufacturer. Provide web stiffening of joists at points of reaction or concentrated loads when center of web punch-out is less than 12" from edge of bearing.
 - Secure joists to interior support systems to prevent lateral movement of bottom flange.
 - Provide additional joist parallel to each opening that interrupts one or more normal joist spacings unless shown otherwise on the drawings. These openings shall be framed with headers of same size as the typical joist, unless shown otherwise on the drawings.
 - Provide an additional joist under all floor partitions that are parallel to joists and longer than one-half the joist span, unless shown otherwise on the drawings.

Bridging:

- Provide bridging as recommended by joist manufacturer top and bottom but not exceeding 8 foot maximum centers for spans exceeding 15 feet and at all concentrated floor loads unless shown otherwise on the drawings. Provide solid bridging between last 4 joists at each line of normal bridging. Provide positive screwed connection at each joist intersection.
- S. Diagonal Bracing: Provide diagonal steel straps of size and location as shown on the drawings. Extend straps from the bottom track to the top track inclined 45° unless shown otherwise and connected with cold-formed metal gusset plates to each track at a stud. Provide connections as required to resist forces indicated on the drawings.
- T. Wall Braces: Provide wall braces ("kickers") as shown on the Architectural and Structural Drawings, but not less in size and gage than that of wall stud being braced and not spaced greater than every fourth stud, and first stud from all corners, whether shown on the drawings or not. Provide connection at each end of brace to develop the required force in the brace. Connections to concrete shall be made with expansion anchors having a valid ICC-ES Evaluation Report by ICC Evaluation Service, Inc. and shall be in strict accordance with manufacturers instructions and only if intended for cold-formed metal attachment. Connections to cold-formed metal and structural steel shall be as specified in section on Connections.
- U. Field Painting: Touch-up shop-applied protective coatings damaged during handling and installation. Use compatible primer for prime coated surfaces; use galvanizing repair paint for galvanized surfaces.

END OF SECTION 054000

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WOOD + PLASTIC

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SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Wood blocking, cants, and nailers.
 - 2. Plywood backing panels.

1.3 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials, both before and after exposure to elevated temperatures when tested according to ASTM D 5516 and ASTM D 5664.
 - 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
 - Preservative-treated wood.
 - 2. Fire-retardant-treated wood.

1.4 QUALITY ASSURANCE

A. Source Limitations for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product through one source from a single producer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

- A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.
- B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:
 - 1. SPIB Southern Pine Inspection Bureau.
 - 2. WCLIB West Coast Lumber Inspection Bureau.
 - 3. WWPA Western Wood Products Association.
- C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
- D. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 1. Provide dressed lumber, S4S, unless otherwise indicated.
 - 2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Basis of Design, Pressure Treatment: Wolmanized Natural Select (CBA) preserve pressure treatment; Arch Wood Protection, USA.
- B. Pressure treat above ground items indicated and the following:
 - 1. Wood nailers, blocking, and similar members in connection with roofing and flashing.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, provide materials that comply with performance requirements in AWPA C20 (lumber). Identify fire-retardant-treated wood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures, when tested by a qualified independent testing agency according to ASTM D 5664, for lumber.
 - 2. Use treatment that does not promote corrosion of metal fasteners.
 - 3. Use Exterior type for exterior locations and where indicated.
 - 4. Use Interior Type A High Temperature (HT), unless otherwise indicated.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction, including but not limited to, the following:
 - 1. Blocking.
 - 2. Cants.
 - 3. Plywood backing panels.
 - 4. Nailers.
 - 5. Furring.
 - 6. Where necessary for installation of other work and not otherwise prohibited.
- B. Fabricate miscellaneous lumber from fire-retardant-treated dimension lumber of sizes indicated and into shapes shown.
- C. Moisture Content: 19 percent maximum for lumber items are not specified to receive wood preservative treatment.
- D. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

2.5 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: APA Grade A-C, sanded.
 - 1. Thickness: ³/₄ inch thick.
 - 2. Finish: Fire-retardant paint finish; refer to Division 9 Section "Painting."
- B. Miscellaneous Equipment Backing Panels: APA Grade A-C, unsanded.
 - 1. Thickness: ³/₄ inch thick.
 - 2. Finish: Fire-retardant treated; unpainted.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Where miscellaneous carpentry is in contact with roofing or flashing, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of Type 304 stainless steel.
- B. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. All rough carpentry related to roofing construction shall be installed in accordance with FM 1-49.
- B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

- C. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the Building Code.
- D. Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
- E. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.
- F. Fit carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
- G. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber.
- H. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.
- I. Use fasteners of appropriate type and length. Predrill members when necessary to avoid splitting wood.

3.2 WOOD SLEEPERS, BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build anchor bolts into masonry during installation of masonry work. Where possible, secure anchor bolts to formwork before concrete placement.

END OF SECTION 06 10 00

SECTION 06 16 00 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Wall sheathing.
- B. Related Requirements:
 - 1. Section 061000 "Rough Carpentry for plywood backing panels.
 - 2. Section 061516 "Wood Roof Decking" for plywood roof decking.
 - 3. Section 071326 "Self-Adhering Sheet Waterproofing" for water-resistive barrier applied over wall sheathing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 2. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory".

2.2 WALL SHEATHING

- A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
 - 1. Products: Basis of Design: G-P Gypsum Corporation; Den-Glass Gold. Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corporation; GlasRoc.
 - b. National Gypsum Company; Gold Bond e(2)XP.
 - c. Temple-Inland Inc.; GreenGlass
 - d. United States Gypsum Co.; Securock.
 - 2. Type and Thickness: Type X, 5/8 inch (15.9 mm)] thick.
 - 3. Size: 48 by 96 inches (1219 by 2438 mm) for vertical installation.

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For and wall sheathing, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
 - 1. For steel framing less than 0.0329 inch (0.835 mm) thick, use screws that comply with ASTM C 1002.
 - 2. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, use screws that comply with ASTM C 954.

2.4 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Section 079200 "Joint Sealants."

B. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

- 1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.
- C. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.

2.5 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 or ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.
 - 1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
 - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."
- D. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to wood framing with screws.
 - 2. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 3. Install boards with a 3/8-inch (9.5-mm) gap where non-load-bearing construction abuts structural elements.
 - 4. Install boards with a 1/4-inch (6.4-mm) gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.
 - 1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of boards.
- D. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
 - 1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of boards.
 - 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- E. Seal sheathing joints according to sheathing manufacturer's written instructions.
 - 1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
 - 2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION 06 16 00

SECTION 06 40 23 - ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Plastic-laminate cabinets.
 - 2. Closet and utility shelving.
 - 3. Shop finishing of interior woodwork.
- B. Related Sections include the following:
 - 1. Division 06 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
 - 2. Division 06 Section "Architectural Woodwork" for carpentry exposed to view that is not specified in this Section.

1.3 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.4 SUBMITTALS

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
 - Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemicaltreatment manufacturer's written instructions for finishing treated material.
 - 2. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
 - 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.

- 4. Include copies of warranties from chemical-treatment manufacturers for each type of treatment.
- B. Product Data: For each type of product indicated, including cabinet hardware and accessories, handrail brackets, and finishing materials and processes.
- C. Product Data: For panel products, high-pressure decorative laminate, adhesive for bonding plastic laminate, solid-surfacing material, fire-retardant-treated materials, cabinet hardware and accessories, handrail brackets and finishing materials and processes.
 - 1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- D. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, and other items installed in architectural woodwork.
 - 4. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
 - 5. Apply WI-certified compliance label to first page of Shop Drawings.

E. Samples for Initial Selection:

- 1. Shop-applied transparent finishes: For panels and trim to match existing wainscot and new trim and panel at stages.
 - Prepare and submit sample to match existing to Architect for approval indicating type of sheen and gloss units. Gloss units measured on 60-degree gloss meter per ASTM D 523
- 2. Shop-applied opaque finishes.
- 3. Plastic laminates.
- 4. Quartz surfacing materials.
- 5. Wood-fiber and cement core panels.

F. Samples for Verification:

- 1. Lumber with or for transparent finish, not less than 5 inches wide by 24 inches long, for each species and cut. finished on 1 side and 1 edge.
- 2. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish.
- 3. Quartz surfacing materials, 6 inches square.
- 4. Exposed cabinet hardware and accessories, one unit for each type and finish.
- 5. For adhesives and glues used at Project site, documentation including printed statement of VOC content.
- 6. For composite wood products, documentation indicating that product contains no urea formaldehyde.

1.6 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For fire-retardant-treated wood, from ICC-ES.
- B. Sample Warranty: For manufacturer's warranty for both interior and exterior applications as applicable.
- C. Product Certificates: For each type of product, signed by product manufacturer.

D. Qualification Data: For Installer and Fabricator.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful inservice performance.
- B. Installer Qualifications: Fabricator of products.
- C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers and wood doors with face veneers that are sequence matched with woodwork and transparent-finished wood doors that are required to be of same species as woodwork.
- D. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
- E. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.
- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- C. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.10 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.
- B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Division 08 Section "Finish Hardware to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 WOODWORK FABRICATORS

A. Available Fabricators: Subject to compliance with requirements, fabricators offering interior architectural woodwork that may be incorporated into the Work include, but are not limited to, the following:

2.2 MATERIALS

- A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Species and Cut for Transparent Finish: Species, cut and finish to match existing.
- C. Wood Products: Comply with the following:
 - 1. Hardboard: AHA A135.4.
 - 2. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.
- D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
 - 1. Basis of Design: Wilsonart International; Div. of Premark International, Inc.
 - a. Finish: Premium Aeon.
 - b. Grain: If product selected has grain, grain shall align and be uniformly directional on all components, unless indicated otherwise.
 - c. Color: As selected by Architect.
 - 2. Other Acceptable Manufacturers: Subject to compliance with requirements, highpressure decorative laminates by one of the following manufacturers are also acceptable:
 - a. Formica Corporation.
 - b. Nevamar Company, LLC; Decorative Products Div.

- E. Metal Panel Insets for Cabinet Doors: Stainless Steel decorative metal mesh to be installed at AV cabinets in Dining Room.
 - 1. Basis of Design: McNichols Metals
 - Pattern: As selected from manufacturer's full range.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this Article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified.
 - 1. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective.
 - 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 - 3. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with performance requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Use the following treatment type:
 - 1. Exterior Type: Organic-resin-based formulation thermally set in wood by kiln drying.
 - 2. Interior Type A: Low-hygroscopic formulation.
 - 3. Mill lumber after treatment within limits set for wood removal that do not affect listed firetest-response characteristics, using a woodworking plant certified by testing and inspecting agency.
 - 4. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
 - 5. Kiln-dry materials before and after treatment to levels required for untreated materials.

2.4 CABINET HARDWARE AND ACCESSORIES

- A. Cabinet hinges shall be heavy-duty, flush overlay, concealed self-closing, stainless-steel, 165-degree opening complying with BHMA A156.9, Grade 1. Provide 2 for doors 48 inches high or less and 3 for doors more than 48 inches high.
 - 1. Basis of Design: Blum
 - 2. Acceptable Manufacturer's subject to compliance with specifications also include:
 - a. Stanley
 - b. Grass America
 - c. Haefle
- B. Hinged Door Pulls: Metal back mounted pulls. Provide 2 pulls for drawers and doors more than 24 inches wide.
 - 1. Design: Edge pulls similar to Haefle 124.02.920.
 - 2. Overall Size: 2-inches.

- 3. Finish: Aluminum or Stainless Steel.
- C. Door Catches: Nylon-roller spring or dual, self-aligning, permanent magnet catches. Provide 2 catches on doors more than 48 inches high.
- D. Drawer Slides: Basis of Design: Accuride Heavy Duty Slides with overtravel, 150 lb..
- E. Label Holders: Stainless steel; sized to receive standard label cards approximately 1 by 2 inches, attached with screws or rivets. Provide where indicated.
- F. Locks for Cabinets and Drawers: Cam type with 5-pin tumbler, US26D finish; complying with BHMA A156.11, Type E07281 or E07261.
 - 1. Basis of Design: Sargent IC SA-54.
 - a. Lever Direction: Standard, unless otherwise required to suit casework indicated.
 - b. Provide where indicated.
 - c. Provide a minimum of two keys per lock and two master keys..
 - 1) Coordinate keying with room door hardware.
 - 2. Master Key System: Key all locks to be operable by master key per Owner furnished keying schedule.
- G. Adjustable Shelf Supports: Mortise-type, stainless steel standards and shelf rests complying with BHMA A156.9, Types B04071 and B04091.
 - 1. Provide 4 per shelf.
- H. Grommets for Cable Passage through Countertops: 2-inch OD, stainless steel grommets and matching plastic caps with slot for wire passage.
 - 1. Product: Subject to compliance with requirements, provide "OG" or "SG series" by Doug Mockett & Company, Inc.
 - 2. Colors: To be selected by the Architect from manufacturer's standard color selections
- I. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated. To be selected by Architect.
 - Satin Stainless Steel: BHMA 630.
- J. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.
- D. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Wood Glues: 30 g/L.

2. Contact Adhesive: 250 g/L.

2.6 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom-grade interior woodwork complying with referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication
- D. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch.
 - 2. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.
 - 3. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch.
- E. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- F. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of openings in countertops with a coat of varnish.
- G. Install glass to comply with applicable requirements in Division 08 Section "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

2.7 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

- A. Grade: Premium.
- B. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building, unless otherwise indicated.
 - 1. Provide split species on trim that faces areas with different wood species, matching each face of woodwork to species and cut of finish wood surfaces in areas finished.
- C. For trim items wider than available lumber, use veneered construction. Do not glue for width.

- D. For rails wider or thicker than available lumber, use veneered construction. Do not glue for width or thickness.
- E. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
- F. Assemble casings in plant except where limitations of access to place of installation require field assembly.

2.8 FLUSH WOOD PANELING AND WAINSCOTS

- A. Grade: Premium.
- B. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building, unless otherwise indicated.
 - 1. Lumber Trim and Edges: At fabricator's option, trim and edges indicated as solid wood (except moldings) may be either lumber or veneered construction compatible with grain and color of veneered panels.
- C. Finish: Transparent stain finish with two (2), clear, satin finish coat of polyurethane; color as selected by Architect.
- D. Fire-Retardant-Treated Paneling: Provide panels consisting of wood veneer and fire-retardant particleboard or fire-retardant medium-density fiberboard. Panels shall have flame-spread index of 25 or less and smoke-developed index of 450 or less per ASTM E 84.

2.9 PLASTIC-LAMINATE CABINETS

- A. Quality Standard: Comply with AWI Section 400 requirements for laminate cabinets.
- B. Grade: Custom.
- C. AWI Type of Cabinet Construction: As indicated.
- D. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 - 1. Horizontal Surfaces Other Than Tops: HGS.
 - 2. Vertical Surfaces: VGS.
 - 3. Edges: HGS.
- E. Materials for Semiexposed Surfaces: Provide surface materials indicated below:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.
 - 2. Drawer Sides and Backs: Solid-hardwood lumber.
 - 3. Drawer Bottoms: Hardwood plywood.
- F. Colors, Patterns, and Finishes: Refer to the Material Schedule.

2.10 PLASTIC-LAMINATE CASEWORK

- A. Quality Standard: Comply with AWI Section 400 requirements for high-pressure decorative laminate casework.
- B. Grade: Custom.
- C. High-Pressure Decorative Laminate Grade: HGS.
- D. Colors, Patterns, and Finishes: Refer to the Material Schedule.
- E. Core Material: Marine-grade plywood.

2.11 SHOP FINISHING

- A. Grade: Provide finishes of same grades as items to be finished.
- B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- C. General: Shop finish transparent-finished interior architectural woodwork at fabrication shop as specified in this Section. Refer to Division 09 painting Sections for finishing opaque-finished architectural woodwork.
- D. General: Drawings indicate items that are required to be shop finished. Finish such items at fabrication shop as specified in this Section. Refer to Division 09 painting Sections for finishing architectural woodwork not indicated to be shop finished.
- E. Shop Priming: Shop apply the prime coat including backpriming, if any, for transparent-finished items specified to be field finished. Refer to Division 09 painting Sections for material and application requirements.
- F. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate or backing paper.

G. Transparent Finish:

- 1. Grade: Premium.
- 2. Staining: Color as selected by Architect.
- 3. Wash Coat for Stained Finish: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
- 4. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
 - a. Apply wash-coat sealer after staining and before filling.
- 5. Sheen: Satin; Prepare and submit sample to match existing to Architect for approval indicating type of sheen and gloss units. Gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.

- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- F. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- G. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 96 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
 - 1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
 - 2. Install wall railings on indicated metal brackets securely fastened to wall framing.
 - 3. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.
- H. Paneling: Anchor paneling to supporting substrate with concealed panel-hanger clips. Do not use face fastening, unless covered by trim or indicated in Drawings.
 - 1. Install flush paneling with no more than 1/16 inch in 96-inch vertical cup or bow and 1/8 inch in 96-inch horizontal variation from a true plane.
- I. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Maintain veneer sequence matching of cabinets with transparent finish.
 - 3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with toggle bolts through metal backing or metal framing behind wall finish.
- J. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 - 2. Install countertops with no more than 1/8 inch in 96-inchsag, bow, or other variation from a straight line.
 - 3. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
 - 4. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."
- K. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.
- L. Refer to Division 09 Sections for final finishing of installed architectural woodwork not indicated to be shop finished.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06 40 23

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06 61 19 QUARTZ SURFACING FABRICATIONS

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 horizontal and trim quartz surface product types:
 - 1. Countertops with or without sinks.
- 1.3 Related Sections include the following:
 - A. Division 5 Section "Metal Fabrications" for Blocking.
 - 1. Section "Rough Carpentry" for Blocking.
 - 2. Section "Architectural Woodwork"
 - 3. Section "Plumbing Fixtures."
 - 4. Section "Electrical Wiring Devices."

1.4 SUBMITTALS

A. Product data:

- 1. For each type of product indicated.
- 2. Indicate product description, fabrication information and compliance with specified performance requirements.

B. Shop drawings:

- 1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.
 - Show the following:
 - Field verified dimensions.
 - 2) Full-size details, edge details, attachments, etc.
 - 3) Locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.
 - 4) Locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacle and other items installed in quartz surface.
 - 5) Seam locations.

C. Samples:

- 1. For each type of product indicated:
 - a. Submit minimum 3-inch by 3-inch sample in specified color.
 - b. 3-inch long cut sample seamed together for representation of seaming techniques.

- c. Indicate full range of color and pattern variation.
- 2. Approved samples will be retained as a standard for work.
- D. Product certificates:
 - 1. For each type of product, signed by product manufacturer.
- E. Fabricator/installer qualifications:
 - 1. Minimum 2-years documented experience in work of this Section.
- F. Manufacturer certificates:
 - 1. Signed by manufacturers certifying that they comply with requirements.
- G. NSF/ANSI standards:
 - Refer to www.nsf.org for the latest compliance to NSF/ANSI Standard 51 for food zone

 — all food types.
- H. Maintenance data:
 - 1. Submit manufacturer's care and maintenance data.
 - a. Maintenance kit for finishes shall be submitted.
 - 2. Include in project closeout documents.
- 1.5 QUALITY ASSURANCE
 - A. Qualifications:
 - Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.
 - B. Fabricator/installer qualifications:
 - 1. Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.
 - C. Applicable standards:
 - 1. Standards of the following, as referenced herein:
 - a. American National Standards Institute (ANSI)
 - b. American Society for Testing and Materials (ASTM)
 - c. National Electrical Manufacturers Association (NEMA)
 - d. NSF International
 - 2. Fire test response characteristics:

- a. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E 84) or another testing and inspecting agency acceptable to authorities having jurisdiction.
- b. Flame Spread Index: 25 or less.
- c. Smoke Developed Index: 450 or less.

D. Allowable tolerances:

- 1. Variation in component size: ±1/8" (3 mm) over a 10' length.
- 2. Location of openings: ±1/8" (3 mm) from indicated location.
- 3. Maximum 1/8" (3 mm) clearance between quartz surfaces and each wall.
- 4. Coordination drawings: Shall be prepared indicating:
 - a. Plumbing work.
 - b. Electrical work.
 - c. Miscellaneous steel for the general work.
 - d. Indicate location of all walls (rated and non-rated), blocking locations and recessed wall items, etc.
 - e. Content:
 - 1) Project-specific information, drawn accurately to scale.
 - 2) Do not base coordination drawings on reproductions of the contract documents or standard printed data.
 - 3) Indicate dimensions shown on the contract drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements.
 - 4) Provide alternate sketches to designer for resolution of such conflicts.
 - 5) Minor dimension changes and difficult installations will not be considered changes to the contract.

f. Drawings shall:

- 1) Be produced in 1/2" scale for all fabricated items.
- 2) Drawings must be complete and submitted to the architect within 60 days after award of contract for record only.
- 3) No review or approval will be forthcoming.
- g. Coordination drawings are required for the benefit of contractor's fabricators/installers as an aid to coordination of their work so as to eliminate or reduce conflicts that may arise during the installation of their work.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver no components to project site until areas are ready for installation.
- B. Store components indoors prior to installation.
- C. Handle materials to prevent damage to finished surfaces.
- D. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.7 WARRANTY

- A. Provide manufacturer's 10-year warranty against defects in materials.
- B. Warranty shall provide material to repair or replace defective materials.
- C. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.

1.8 MAINTENANCE

A. Provide maintenance requirements as specified by the manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Designation QTZ-1: Subject to compliance with the requirements, provide product indicated in drawings by e quartz surfaces from Wilsonart or approved product with approved color and finish from one of the following:
 - 1. Silastone
 - 2. Caeserstone.

2.2 MATERIALS

- A. Material:
 - 1. Quartz Sheet: Homogeneous quartz surfaces material.
 - 2. Material shall have minimum physical and performance properties specified.
 - 3. Anti-microbial protection integral to sheet.
- B. Overall Thickness: 3 cm
- C. Edge treatment: Eased edge with turndown as indicated in Drawings.
- D. Seam width: <1/8" unless otherwise specified.
 - Seams to be blended in with manufacturer recommended filler in color to match quartz surface.
- E. Sink mounting: Undermount; as indicated in Plumbing and Architectural drawings.
 - 1. Use template furnished by General Contractor from purchased equipment. Do not download templates from the internet.
- F. Backsplash: As indicated.
- G. Endsplash: As indicated.
- H. Performance characteristics: physical properties data sheet:

| 1. 2. | Property Flexural Strength | Typical Result >5,300 psi | Test Procedure ASTM D 790 | |
|----------|---|------------------------------------|------------------------------|--|
| 3. | Flexural Modulus | 5.3–5.7E ⁶ psi | ASTM D 790 | |
| 4. | Flexural Elongation | >0.1% | ASTM D 790 | |
| 5. | Compression Strength (Dry) | ~27,000 psi | ASTM C 170 | |
| 6. | Compression Strength (Wet) | ~24,000 psi | ASTM C 170 | |
| 7. | Hardness | 7 | Mohs' Hardness Scale | |
| 8. | Thermal Expansion | 1.45 x 10 ⁻⁵ in./in./°C | ASTM D 696 | |
| 9. | Gloss (60° Gardner) | 45–50 | ANSI Z 124 | |
| 10. | Colorfastness | Passes | ANSI Z 124.6.5.1 | |
| 11. | Wear and Cleanability | Passes | ANSI Z 124.6.5.3 | |
| 12. | Stain Resistance | Passes | ANSI Z 124.6 | |
| 13. | (stain 5.2, chemical 5.5, cigarette 5.4 resistances) | | | |
| 14. | Fungal and Bacterial ResistanceNo growth ASTM G 21 & G 22 | | | |
| 15. | High Temperature | None to slight effect | NEMA LD 3.3.6* | |
| 16. | Resistance (356°F) | 9 | | |
| 17. | Boiling Water Resistance | None to slight effect | NEMA LD 3.3.5* | |
| 18. | Freeze-Thaw Cycling | Unaffected | ASTM C 1026 | |
| 19. | Point Impact | Passes | ANSI Z 124.6.4.2 | |
| 20. | Ball Impact | 164 inches | NEMA LD 3.3.8* | |
| 21. | Slip Resistance | Above 0.80 (textured) | ASTM C 1028 | |
| 22. | Static Coefficient of Friction | 0.89/0.61 (wet/dry) | ASTM C 1028 | |
| 23. | (as received) | , , , | | |
| 24. | Static Coefficient of Friction | 0.87/0.65 (wet/dry) | ASTM C 1028 | |
| 25. | (with renovator) | , , | | |
| 26. | Abrasion Resistance | 139 | ASTM C 501 | |
| 27. | Specific Gravity | 2.44 | ASTM D 792 | |
| 28. | Density | ~2400 kg/m3 | | |
| 29. | Water Absorption | 0.12% | ASTM C 373 | |
| 30. | Long- and Short-Term | <0.04% | ASTM D 570 | |
| 31. | Moisture Expansion | <0.01% on average | ASTM C 370 | |
| 32. | Toxicity | Passes, LC50=68-128 | | |
| 33. | Flammability | For all colors tested | ASTM E 84, UL 723 | |
| | , | (Class I and Class A) | and NFPA 255 | |
| 34. | Flame Spread Index | FSI <10 for 3 cm and <15 for 2 cm | | |
| 35. | Smoke Developed Index | SDI <50 for 3 cm and <100 for 2 cm | | |
| 36. | Nominal Thickness | 2 cm and 3 cm | | |
| 37. | Nominal Weight | 10 lb./ft.2 (2 cm) | | |
| 38. | 15 lb./ft.2 (3 cm) | (= 5) | | |
| 39. | NEMA results based on the NEMA LD 3-2000 | | | |
| 50. | | | | |

2.3 ACCESSORY PRODUCTS

- A. Joint adhesive: Manufacturer recommended adhesive to create color-matched seam.
- B. Sink/bowl mounting hardware: Manufacturer's approved bowl clips, brass inserts and fasteners for attachment of under-mount sinks/bowls. Clear sealant to be provided at joint.

2.4 FACTORY FABRICATION

A. Shop assembly

1. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.

- 2. Form joints between components using manufacturer's standard joint adhesive joints.
 - a. Reinforce as required.
- 3. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.
- 4. Rout and finish component edges with clean, sharp returns.
 - a. Rout cutouts, radii and contours to template.
 - b. Smooth edges.

2.5 FINISHES

A. As selected by Architect from Manufacturer's Grade 2.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install components plumb and level, in accordance with approved shop drawings and product installation details.
 - 1. Tops:
 - a. Flat and true to within 1/8" (3 mm) of a flat surface over a 10' length.
 - b. Allow a minimum of 1/16" to a maximum of 1/8" (3 mm) clearance between surface and each wall.
- B. Form field joints using manufacturer's recommended adhesive, with joint widths no greater than 1/8" (3 mm) in finished work.
 - 1. Keep components and hands clean when making joints.
- C. Sinks:
 - 1. Adhere undermount sinks/bowls to countertops using manufacturer's recommended adhesive and mounting hardware.
- D. Provide backsplashes and end splashes as indicated on the drawings.
 - 1. Adhere to countertops using manufacturer's standard color-matched silicone sealant.
- E. Keep components and hands clean during installation.
 - 1. Remove adhesives, sealants and other stains.
 - 2. Components shall be clean on date of substantial completion.
- F. Connections:
 - 1. Make plumbing connections in accordance with Division 15.
 - 2. Make electrical connections in accordance with Division 16.

3.2 CLEANING AND PROTECTION

- A. Keep components clean during installation.
- B. Remove adhesives, sealants and other stains.
- C. Protect surfaces from damage until date of substantial completion.
- D. Replace damaged work.

END OF SECTION 06 61 19

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section 07

THERMAL + MOISTURE PROTECTION

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SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

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

This Section includes rubberized asphalt sheet waterproofing.

1.3 SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
- C. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.
- D. Product Test Reports: From a qualified independent testing agency indicating and interpreting test results of waterproofing for compliance with requirements, based on comprehensive testing of current waterproofing formulations.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who is authorized, approved, or licensed by waterproofing manufacturer to install manufacturer's products.

1.5 PROJECT CONDITIONS

A. Weather Limitations: Proceed with dampproofing only when existing and forecasted weather conditions will permit work to be performed according to manufacturer's recommendations and warranty requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.
- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- D. Store rolls according to manufacturer's written instructions.
- E. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

1. Do not apply waterproofing in rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the following products:
 - 1. "Bituthene"; W.R. Grace & Co.
 - 2. "Mel-Rol"; W.R. Meadows, Inc.
 - 3. "Miradri"; T.C. Miradri.
 - 4. "Duramem 700-SM"; Pecora Corporation.
 - 5. "Polyguard 650"; Polyguard Products, Inc.

2.2 RUBBERIZED ASPHALT SHEET WATERPROOFING

A. Rubberized Asphalt Sheet: 60 mil thick, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated to a 4 mil thick, polyethylene film with release liner on adhesive side.

2.3 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
- B. Primer: Liquid waterborne primer recommended for substrate by manufacturer of sheet waterproofing material.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.
- D. Sheet Strips: Self-adhering, rubberized asphalt composite sheet strips of same material and thickness in sheet waterproofing.
- E. Protection Course: Semirigid sheets of fiberglass or mineral reinforced asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
 - 1. Thickness: 1/8 inch, nominal.
 - 2. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for type of protection course.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 - 1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
 - 2. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.

 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants of film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
- E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
- F. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
- G. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.3 RUBBERIZED ASPHALT SHEET APPLICATION

- A. Install self-adhering sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D 6135.
- B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2 inch minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
- D. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.
- E. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic or sealant.
- F. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheets extending 6 inches beyond repaired areas in all directions.
- G. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements, repair substrates, reapply waterproofing, and repair sheet flashings.

3.4 PROTECTION COURSE INSTALLATION

A. Install protection course with butted joints over waterproofing membrane before starting subsequent construction operation.

3.5 PROTECTION AND CLEANING

- A. Protect waterproofing from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 13 26

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SECTION 07 14 16 - COLD FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Fluid applied waterproofing.

1.3 PERFORMANCE REQUIREMENTS

A. Provide waterproofing membrane coatings that prevents the passage of water.

1.4 SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
- C. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.
- D. Product Test Reports: From a qualified independent testing agency indicating and interpreting test results of waterproofing for compliance with requirements, based on comprehensive testing of current waterproofing formulations.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain waterproofing materials through one source from a single manufacturer.
- B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review requirements for waterproofing, including surface preparation specified under other Sections, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver liquid materials to Project site in original containers with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, shelf life, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer.

- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- D. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than 5 degrees F above dew point.
 - 1. Do not apply waterproofing in rain, fog or mist, or when such weather conditions are imminent during application and curing period.
- B. Maintain adequate ventilation during application and curing of waterproofing materials.

PART 2 - PRODUCTS

2.1 FLUID APPLIED WATERPROOFING

- A. Products: Subject to compliance with requirements, provide products by one of the following:
 - 1. Vulkem 250 GC; Tremco
 - 2. Mel-Rol LM; W.R. Meadows, Inc.
- B. Other Acceptable Manufacturers: Subject to compliance with requirements, products by Cetco Building Materials are also acceptable.

2.2 AUXILIARY WATERPROOFING MATERIALS

- A. Protection Course: Semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners, manufactured in accordance with ASTM D 6506.
 - 1. Basis of Design: PC-2 Protection Course; W. R. Meadows, Inc.
 - 2. Thickness: 1/8 inch, nominal.
- B. Primer: Manufacturer's standard primer formulated for substrates and conditions indicated.
- C. Sheet Flashing: 50-mil-minimum, nonstaining uncured sheet neoprene.
 - 1. Adhesive: Manufacturer's recommended contact adhesive.
- D. Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.
- E. Joint Sealant: Multicomponent polyurethane sealant, compatible with waterproofing, complying with ASTM C 920 Type M, Class 25; Grade NS for sloping and vertical applications or Grade P for deck applications; Use NT exposure; and as recommended by manufacturer for substrate and joint conditions.
 - 1. Backer Rod: Closed-cell polyethylene foam.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 - 1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
 - 2. Verify that substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean and prepare substrate according to manufacturer's written recommendations. Provide clean, dust-free, and dry substrate for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage or overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.

3.3 PREPARATION AT TERMINATIONS AND PENETRATIONS

A. Prepare terminations and penetrations through waterproofing and at expansion joints, drains, and sleeves according to manufacturer's instructions and recommendations

3.4 JOINT AND CRACK TREATMENT

A. Prepare, treat, rout, and fill joints and cracks in substrate according to waterproofing manufacturer's written instructions. Remove dust and dirt from joints and cracks in accordance with manufacturer's requirements before coating surfaces.

3.5 WATERPROOFING APPLICATION

- A. General: Apply waterproofing in accordance with manufacturer's written instructions.
- B. Mixing and Application: Mix materials and apply waterproofing by spray or roller, or other application method approved by the manufacturer and suitable to slope of substrate. Apply waterproofing in two coats to prepared wall terminations and vertical surfaces.
 - 1. Minimum Total Thickness: 60 mils DFT (dry film thickness).
 - a. Verify film thickness of waterproofing every 100 square feet.
 - 2. Minimum Thickness per Coat: 40 mils WFT (wet film thickness); 30 mils DFT (dry film thickness)
 - a. Verify film thickness of waterproofing every 100 square feet.

3.6 CURING, PROTECTING, AND CLEANING

- A. Cure waterproofing according to manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.
- D. Remove waterproofing materials completely from areas indicated to receive sealant materials. Clean surfaces in accordance with sealant manufacturer's requirements for acceptable substrate conditions required for application of sealant materials.

END OF SECTION 07 14 16

SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Foam-plastic board insulation.
- 2. Mineral-wool blanket insulation.
- Radiant barriers.
- 4. Vapor retarders.

B. Related Sections:

- 1. Section 042000 "Unit Masonry" for insulation installed in cavity walls.
- 2. Section 061600 "Sheathing" for foam-plastic board sheathing over wood or steel framing.
- 3. Section 075552 "Modified Bituminous Protected Membrane Roofing" for insulation specified as part of roofing construction.
- 4. Section 078446 "Fire-Resistive Joint Systems" for insulation installed as part of a perimeter fire-resistive joint system.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
- B. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.5 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated on Drawings or specified elsewhere in this Section as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.

- 4. Compliance with NFPA 285.
- 5. Compliance with Chapter 8 of the Florida Building Code.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Conform to applicable code requirements for flame and smoke ratings and non-combustibility as applicable.
- B. Toxicity/Hazardous Materials:
 - 1. Formaldehyde: Products containing urea-formaldehyde shall not be permitted.
 - 2. Chlorofluorocarbons (CFCs)/HCFCs: Products and equipment requiring or using CFCs or HCFCs during the manufacturing process shall not be permitted.
- C. Airtightness: Install to meet requirements of the Energy Star Program of 1.5 Air Changes/Hour at 50 Pa and a maximum air permeance of 0.02 L/s-m2 at 75 Pa as per ASTM E 283 or ASTM E 2178.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
 - Do not expose to sunlight except to necessary extent for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
 - 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company (The).

- c. Owens Corning.
- d. Pactiv Building Products.
- 2. Selection to be coordinated with warranted assembly.
- 3. Type V, 100 psi (690 kPa).
- B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

2.2 GLASS-FIBER BLANKET INSULATION

- 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. CertainTeed Corporation.
 - 2. Guardian Building Products, Inc.
 - 3. Johns Manville.
 - 4. Knauf Insulation.
 - Owens Corning.
- B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- C. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
- D. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.
- E. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
 - 1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
 - 2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

2.3 MINERAL-WOOL BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Fibrex Insulations Inc.
 - 2. Owens Corning.
 - 3. Roxul Inc.
 - 4. Thermafiber.
- B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- C. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that substrate and cavities are free of any foreign material that will impede application.
- B. Verify that other work on and within spaces to be insulated is complete prior to application.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.
- E. Mask and protect adjacent surfaces from overspray or damage.

3.3 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures.
 - 4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping stapling flanges to flanges of metal studs.
- D. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..

3.4 PROTECTION

A. General: Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

3.5 INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION

A. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install blanket insulation over entire ceiling area in thicknesses indicated. Extend insulation 48 inches (1219 mm) up either side of partitions.

3.6 INSTALLATION OF INSULATION FOR CONCRETE SUBSTRATES

- A. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
 - 1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
 - 2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
 - 3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
 - 4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

3.7 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

3.8 CONSTRUCTION WASTE MANAGEMENT

- A. Plan and coordinate the insulation work to minimize the generation of offcuts and waste. Reuse insulation scraps to the maximum extent
- B. Separate and recycle waste materials in accordance with the Waste Management Plan and to the extent economically feasible.

END OF SECTION 07 21 00

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SECTION 07 21 19 - FOAMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Open-cell spray polyurethane foam.
- B. Related Requirements:
 - 1. Section 072100 "Thermal Insulation" for foam-plastic board insulation.
 - 2. Section 078123 "Intumescent Fireproofing" for thermal and ignition barriers where required and as recommended by manufacturer.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Evaluation Reports: For spray-applied polyurethane foam-plastic insulation, from ICC-ES.
 - 1. Must meet Florida Building Code and NFPA requirements based on application.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 OPEN-CELL SPRAY POLYURETHANE FOAM

A. Open-Cell Spray Polyurethane Foam: Spray-applied polyurethane foam using water as a blowing agent. Minimum density of 0.4 lb/cu. ft. (6.4 kg/cu. m)] and minimum aged R-value at 1-inch (25.4-mm) thickness of 3.4 deg F x h x sq. ft./Btu at 75 deg F (24 K x sq. m/W at 24 deg C).

- 1. Basis of Design: Icynene Classic Plus (MD-C-200 v3)
- 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation.
 - b. Dow Chemical Company (The)
- 3. Surface-Burning Characteristics: Comply with ASTM E 84 and UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
- 4. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
- 5. Coordinate with required intumescent coating/ ignition barrier to ensure adherence capability and permeability.

2.2 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by insulation manufacturer where required for adhesion of insulation to substrates.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.
- B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.
- C. Examine substrates and conditions, under which work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.
 - 1. Review placement area to determine final location will not be within 3 inches of any heat source where the temperature will exceed 200 deg F per ASTM C 411 or in accordance with Authorities Having Jurisdiction.

3.2 INSTALLATION

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Spray insulation to envelop entire area to be insulated and fill voids.

C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.

- D. Framed Construction: Install into cavities formed by framing members to achieve thickness indicated on Drawings.
- E. Cavity Walls: Install into cavities to achieve required R-value as shown on drawings while maintaining required air space.
- F. Miscellaneous Voids: Apply according to manufacturer's written instructions.

3.3 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

END OF SECTION 07 21 19

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SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

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:

- Manufactured reglets with counterflashing.
- 2. Formed roof-drainage sheet metal fabrications.
- 3. Formed low-slope roof sheet metal fabrications.
- 4. Formed steep-slope roof sheet metal fabrications.
- 5. Formed wall sheet metal fabrications.
- Formed equipment support flashing.

B. Related Requirements:

- 1. Section 06 10 00 "Rough Carpentry" for wood nailers, curbs, and blocking.
- Section 07 31 13 "Asphalt Shingle Roofing System" for installation of sheet metal flashing and trim integral with roofing.
- Section 07 52 16 "Modified Bituminous Roofing System" for sheet metal flashing and trim integral with roofing.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
 - 3. Review requirements for insurance and certificates if applicable.
 - 4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
 - 2. Notice of Florida Product Approval if available for assemblies. If NOA is not available, refer to "Shop Drawings" for additional requirements.
- B. Shop Drawings: For sheet metal flashing and trim.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
 - 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
 - 4. Include details for forming, including profiles, shapes, seams, and dimensions.
 - 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 - 6. Include details of termination points and assemblies.
 - 7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
 - 8. Include details of roof-penetration flashing.
 - 9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
 - 10. Include details of special conditions.
 - 11. Include details of connections to adjoining work.
 - 12. Signed and sealed engineered delegated design drawings for assembly and attachment per Florida Building Code requirements in absence of Florida Notice of Product Approval for assembly.
 - 13. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches (1:5).
- C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.
- D. Samples for Verification: For each type of exposed finish.
 - 1. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
 - 2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.
 - 3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
 - 4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Certificates: For each type of coping and roof edge flashing that is SPRI ES-1 tested and FM Approvals approved.

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

D. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 - For copings and roof edge flashings that are SPRI ES-1 tested and FM Approvals approved, shop shall be listed as able to fabricate required details as tested and approved.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Build mockup of typical roof edge and eave, including gutter, fascia, flashing and trim, approximately 10 feet (3.0 m)] long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.10 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. FM Approvals Listing: Manufacture and install copings and roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, as indicated on drawings. Identify materials with name of fabricator and design approved by FM Approvals.
 - 1. Design Pressure: As indicated on Drawings.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
 - 1. Nonpatinated Exposed Finish: Mill to match existing.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface; match existing.
 - 1. As-Milled Finish: Match existing.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 60 mils (1.524 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.
 - 1. Refer to Section "Self-Adhering Sheet Waterproofing".
 - 2. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C) or higher.
 - 3. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C) or lower.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Through-Wall, Ribbed, Sheet Metal Flashing: Manufacture through-wall sheet metal flashing for embedment in masonry, with ribs at 3-inch (75-mm) intervals along length of flashing to provide integral mortar bond. Manufacture through-wall flashing with interlocking counterflashing on exterior face, of same metal as flashing.
- B. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated [with factory-mitered and -welded corners and junctions] [and] [with interlocking counterflashing on exterior face, of same metal as reglet].
 - 1. Material: Aluminum, 0.024 inch (0.61 mm) thick.

2. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.

- 3. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
- 4. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
- Accessories:
 - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
 - b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.
- 6. Finish: Match existing.

2.6 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 2. Obtain field measurements for accurate fit before shop fabrication.
 - Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

G. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

- H. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- I. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.
- J. Do not use graphite pencils to mark metal surfaces.

2.7 ROOF-DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- (2400-mm-) long sections. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.
 - 1. Gutter Profile: Match existing profile according to cited sheet metal standard.
 - 2. Expansion Joints: Lap type.
 - Accessories: Continuous, removable leaf screen with sheet metal frame and hardware cloth screen.
 - 4. Gutters with Girth up to 15 Inches (380 mm): Fabricate from the following materials:
 - Aluminum: 0.032 inch (0.81 mm) minimum, but no less than existing.
- B. Downspouts: Fabricate shape to match existing for all downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.
 - 1. Fabricated Hanger Style: Match existing according to SMACNA's "Architectural Sheet Metal Manual."
 - Manufactured Hanger Style: Match existing according to SMACNA's "Architectural Sheet Metal Manual."
 - 3. Hanger Style: Match existing.
 - Fabricate from the following materials:
 - Aluminum: 0.024 inch (0.61 mm) thick; but no less than existing.
- C. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fabricate from the following materials:
 - 1. Aluminum: [0.032 inch (0.81 mm)] thick.
 - 2. Match sheet metal flashing and trim.

- D. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape required, complete with outlet tubes, exterior flange trim, and built-in overflows. Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch (0.81 mm) thick.
 - Match existing sheet metal flashing and trim.
- E. Splash Pans: Fabricate to dimensions and shape required and from the following materials:
 - 1. Aluminum: 0.040 inch (1.02 mm) thick.

2.8 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing (Gravel Stop[and Fascia Ca]: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long sections. Furnish with 6-inch- (150-mm-) wide, joint cover plates[Shop fabricate interior and exterior corners]
 - 1. Joint Style:Overlapped, 4 inches (100 mm) wide.
 - 2. Fabricate with scuppers spaced as indicated on drawings, to dimensions required with 4-inch- (100-mm-) wide flanges and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
 - Fabricate from the Following Materials:
 - a. Aluminum: [0.050 inch (1.27 mm)] < Insert dimension > thick.
 - b. Match existing sheet metal flashing and trim.
- B. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, fasten and seal watertight. Shop fabricate interior and exterior corners.
 - Coping Profile: Match existing according to SMACNA's "Architectural Sheet Metal Manual."
 - Joint Style: Butted with expansion space and 6-inch- (150-mm-) wide, concealed backup plate.
 - 3. Fabricate from the Following Materials:
 - a. Aluminum: [0.050 inch (1.27 mm)] < Insert dimension > thick.
 - b. Match existing sheet metal flashing and trim.
- C. Roof and Roof-to-Wall Transition, Roof-to-Roof Edge-Flashing (Gravel-Stop) Transition, Roof-to-Roof Edge-Flashing (Gravel-Stop) and Fascia-Cap Transition Expansion-Joint Cover: Fabricate from the following materials: Shop fabricate interior and exterior corners.
 - 1. Aluminum: 0.050 inch (1.27 mm) thick.
 - 2. Match existing sheet metal flashing and trim.
- D. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
 - 1. Aluminum: [0.040 inch (1.02 mm)] < Insert dimension > thick.
 - 2. Match existing sheet metal flashing and trim.
- E. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
 - 1. Aluminum: [0.032 inch (0.81 mm)] <Insert dimension> thick.
 - 2. Match existing sheet metal flashing and trim.
- F. Flashing Receivers: Fabricate from the following materials:
 - 1. Aluminum: [0.032 inch (0.81 mm)] < Insert dimension > thick.

2. Match existing sheet metal flashing and trim.

2.9 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
 - 1. Aluminum: [0.032 inch (0.81 mm)] < Insert dimension > thick.
- B. Valley Flashing: Fabricate from the following materials:
 - 1. Copper: 16 oz./sq. ft. (0.55 mm thick).
- C. Drip Edges: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch (0.81 mm) thick.
 - 2. Match existing sheet metal flashing and trim.
- D. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch (0.81 mm) thick.
- E. Counterflashing: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch (0.81 mm) thick.
- F. Flashing Receivers: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch (0.81 mm) thick.
- G. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Copper: 16 oz./sq. ft. (0.55 mm thick).

2.10 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:
 - Copper: 16 oz./sq. ft. (0.55 mm thick).
- B. Overhead-Piping Safety Pans: Fabricate from the following materials:
 - 1. Copper: 24 oz./sq. ft. (0.82 mm thick).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

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

3.2 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller. Cover underlayment within 14 days.
- B. Apply slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.

3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 - 5. Torch cutting of sheet metal flashing and trim is not permitted.
 - 6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 - 1. Coat concealed side of uncoated-aluminum sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws or substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
 - 1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
 - 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- G. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.4 ROOF-DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters: Join sections with riveted joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.
 - 1. Fasten gutter spacers to front and back of gutter.
 - 2. Anchor and loosely lock back edge of gutter to continuous eave or apron flashing.
 - Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches (600 mm) apart.
 - 4. Anchor gutter with gutter straps to match existing spaced not more than 24 inches (600 mm) apart to roof deck, unless otherwise indicated, and loosely lock to front gutter bead.
 - 5. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet (15.24 m) apart. Install expansion-joint caps.
 - 6. Install continuous gutter screens on gutters with noncorrosive fasteners, to match existing.
- C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints.
 - 1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c.
 - Provide elbows at base of downspout to direct water away from building.
 - 3. Connect downspouts to underground drainage system.
- D. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in or elastomeric sealant compatible with the substrate.
- E. Parapet Scuppers: Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

- Anchor scupper closure trim flange to exterior wall and seal with elastomeric sealant to scupper.
- 2. Loosely lock front edge of scupper with conductor head.
- Seal with elastomeric sealant exterior wall scupper flanges into back of conductor head.
- F. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch (25 mm) below scupper discharge.
- G. Expansion Joint Covers: Install expansion joint covers at locations and of configuration indicated. Lap joints minimum of 4 inches (100 mm) in direction of water flow.

3.5 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch (75-mm) centers.
- C. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.
- D. Copings: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.
- E. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- F. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints minimum of 4 inches (100 mm). Secure in waterproof manner by means of interlocking folded seam or blind rivets and sealant unless otherwise indicated.
- G. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.6 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Reglets: Installation of reglets is specified in Section 033000 "Cast-in-Place Concrete."

C. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

3.7 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.
- B. Overhead-Piping Safety Pans: Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.

3.8 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.9 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 62 00

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SECTION 07 81 23 - INTUMESCENT FIREPROOFING

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 mastic and intumescent fire-resistive coatings (MIFRC).

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site
 - 1. Review products, design ratings, restrained and unrestrained conditions, thicknesses, and other performance requirements.
 - 2. Review installation requirements, coordination with other trades, sequenced work and coordination requirements.
 - 3. Attendees to include Contractor, sub-contractor(s), testing agent, representative from the Authority Having Jurisdiction, Owner's representative, and Architect.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Structural framing plans indicating the following:
 - 1. Extent of fireproofing for each construction and fire-resistance rating.
 - 2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
 - 3. Minimum fireproofing thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
 - 4. Treatment of fireproofing after application.
- C. Samples: For each exposed product and for each color and texture specified, 4 inches (102 mm) square in size.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing agency.
- B. Product Certificates: For each type of fireproofing.
- C. Evaluation Reports: For fireproofing, from ICC-ES.

D. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Build mockup of each type of fireproofing and different substrate and each required finish as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is 50 deg F (10 deg C) or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
- B. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.
- B. Source Limitations: Obtain fireproofing from single source.
- C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E 119 or UL 263 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- D. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction and the following VOC limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 150 g/L.
 - 3. Primers, Sealers, and Undercoaters: 200 g/L.
 - 4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.

- 5. Fireproofing Exterior Coatings: 350 g/L.
- E. Asbestos: Provide products containing no detectable asbestos.

2.2 MASTIC AND INTUMESCENT FIRE-RESISTIVE COATINGS

- A. Intumescent Coating: Opaque, intumescent coating to achieve an ignition barrier rating for wood and spray foam insulation materials.
 - 1. Basis of Design: No Burn Plus XD, by No Burn, Inc.

2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: Primers approved by fireproofing manufacturer and complying with required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by fireproofing manufacturer.
- D. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachment.
- E. Topcoat: Suitable for application over applied fireproofing; of type recommended in writing by fireproofing manufacturer for each fire-resistance design.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design. Verify compliance with the following:
 - Substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.
 - 2. Objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 - 3. Substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.
- B. Conduct tests according to fireproofing manufacturer's written recommendations to verify that substrates are free of substances capable of interfering with bond.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

- D. Proceed with installation only after unsatisfactory conditions have been corrected.
- E. Contractor to verify product meets shelf-life requirements recommended by the Manufacturer prior to beginning installation.

3.2 PREPARATION

- A. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.
- B. Clean substrates of substances that could impair bond of fireproofing.
- C. Prepare coating by mixing as required and recommended by Manufacturer.
- D. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.
- E. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fireproofing. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.3 APPLICATION

- A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, topcoats, finishing, and other materials and procedures affecting fireproofing work.
- B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.
 - 1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.
 - 2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.
- D. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer's written recommendations for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.
- E. Spray apply fireproofing to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.

- F. Extend fireproofing in full thickness over entire area of each substrate to be protected.
- G. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.
- H. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.
- I. Cure fireproofing according to fireproofing manufacturer's written recommendations.
- J. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.
- K. Do not thin.
- L. Finishes: Where indicated, apply fireproofing to produce the following finishes:
 - Manufacturer's Standard Finishes: Finish according to manufacturer's written instructions for each finish selected.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 - 1. Test and inspect as required by the IBC, 1704.11.
- B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.
- C. Fireproofing will be considered defective if it does not pass tests and inspections.
 - 1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
 - 2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.
- D. Prepare test and inspection reports.

3.5 CLEANING, PROTECTING, AND REPAIRING

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.
- B. Protect fireproofing, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fireproofing will be without damage or deterioration at time of Substantial Completion.
- C. As installation of other construction proceeds, inspect fireproofing and repair damaged areas and fireproofing removed due to work of other trades.

- D. Repair fireproofing damaged by other work before concealing it with other construction.
- E. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 07 81 23

SECTION 07 84 03 - PENETRATION FIRESTOPPING

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 through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:
 - 1. Walls and partitions.
 - 2. Floors, ceilings, and roofs.
 - 3. Smoke barriers.

1.3 PERFORMANCE REQUIREMENTS

- A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
 - 1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
 - 2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
- B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
- C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- D. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

1.4 SUBMITTALS

- A. Product Data: For each type of through-penetration firestop system product indicated.
- B. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.
 - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
 - 2. Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer.
- C. Qualification Data: For Installer.
- D. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.
- E. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed through-penetration firestop systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:
 - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 - 2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:.
 - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:
 - 1) UL in "Fire Resistance Directory."
- D. Pre-installation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and

- inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.
- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hilti Construction Chemicals, Inc.
 - 2. Nelson Firestop Products.
 - 3. 3M Fire Protection Products.
 - 4. Tremco.

2.2 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
 - 1. Permanent forming/damming/backing materials, including the following:

- a. Slag-/rock-wool-fiber insulation.
- b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
- c. Fire-rated form board.
- d. Fillers for sealants.
- 2. Temporary forming materials.
- 3. Substrate primers.
- 4. Collars.
- 5. Steel sleeves.

2.3 FILL MATERIALS

- A. General: Provide through-penetration firestop systems containing the types of fill materials indicated by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.
- B. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in horizontal surfaces and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
 - 2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in other horizontal surfaces.
 - 3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.4 MIXING

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.

B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

3.5 IDENTIFICATION

- A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
 - 1. The words: "Warning--Through-Penetration Firestop System--Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Through-penetration firestop system manufacturer's name.
 - Installer's name.

3.6 CLEANING AND PROTECTION

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

END OF SECTION 07 84 03

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SECTION 07 84 46 - FIRE-RESISTIVE JOINT 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. This Section includes fire-resistive joint systems for the following:
 - 1. Floor-to-floor joints.
 - 2. Floor-to-wall joints.
 - 3. Head-of-wall joints.
 - 4. Wall-to-wall joints.
 - 5. Joints between perimeter edge of fire-resistance-rated floor assemblies and back of non-fire-resistance-rated, exterior, glazed aluminum curtain walls.

1.3 PERFORMANCE REQUIREMENTS

- A. General: For joints in the following constructions, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed:
 - 1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
 - 2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
 - 3. Fire-resistance-rated floor assemblies.
 - 4. Exterior curtain-wall assemblies and fire-resistance-rated floor assemblies.
- B. Fire Resistance of Joint Systems: Assembly ratings and movement capabilities indicated, but with assembly ratings not less than that equaling or exceeding fire-resistance rating of constructions in which joints are located, as determined by UL 2079.
 - 1. Load-bearing capabilities as determined by evaluation during the time test.
- C. Fire Resistance of Perimeter Fire-Containment Systems: Integrity and insulation ratings indicated as determined by UBC Standard 26-9 and UL 2079.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each fire-resistive joint system, show each kind of construction condition in which joints are installed and relationships to adjoining construction. Include fire-resistive joint system design designation of testing and inspecting agency acceptable to authorities having jurisdiction that demonstrates compliance with requirements for each condition indicated.

- 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each fire-resistive joint system configuration for construction and penetrating items.
- C. Product Certificates: For each type of fire-resistive joint system, signed by product manufacturer.
- D. Qualification Data: For Installer.
- E. Compatibility and Adhesion Test Reports: From fire-resistive joint system manufacturer indicating the following:
 - 1. Materials forming joint substrates have been tested for compatibility and adhesion with fill materials.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Evaluation Reports: Evidence of fire-resistive joint systems' compliance with ICBO ES AC30, from the ICBO Evaluation Service.
- G. Research/Evaluation Reports: For each type of fire-resistive joint system.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain fire-resistive joint systems for each kind of joint and construction condition indicated through one source from a single manufacturer.
- B. Preconstruction Compatibility and Adhesion Testing: Submit to fire-resistive joint system manufacturers, for testing indicated below, samples of materials that will contact or affect fill materials.
 - Use manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of fill materials to joint substrates.
 - Perform tests under environmental conditions replicating those that will exist during installation.
 - 2. Submit no fewer than nine pieces of each type of material, including joint substrates, forming materials, and miscellaneous materials.
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain fire-resistive joint system manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
- C. Fire-Test-Response Characteristics: Provide fire-resistive joint systems that comply with the following requirements and those specified in "Performance Requirements" Article:
 - Fire-resistance tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for fire-resistive joint systems acceptable to authorities having jurisdiction.
 - 2. Fire-resistive joint systems are identical to those tested per ICBO ES AC30 and are qualified for types of joints and joint movement capabilities indicated in a current Evaluation Report by the ICBO Evaluation Service.
 - 3. Fire-resistive joint systems are identical to those tested per UL 2079. Provide rated systems complying with the following requirements:
 - 1. Fire-resistive joint system products bear classification marking of qualified testing and inspecting agency.

2. Fire-resistive joint systems correspond to those indicated by referencing system designations listed by the following:

1) UL in its "Fire Resistance Directory."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fire-resistive joint system products to Project site in original, unopened containers or packages with qualified testing and inspecting agency's classification marking applicable to Project and with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials for fire-resistive joint systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate fire-resistive joint systems per manufacturer's written instructions by natural means or, if this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
- B. Coordinate sizing of joints to accommodate fire-resistive joint systems.
- C. Notify Owner's inspecting agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1

2.2 MANUFACTURERS

A. Acceptable Products: Subject to compliance with requirements, provide products by one of the following:

В.

UF IFAS NFREC Building 8003 Remodel (2021-0011)

7 84 46 - 3 Fire-Resistive Joint Systems

- Fire-Resistive Joint Systems:
 - a. A/D Fire Protection Systems Inc.
 - b. Hilti, Inc.
 - c. ISOLATEK International.
 - d. Nelson Firestop Products.
 - e. 3M Fire Protection Products.
 - f. Tremco, Inc.
 - g. United States Gypsum Company.
- 2. Perimeter Fire-Containment Systems:
 - a. United States Gypsum Company.

2.3 FIRE-RESISTIVE JOINT SYSTEMS, GENERAL

- A. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.
- B. Accessories: Provide components of fire-resistive joint systems, including forming materials that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

2.4 FIRE-RESISTIVE JOINT SYSTEMS

A. Where UL-classified fire-resistive joint systems are indicated, they refer to alphanumeric designations listed in UL's "Fire Resistance Directory" under product Category XHBN.

2.5 PERIMETER FIRE-CONTAINMENT SYSTEMS

A. Where UL-classified perimeter fire-containment systems are indicated, they refer to alphanumeric designations listed in UL's "Fire Resistance Directory" under product Category XHDG.

B.

PART 3 - EXECUTION

3.1 Not Used

3.2 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

- 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
- 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
- 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from fire-resistive joint system materials. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

3.4 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with Part 1 "Performance Requirements" Article and fire-resistive joint system manufacturer's written installation instructions for products and applications indicated.
- B. Install forming/packing/backing materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
- C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings and forming/packing/backing materials as required to achieve fire-resistance ratings indicated.
 - 2. Apply fill materials so they contact and adhere to substrates formed by joints.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified independent inspecting agency to inspect fire-resistive joint systems and to prepare inspection reports.
 - 1. Inspecting agency will state in each report whether inspected fire-resistive joint systems comply with or deviate from requirements.
- B. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and inspecting agency has approved installed fire-resistive joint systems.
- C. If deficiencies are found, repair or replace fire-resistive joint systems so they comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to joints as Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 07 84 46

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes joint sealants for the applications indicated in the Joint-Sealant Schedule at the end of Part 3.
- B. Related Sections include the following:
 - 1. Division 04 Section "Structural Reinforced Concrete Masonry Units" for masonry control and expansion joint fillers and gaskets.
 - 2. Division 06 Section "Architectural Woodwork" for sealing joints at perimeter of casework and countertops.
 - 3. Division 07 Section "Fire-Resistive Joint Systems" for sealing joints in fire-resistance-rated construction.
 - 4. Division 08 all divisions for sealants at perimeter of openings and glazing
 - 5. Division 08 Section "Glazing" for glazing sealants.
 - 6. Division 09 Section "Gypsum Board Assemblies" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
 - 7. Division 09 Section "Tiling" for sealing tile joints.
 - 8. Division 09 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters of acoustical ceilings.
 - 9. Division 09 Section "Resilient Base and Accessories" for sealing requirements at the perimeter of wall base.
 - 10. Division 09 Section "Resilient Tile Flooring" for finishing requirements at the perimeter of flooring.
 - 11. Division 09 Section "Painting".
 - 12. Division 09 Section "Staining and Transparent Finishing"

1.3 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

A. Product Data:

1. For each joint-sealant product indicated.

2. Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D (EPA Method 24)

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.6 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Suitability for Immersion in Liquids. Where elastomeric sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing

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according to ASTM C 1247 and qualify for the length of exposure indicated by reference to ASTM C 920 for Class 1 or 2. Liquid used for testing sealants is deionized water, unless otherwise indicated.

- D. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- E. Single-Component Neutral- and Basic-Curing Silicone Sealant:
 - 1. Products:
 - a. BASF Building Systems; Omniseal 50.
 - b. Dow Corning Corporation; 791.
 - c. GE Silicones; SilPruf NB SCS9000.
 - d. Tremco; Spectrem 1 (Basic).
 - e. Pecora Corporation; 864.
 - f. Sika Corporation; SikaSil-C 995.
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 50.
 - Use Related to Exposure: NT (nontraffic).
 - 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
 - Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.
- F. Single-Component Mildew-Resistant Acid-Curing Silicone Sealant:
 - 1. Products:
 - a. Dow Corning Corporation; 786 Mildew Resistant.
 - b. BASF Building Systems; OmniPlus.
 - c. GE Silicones; Sanitary SCS1700.
 - d. Tremco; Tremsil 600 White.
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 25.
 - 4. Use Related to Exposure: NT (nontraffic).
 - 5. Uses Related to Joint Substrates: To sensitive surface joint substrates indicated, O.
 - a. Use O Joint Substrates: Galvanized steel and insulated glazing units.
- G. Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant:
 - 1. Products:
 - a. Pecora Corporation; 898.
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 50.
 - 4. Use Related to Exposure: NT (nontraffic).
 - 5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.
- H. Multicomponent Nonsag Immersible Urethane Sealant:

1. Products:

- a. Pacific Polymers, Inc.; Elasto-Thane 227 R Type II (Gun Grade).
- b. Pecora Corporation; Dynatred.
- c. Tremco; Vulkem 227.
- 2. Type and Grade: M (multicomponent) and NS (nonsag).
- 3. Class: 25.
- 4. Use Related to Exposure: T (traffic) NT (nontraffic) and I (immersible), Class 1 or 2.
- Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.
- I. Multicomponent Pourable Urethane Sealant:
 - Products:
 - Bostik Inc.: Chem-Calk 550.
 - b. Meadows, W. R., Inc.; POURTHANE.
 - c. Pecora Corporation; Urexpan NR-200.
 - d. Tremco; Vulkem 245.
 - 2. Type and Grade: M (multicomponent) and P (pourable).
 - 3. Class: 25.
 - 4. Use Related to Exposure: T (traffic).
 - Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.
- J. Single-Component Nonsag Urethane Sealant:
 - Products:
 - a. Sika Corporation, Inc.; Sikaflex 1a.
 - b. BASF Building Systems; NP 1.
 - c. Tremco; Vulkem 116.
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 25.
 - 4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
 - Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

2.4 LATEX JOINT SEALANTS

- A. Latex Sealant: Comply with ASTM C 834, Type P, Grade NF.
- B. Products:
 - 1. Bostik Inc.; Chem-Calk 600.
 - 2. Pecora Corporation; AC-20+.
 - 3. BASF Building Systems; Sonolac.
 - 4. Tremco; Tremflex 834.

2.5 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:

- 1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- 2. Products:
 - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.

2.6 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide selfadhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

- 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
- 2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include, but are not limited to, the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
- 3. Remove laitance and form-release agents from concrete.
- 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include, but are not limited to, the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

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E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

- F. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
 - 4. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 5C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 CLEANING

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

3.5 PROTECTION

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

3.6 SEALANT SCHEDULE

| JOINT SEALANT | APPLICATION |
|---|--|
| Single-Component Neutral- and Basic- Curing Silicone Sealant | Exterior vertical and horizontal nontraffic joints in cast-in-place concrete |
| | Exterior vertical control and expansion joints in unit masonry |
| | Exterior horizontal pressure-relieving joints in unit masonry |
| | Exterior joints between flashing materials and |

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| | unit masonry |
|---|--|
| | Exterior butt joints between metal panels |
| | Exterior perimeter joints at frames of doors, |
| | windows and louvers |
| | Exterior control and expansion joints in ceilings |
| | and other overhead surfaces |
| | Exterior vertical joints between different mate- |
| | rials listed above |
| | All other exterior vertical and horizontal nontraf- |
| | fic joints unless noted otherwise |
| Single-Component Mildew-Resistant | Exterior joints with galvanized steel or insulated |
| Neutral-Curing Silicone Sealant | glass substrates |
| Single-Component Mildew-Resistant Ac- | Interior joints between plumbing fixtures and |
| id-Curing Silicone Sealant | adjoining walls, floors, and counters |
| la carring difference dealarit | Joints between counters and adjoining walls |
| | and floors at bathrooms, kitchens and other |
| | wet areas |
| Multicomponent Nonsag Immersible Ure- | |
| thane Sealant | Submerged interior locations |
| Multicomponent Pourable Urethane | Exterior horizontal nontraffic and traffic isola- |
| Sealant | tion and contraction joints in cast-in-place con- |
| Salant | crete slabs |
| | Exterior control and expansion joints in hori- |
| | zontal traffic surfaces of ceramic tile, and simi- |
| | lar materials unless otherwise specified in indi- |
| | vidual specification sections. |
| | Interior expansion, control, contraction, and |
| | isolation joints in horizontal traffic surfaces in |
| | ceramic tile, dimension stone tile and brick, un- |
| | |
| | less otherwise specified in individual specifica- |
| Single Component Nances Urethons | tion sections. |
| Single-Component Nonsag Urethane Sealant | Vertical joints on exposed surfaces of interior unit masonry and concrete walls and partitions |
| Calant | |
| | Interior perimeter joints of exterior openings leints between ten of pen lead begring unit |
| | Joints between top of non-load bearing unit |
| | masonry walls and underside of cast-in-place |
| Latov Socient | concrete slabs and beams |
| Latex Sealant | Perimeter joints between interior wall surfaces and frames of interior deeps windows and also |
| | and frames of interior doors, windows and ele- |
| Acquetical Coolent for Evenes dend | vator entrances |
| Acoustical Sealant for Exposed and | Both faces of interior gypsum board partitions |
| Concealed Joints | at perimeter relief joints and through penetra- |
| | tions |
| | As required for acoustical-rated constructions |
| | As required for gypsum board shaft-wall as- |
| | semblies |

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section 08

OPENINGS

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SECTION 08 11 13 – HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Section includes hollow-metal work.
- B. Related Requirements:
 - 1. Section 081119 "Stainless-Steel Doors and Frames" for hollow-metal doors and frames manufactured from stainless steel.
 - 2. Section 087100 "Finish Hardware" for door hardware for hollow-metal doors.

1.3 PERFORMANCE REQUIREMENTS

- A. Florida Building Code: Exterior steel door assemblies shall meet the requirements of the Florida Building Code.
 - 1. Basic Wind Speed: As indicated on the Drawings.
 - 2. Design Pressures: As indicated on the Structural Drawings.
 - 3. Structural Performance: Provide products meeting the structural requirements of the Florida Building Code.
- B. Florida Fire Prevention Code: View panels in any fire door assembly shall meet the requirements of the Florida Fire Prevention Code.

1.4 DEFINITIONS

- A. Steel Sheet Thickness: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic-coated steel sheets.
- B. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.5 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.7 SUBMITTALS

- A. Product Approval for Exterior Door Assemblies: Comply with the Florida Building Code.
 - 1. Submit manufacturer's certification indicating compliance.
- B. Engineering Responsibility: Prepare engineering data for exterior steel doors and frames including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project signed and sealed by a professional engineer registered in the state of Florida.
- C. Testing and Labeling: Comply with the Florida Building Code. Submit manufacturer's certification indicating compliance.
- D. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.
- E. Shop Drawings: SDI-106 Recommended Standard Door Type Nomenclature and SD-111 Recommended Standard Details for Steel Doors & Frames shall be used as a guide in the development of Schedules and Shop Drawings.
 - 1. Show the following:
 - a. Elevations of each door type.
 - b. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 - c. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - d. Locations of reinforcement and preparations for hardware.
 - e. Details of each different wall opening condition.
 - f. Details of anchorages, joints, field splices, and connections.
 - g. Details of accessories.
 - h. Details of moldings, removable stops, and glazing.
 - i. Details of conduit and preparations for power, signal, and control systems
 - j. Indicate location, size, door and frame types, rating and hand of each door.
 - k. Indicate door construction, details and methods of assembling sections, hardware locations, anchorage & fastening methods and finish requirements.
 - I. Coordination of glazing frames and stops with glass and glazing requirements.
 - m. Include anchoring details engineered to meet wind load requirements to comply with the Code.
 - n. Utilize same designation as Architect's door mark.
- F. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.
- G. Product Certificates: Product certificates shall be required by manufacturers of non-named products certifying that each product furnished meets the Specifications and with individual project requirements for the purpose intended. Certificates shall be submitted with Shop Drawings.

- H. Samples for Initial Selection: For units with factory-applied color finishes.
- I. Samples for Verification:
 - 1. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches (75 by 127 mm).
 - 2. For "Doors" and "Frames" subparagraphs below, prepare Samples approximately 12 by 12 inches to demonstrate compliance with requirements for quality of materials and construction:
 - a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
 - b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.

1.8 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.
- B. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: Employ only experienced Contractors (Installers) skilled in the successful installation of the specified materials and assemblies on similar projects for a minimum of five years.
- B. Source Limitations: Obtain steel doors and frames through one source from a single manufacturer.
- C. Steel Door and Frame Standard: Comply with requirements contained in SDI 100 Recommended Specifications for Standard Steel Doors and Frames unless more stringent requirements are indicated.
- D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
 - 1. Test Pressure: Test according to NFPA 252 or UL 10C. After 5 minutes into the test, the neutral pressure level in furnace shall be established at 40 inches or less above the sill.
 - 2. Temperature-Rise Rating: Where indicated, provide doors that have a temperature-rise rating of 450 degrees F maximum in 30 minutes of fire exposure.

E. Preparation/Field Verification

- 1. Verify doorframes are in proper location and have been properly anchored in accordance with Specifications and SDI 105 Recommended Erection Instruction for Steel Frames.
- 2. Verify that frames comply with indicated requirements for type, size, location and swing characteristics. Verify that frames have been installed with plumb jambs and level heads.
- 3. Verify that Shop Drawings have been successfully submitted, reviewed and returned.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage.
- B. Doors shall be individually wrapped, protected and packaged as standard of manufacturer.
- C. Each door shall be marked on top and bottom rail with same opening number used on Shop Drawings.
- D. Inspect doors and frames on delivery for damage and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Owner's Representative. Remove and replace damaged items that cannot be repaired as directed.
- E. Store doors and frames at building site under cover. Place units on minimum 4-inch- high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to permit air circulation.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Interior Steel Doors and Frames and Exterior Steel Doors and Frames not Subject to Product Approval Requirements: Subject to compliance with requirements, provide products by one of the following:
 - 1. Steel Doors and Frames:
 - a. Amweld Building Products, Inc.
 - b. Ceco Door Products
 - c. Curries Company
 - d. Steelcraft
 - e.
- B. Exterior Flush Steel Doors and Frames Requiring Product Approval:
 - 1. Basis of Design: Curries Company, Series 747F Doors, Series "M" Frames .
 - 2. Other Products and Manufacturers: Subject to compliance with requirements, the following products and manufacturers are also acceptable:
 - a. Amweld Building Products, Inc.
 - b. Ceco Door Products, "Medallion" exterior doors, "SU Series" Frames.

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2.2 MATERIALS

A. Hot-Rolled Steel Sheets: ASTM A 569, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

- B. Cold-Rolled Steel Sheets: ASTM A 366, Commercial Steel (CS), or ASTM A 620, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.
- C. Metallic-Coated Steel Sheets: ASTM A 653, Commercial Steel (CS), Type B, with an A40 zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.

2.3 DOORS

- A. General: Provide doors of sizes, thickness, and designs indicated.
- B. Interior Doors: Provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical-endurance level:
 - 1. Minimum SDI Level and Physical Performance: Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).
- C. Exterior Doors: Provide doors complying with Code requirements and with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
 - 1. Minimum SDI Level and Physical Performance: Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).

D. Vision Lite Systems:

- 1. Frames for glazed openings (borrowed lites) shall be provided with manufacturer's standard glazing system designed to receive the glazing materials specified.
- 2. Stops and glazing beads shall be screw applied. Screws shall be flat-head type and recessed flush with the surface of the stop.
- E. Louvers: Louvers in steel doors shall be inverted "Y" blade type and shall be constructed in accordance with SDI-111C.
- F. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum ¾-inch beyond edge of door on which astragal is mounted.

2.4 FRAMES

- A. General: Provide steel frames for doors, transoms, sidelights, borrowed lights, and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.
- B. Frames of 0.053-inch- thick 14 gauge steel sheet for the following:
 - 1. Door openings wider than 48 inches.
 - 2. Level 2 steel doors.
 - 3. Wood doors.

C. Frames of 16 gauge minimum steel sheet for interior door openings less than 42 inches wide; 14 gauge for frames 42 inches or larger.

- D. Frames of 0.067-inch- thick steel sheet for the following:
 - 1. Level 3 steel doors.
- E. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.
- F. Supports and Anchors: Fabricated from not less than 0.042-inch- thick, electrolytic zinc-coated or metallic-coated steel sheet.
 - 1. Wall Anchors in Masonry Construction: 0.177-inch- diameter, steel wire complying with ASTM A 510 may be used in place of steel sheet.
- G. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153, Class C or D as applicable.

2.5 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Ceiling Struts: Minimum 1/4 inch thick by 1 inch wide steel.
- C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.6 FABRICATION

- A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.
- B. Exterior Door Construction: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch- thick, metallic-coated steel channels with channel webs placed even with top and bottom edges. Provide continuous welded seams.
 - 1. Face sheets shall be 14 gauge (0.053 in) hot-dipped galvanized steel sheets conforming to ASTM A591, Commercial Steel (CS) Class B coating, mill phosphatized.
- C. Interior Door Faces: Fabricate exposed faces of doors, including stiles and rails of nonflush units, from the following material:
 - 1. Face sheets shall be minimum 16 gauge cold-rolled steel sheets conforming to ASTM A366/A 366M, Commercial Steel (CS) or ASTM A620, Drawing Steel (DS), Type B.
- D. Exterior Door Faces: Fabricate exposed faces of doors, including stiles and rails of nonflush units, from the following material:
 - 1. Face Sheets: Minimum 14 gauge cold-rolled steel sheets conforming to ASTM A366, Commercial Steel (CS) or ASTM A620, Drawing Steel (DS), Type B.
- E. Core Construction: Complying with SDI standards:
 - 1. Exterior Doors: Insulated; polyurethane or polystyrene core.

- 2. Interior Non-Fire Rated Doors: Insulated; polyurethane or polystyrene core.
- 3. Interior Fire Rated Doors: Manufacturer's standard core for fire ratings indicated.
- F. Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch at jambs and heads, except not more than 1/4 inch between pairs of doors. Not more than 3/4 inch at bottom.
- G. Clearances for Fire-Rated Doors: As required by NFPA 80.
- H. Single Acting, Door-Edge Profile: Beveled edge unless otherwise required to comply with Code requirements.
- I. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- J. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.
- K. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- L. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.
 - 1. Security Hardware: Prepare frames for security hardware required. Refer to Division 08 specifications.
- M. Frame Construction: Fabricate frames to shape shown.
 - 1. Frames shall be welded construction type and have mitered or butted corners with welded and finished frame faces (seamless). The remaining elements of the frame profile, i.e., rabbet and stop, shall not be continuously welded.
 - 2. Frames for exterior use shall have shall have mitered corners welded continuously and finished frame faces (seamless).
 - 3. Headers and jambs shall be secured at corners either by external welding with seamless face joints.
 - 4. Frames shall be provided with temporary spreader bars for shipping and handling purposes.
 - 5. Frames for exterior use shall be hot-dipped galvanized steel after fabrication.
 - 6. Frames for paired doors shall be furnished with a removable center mullion, where indicated.
 - 7. Mullions and transom bars shall be joined to adjacent members by welding so as to maintain alignment of parts and assure performance of completed frames. Face joints shall be welded and ground smooth (seamless).
 - 8. Frames shall be provided with a minimum of three anchors per jamb suitable for the adjoining wall construction. Anchors shall be minimum 16-gauge steel or 7-gauge wire. Frames over 7'-6" shall be provided with additional wall anchors as required.
 - 9. In addition, frames shall be provided with minimum 16-gauge base anchor. For existing masonry wall conditions that will not accept base anchor, an additional jamb anchor shall be provided.
 - 10. Frames in masonry shall be fully grouted.
 - 11. Frames shall be furnished in manufacturer's standard factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.
- N. Hardware Preparation
 - 1. Provide minimum hardware reinforcing gauges as required in ANSI A250.6.

- 2. Doors and frames shall be reinforced, drilled and tapped to receive mortised hinges, locks, latches, flush bolts, etc, as required in ANSI A115 and ANSI A250.6.
- 3. Doors shall be reinforced for specified surface-mounted hardware. Drilling and tapping may be completed at the job site by the installers.
- 4. Hardware shall be located in accordance with locations prescribed in ANSI A250.8/SDI 100.
- O. Glazing Stops: Manufacturer's standard, formed from 0.032-inch- thick steel sheet.
 - 1. Provide nonremovable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.
 - 2. Provide screw-applied, removable, glazing stops on inside of glass, louvers, and other panels in doors.
- P. Fire-Rated Doors, Frames, Hardware and Components:
 - Both fire-rated doors and frames shall bear labels of a recognized test lab or certifying agency acceptable to the authority having jurisdiction. Door labels shall indicate the hourly rating; frame labels do not indicate the hourly rating since they assume the rating of the fire door.

2.7 FINISHES

- A. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.
- B. Final Finish: Refer to Division 9 Section "Painting".

PART 3 - EXECUTION

3.1 INSTALLATION ENVIRONMENTAL CONDITIONS:

A. Doors shall not be delivered or installed until building is enclosed, wet work completed and HVAC system is operating and maintaining temperature and humidity at occupancy level during remainder of construction period.

3.2 INSTALLATION

- A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.
- B. Placing Frames: Frames shall be installed plumb, level, rigid and in true alignment as recommended in SDI 105 and ANSI/DHI A115.IG.
 - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
 - 2. Brace frames intended for construction in masonry walls that will prevent the pressure of the grout from deforming the frame members.
 - 3. Grout shall be mixed to attain a 4-inch slump and hand-toweled into place. Grout mixed to a thinner, "pump-able" consistency shall not be used as the excess water causes premature rusting of frames.
 - 4. Except for frames located in existing walls or partitions, place frames before construction of enclosing walls and ceilings.

5. In masonry construction, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors. Frames to be fully grouted.

- 6. In existing concrete or masonry construction, provide at least three completed opening anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.
- 7. In metal-stud partitions, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Attach wall anchors to studs with screws.
- 8. Install fire-rated frames according to NFPA 80.
- 9. For openings 90 inches or more in height, install an additional anchor at hinge and strike jambs.
- C. Door Installation: Comply with ANSI A250.8. Fit hollow-metal doors accurately in frames, within clearances specified in ANSI A250.8.
 - 1. Doors shall be installed and fastened to maintain alignment with frames to achieve maximum operational effectiveness and appearance.
 - 2. Doors shall be adjusted to maintain perimeter clearances specified.
 - 3. Shimming shall be as indicated in ANSI/DHI A115.IG and SDI-122.
 - 4. Fire-Rated Doors: Install within clearances specified in NFPA 80.
 - 5.

3.3 PROTECTION DURING CONSTRUCTION

- A. Steel doors shall be protected at all times during construction. After installation, take appropriate measures to protect doors from abuse.
- B. Replace doors and frames that are damaged or do not comply with requirements. Doors and frames may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

3.4 ADJUSTING AND CLEANING

A. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.

END OF SECTION 08 11 13

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SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Solid-core doors with wood-veneer faces.
 - 2. Factory machining for hardware.

1.3 SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction, and trim for openings. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
 - 1. Dimensions and locations of blocking.
 - 2. Dimensions and locations of mortises and holes for hardware.
 - 3. Dimensions and locations of cutouts.
 - 4. Undercuts.
 - 5. Requirements for veneer matching.
 - 6. Doors to be factory finished and finish requirements.
 - 7. Fire-protection ratings for fire-rated doors.
 - 8. Existing flush wood doors to be salvaged and reinstalled.
- C. Samples for Initial Selection: For factory-finished doors.
- D. Samples for Verification:
 - Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.
 - 2. Plastic laminate, 6 inches (150 mm) square, for each color, texture, and pattern selected.
 - 3. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edges representing actual materials to be used.
 - a. Provide Samples for each species of veneer and solid lumber required.
 - 1) Match existing veneer and color.

- b. Finish veneer-faced door Samples with same materials proposed for factory-finished doors.
- 4. Louver blade and frame sections, 6 inches (150 mm) long, for each material and finish specified, if applicable.
- 5. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.
- B. Quality Standard Compliance Certificates: AWI Quality Certification

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
- B. Quality Standard: Comply with WDMA I.S.1-A, "Architectural Wood Flush Doors." AWI's "Architectural Woodwork Quality Standards Illustrated." Wood doors shall meet the Standards of The National Woodwork Manufacturers Association.
 - 1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
- C. Low-Emitting Materials: Made with adhesives and composite wood products that do not contain urea formaldehyde.
 - Adhesives for both exterior and interior shall conform to ANSI / NWMA I.S.1.
- D. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, and ASTM E 152 requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Mark each door on top and bottom rail with opening number used on Shop Drawings.
- C. Each door shall bear an identifying label indicating the manufacturer, door number and order number, as well as fire rating and smoke rating if applicable.
- D. Store doors flat on a level surface.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist), or show telegraphing of core construction in face veneers.

- Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
- 2. Warranty shall be in effect during the following period of time from date of Substantial Completion:
 - a. Solid-Core Interior Doors: Life of installation.

1.9 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."
 - 1. Provide WI Certified Compliance Labels indicating that doors comply with requirements of grades specified.
- B. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.
- C. Low-Emitting Materials: Fabricate doors with adhesives that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. WDMA I.S.1-A Performance Grade:
 - 1. Extra Heavy Duty: Classrooms, public toilets, and custodial closets.
- E. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
- F. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Marshfield Door Systems.
- B. 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. Flush Wood Doors and Bi-Fold Doors:

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- a. Algoma Hardwoods Inc
- b. Assa Abloy Group: Graham Door Division "GPD Series"
- c. Eggers Industries; Architectural Door Division.

2.2 DOOR CONSTRUCTION, GENERAL

A. Doors for Transparent Finish:

- 1. Species and Cut: Clear, Natural Birch; Plain Sliced.
- 2. Veneer Matching: Slip matched.
- 3. Pair & Set Match: Provide for pairs of doors and for doors hung in adjacent sets.
- 4. Stiles: Hardwood.
- 5. Finish: As selected by Architect from Manufacturer's full range.

2.3 SOLID-CORE DOORS

- A. Particleboard Cores: Comply with the following requirements:
 - 1. Particleboard: ANSI A208.1, Grade 1-LD-2.
 - 2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.

B. Interior Veneer-Faced Doors:

- 1. Core: Solid core; Particle Board.
- 2. Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.

C. Fire-Rated Doors:

- 1. Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as needed to provide fire rating indicated. Provide metal label on all fire-rated doors.
- 2. Smoke and Draft Control Assembly:. Doors shall be "S" labeled, and shall include gasketing on frame, and on meeting stiles of pair doors, as required to comply with ITS/Warnock Hersey.
- 3. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated as needed to eliminate through-bolting hardware.
- 4. Edge Construction: At hinge stiles, provide manufacturer's standard laminated-edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer.
- 5. Pairs: Provide fire-rated pairs with fire-retardant stiles matching face veneer that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals.

D. Acoustic Rated Wood Doors – STC 35-45:

1. Provide core indicated or special construction core as required to meet STC rating indicated on door schedule. All STC ratings must be tested as operable.

2. Provide gasketing and [door shoe] [mortise door bottom] as required to meet manufacturers tested acoustic rating.

- 3. Hollow metal frames shall be fully grouted or packed with mineral wool where acoustic rated wood doors are installed.
- 4. The Sound Transmission Class (STC) specified shall be certified by the manufacturer to be based on tests conducted at an independent testing agency in accordance with ASTM E90-90 and E413-87.

2.4 FABRICATION

- A. General: Fabricate doors in sizes indicated for Project-site fitting.
 - 1. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:
- B. Clearances: Additional means of gap covering shall be provided where either code required or the room use dictates privacy.
 - 1. Fire-Rated Doors: As required by NFPA 80.
 - 2. Non-Fire-Rated Doors: Not more than 1/8 inch at jambs and heads, and not more than 1/8 inch between meeting stiles of pairs of doors; 3/4 inch at bottom unless otherwise indicated.
- C. Machining: Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
 - 1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 - 2. Metal Astragals: Premachine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- D. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware."

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B. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.

- 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold.
 - a. Comply with NFPA 80 for fire-rated doors.
 - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
 - 3. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.

3.3 ADJUSTING

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

END OF SECTION 08 14 16

SECTION 085113 - ALUMINUM WINDOWS

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 aluminum windows for exterior locations.
- B. Related Requirements:
 - 1. Section 08 80 00 "Glass and Glazing" for glazing requirements.

1.3 PERFORMANCE REQUIREMENTS

- A. Florida Building Code: Exterior aluminum window assemblies shall meet the requirements of the Florida Building Code.
 - 1. Basic Wind Speed: As indicated on the Drawings.
 - 2. Design Pressures: As indicated on the Drawings.
 - 3. Structural Performance: Provide products meeting the structural requirements of the Florida Building Code.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review and discuss the finishing of aluminum windows that is required to be coordinated with the finishing of other aluminum work for color and finish matching.
 - 3. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
 - 4. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
 - 5. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.

- B. Shop Drawings: For aluminum windows.
 - 1. Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- C. Samples: For each exposed product and for each color specified, 2 by 4 inches (50 by 100 mm) in size.
- D. Samples for Initial Selection: For units with factory-applied finishes.
 - 1. Include Samples of hardware and accessories involving color selection.
- E. Samples for Verification: For aluminum windows and components required, showing full range of color variations for finishes, and prepared on Samples of size indicated below:
 - 1. Exposed Finishes: 2 by 4 inches (50 by 100 mm).
 - 2. Exposed Hardware: Full-size units.
- F. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For manufacturer's warranties.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.
- B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.

- b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
- c. Faulty operation of movable sash and hardware.
- d. Deterioration of materials and finishes beyond normal weathering.
- e. Failure of insulating glass.

2. Warranty Period:

- a. Window: 10 years from date of Substantial Completion.
- b. Glazing Units: 10 years from date of Substantial Completion.
- c. Aluminum Finish: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - 1. Window Certification: AAMA certified with label attached to each window.
- B. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.60 Btu/sq. ft. x h x deg F (3.43 W/sq. m x K).
- C. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of .025.
- D. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 45.
- E. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F (67 deg C) ambient; 180 deg F (100 deg C) material surfaces.
- F. Sound Transmission Class (STC): Rated for not less than 30 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.
- G. Windborne-Debris-Impact Resistance: Capable of resisting impact from large-missle windborne debris based on testing glazed windows identical to those specified, according to requirements of Authorities Having Jurisdiction.

2.3 ALUMINUM WINDOWS

A. Basis of Design: CGI, Targa Series 7100 Single Hung, Impact Window with 1-15/16 inch insulated, laminated LowE 3 glazing as indicated in Section 08 80 00 "Glass and Glazing".

- B. Operating Types: Provide the following operating types in locations indicated on Drawings:
 - 1. Single hung.
- C. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.
 - 1. Thermally Improved/Broken Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.
- D. Large-Missile Windborne-Debris-Impact-Resistant Insulating-Glass Units: ASTM E 2190 with two lites and complying with impact-resistance requirements in "Window Performance Requirements" Article with weather tight seal.
 - 1. Exterior Lite: ASTM C 1036, Type 1, Class 1, q3.
 - a. Tint: Clear.
 - b. Kind: Fully tempered.
 - 2. Interior Lite: ASTM C 1172 clear laminated glass with two plies of float glass.
 - a. Float Glass: Fully tempered.
 - b. Interlayer Thickness: As required by performance requirements indicated.
 - 3. Filling: Fill space between glass lites with air.
 - 4. Low-E Coating: Pyrolytic on second surface.
- E. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.
 - 1. Exposed Hardware Color and Finish: As indicated by manufacturer's designations.
- F. Hung Window Hardware:
 - 1. Counterbalancing Mechanism: Complying with AAMA 902, concealed, of size and capacity to hold sash stationary at any open position.
 - 2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
 - 3. Tilt Latch: Releasing latch allows sash to pivot about horizontal axis to facilitate cleaning
- G. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
- H. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 ACCESSORIES

- A. Horizontal Louver Blinds: Refer to schedule in drawings.
 - 1. Operation: Cordless, easy lift system.
 - 2. Color: White.
- B. Subsills: As indicated on Drawings.
- C. Interior Trim: Standard window assembly.
- D. Panning Trim: Match existing adjacent buildings; Extruded-aluminum profiles in sizes and configurations indicated on Drawings.
- E. Receptor System: Two-piece, snap-together, thermally broken, extruded-aluminum receptor system that anchors windows in place.

2.5 INSECT SCREENS

- A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
 - Type and Location: Half, outside for single-hung sashes.
- B. Aluminum Frames: Manufacturer's standard aluminum alloy complying with SMA 1004 or SMA 1201. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.
 - 1. Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.
- C. Glass-Fiber Mesh Fabric: 20-by-20 (0.85-by-0.85-mm) mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D 3656/D 3656M.
 - 1. Mesh Color: Manufacturer's standard.

2.6 FABRICATION

- A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- B. Glaze aluminum windows in the factory.
- C. Weather strip each operable sash to provide weathertight installation.
- D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- E. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.

F. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.7 GENERAL FINISH REQUIREMENTS

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

2.8 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
 - 1. Color: Match existing adjacent buildings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Testing Services: Testing and inspecting of installed windows shall take place as follows:
 - 1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502.
 - 2. Air-Infiltration Testing:
 - a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.
 - b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.
 - 3. Water-Resistance Testing:
 - a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
 - b. Allowable Water Infiltration: No water penetration.
 - 4. Testing Extent: Three windows as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured
 - 5. Test Reports: Prepared according to AAMA 502.
- C. Windows will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
 - 1. Keep protective films and coverings in place until final cleaning.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 08 51 13

SECTION 087100 - DOOR HARDWARE

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 commercial door hardware for the following:
 - 1. Swinging doors.
 - 2. Sliding doors.
 - 3. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Automatic operators.
 - 3. Cylinders specified for doors in other sections.

C. Related Sections:

- 1. Division 06 Section "Rough Carpentry".
- 2. Division 08 Section "Operations and Maintenance".
- 3. Division 08 Section "Door Schedule".
- 4. Division 08 Section "Hollow Metal Doors and Frames".
- 5. Division 08 Section "Flush Wood Doors".
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC International Building Code.
 - 3. NFPA 70 National Electrical Code.
 - 4. NFPA 80 Fire Doors and Windows.
 - 5. NFPA 101 Life Safety Code.
 - 6. NFPA 105 Installation of Smoke Door Assemblies.
 - 7. UL/ULC and CSA C22.2 Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
 - 8. State Building Codes, Local Amendments.

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E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

- 1. ANSI/BHMA Certified Product Standards A156 Series.
- 2. UL10C Positive Pressure Fire Tests of Door Assemblies.
- 3. ANSI/UL 294 Access Control System Units.
- 4. UL 305 Panic Hardware.
- 5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 - 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 - 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
 - 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

D. Informational Submittals:

- 1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.4 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
- F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

- 1. Function of building, purpose of each area and degree of security required.
- 2. Plans for existing and future key system expansion.
- 3. Requirements for key control storage and software.
- 4. Installation of permanent keys, cylinder cores and software.
- 5. Address and requirements for delivery of keys.
- H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
 - 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 - 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 - 3. Review sequence of operation narratives for each unique access controlled opening.
 - 4. Review and finalize construction schedule and verify availability of materials.
 - 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check

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Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
 - 1. Ten years for mortise locks and latches.

1.8 MAINTENANCE SERVICE

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

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

- 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
 - 1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 - 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 - 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
 - 4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
 - 5. Manufacturers:
 - a. Hager Companies (HA).

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- b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
- c. Stanley Hardware (ST).

2.3 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.
 - 1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
 - 2. Furnish dust proof strikes for bottom bolts.
 - 3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
 - 4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
 - 5. Manufacturers:
 - a. Door Controls International (DC).
 - b. Rockwood (RO).
 - c. Trimco (TC).
- B. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
 - 1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
 - 2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
 - 3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
 - 4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
 - 5. Manufacturers:
 - a. Hiawatha, Inc. (HI).
 - b. Rockwood (RO).
 - c. Trimco (TC).

2.4 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

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- 1. Threaded mortise cylinders with rings and cams to suit hardware application.
- 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
- 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
- 4. Tubular deadlocks and other auxiliary locks.
- 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
- 6. Keyway: Match Facility Restricted Keyway.
- C. Keying System: Each type of lock and cylinders to be factory keyed.
 - 1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
 - 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 - 3. Existing System: Field verify and key cylinders to match Owner's existing system.
- D. Key Quantity: Provide the following minimum number of keys:
 - 1. Change Keys per Cylinder: Two (2)
 - 2. Master Keys (per Master Key Level/Group): Five (5).
 - 3. Construction Keys (where required): Ten (10).
- E. Construction Keying: Provide construction master keyed cylinders.
- F. Key Registration List (Bitting List):
 - 1. Furnish a list of opening numbers with locking devices, showing cylinder types and quantities required when cylinders or cores are to be owner furnished.

2.5 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
 - 1. Where specified, provide status indicators with highly reflective color and wording for "locked/unlocked" or "vacant/occupied" with custom wording options if required. Indicator to be located above the cylinder with the inside thumb-turn not blocking the visibility of the indicator status. Indicator window size to be a minimum of 2.1" x 0.6" with a curved design allowing a 180 degree viewing angle with protective covering to prevent tampering.
 - 2. Manufacturers:
 - a. Corbin Russwin Hardware (RU) ML2000 Series.
 - b. Sargent Manufacturing (SA) 8200 Series.

2.6 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
 - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 - 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
 - 4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
 - 1. Strikes for Mortise Locks and Latches: BHMA A156.13.
 - 2. Strikes for Bored Locks and Latches: BHMA A156.2.
 - 3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
 - 4. Dustproof Strikes: BHMA A156.16.

2.7 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
 - 1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
 - 2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 - 3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
 - 4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 - 5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
 - 6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with

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complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.

1. Manufacturers:

a. LCN Closers (LC) - 4040XP Series.

2.8 ARCHITECTURAL TRIM

A. Door Protective Trim

- 1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
- 2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
- 3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
- 4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inch thick.
- 5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
- 6. Manufacturers:
 - a. Hiawatha, Inc. (HI).
 - b. Rockwood (RO).
 - c. Trimco (TC).

2.9 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor

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stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

- a. Hiawatha, Inc. (HI).
- b. Rockwood (RO).
- c. Trimco (TC).

2.10 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 - 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
 - 1. National Guard Products (NG).
 - 2. Pemko (PE).
 - 3. Reese Enterprises, Inc. (RE).

2.11 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.12 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.

3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."

- 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
 - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
 - 1. Quantities listed are for each pair of doors, or for each single door.
 - 2. The supplier is responsible for handing and sizing all products.
 - 3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
 - 4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.
- B. Manufacturer's Abbreviations:
 - 1. MK McKinney
 - 2. OT Other
 - 3. SA SARGENT
 - 4. RO Rockwood
 - 5. LC LCN Closers
 - 6. NO Norton
 - 7. PE Pemko

Hardware Sets

Set: 1.0

Doors: M195A

Description: EXT - MEP PR

| 6 Hinge, Full Mortise, Hvy Wt | T4A3386 x NRP 4-1/2" x 4-1/2" | US32D | MK |
|-------------------------------|-------------------------------|----------------|----|
| 2 Surface Bolt | 988 | Bright Zinc | SA |
| 1 Storeroom Deadbolt Lock | 8251 WTL | US32D | SA |
| 1 Cylinder | Cylinders by UF | US32D | SA |
| 2 Surface Closer | 4040XP SCUSH | .689 | LC |
| 2 Kick Plate | K1050 12" X 2" LDW CSK | US32D | RO |
| 1 Threshold | 2005AT | | PE |
| 1 Rain Guard | 346C | | PE |
| 1 Gasketing | S88BL 25' | | PE |
| 1 Astragal | 357SP X S88D | | PE |

Notes: Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Set: 2.0

Doors: 129A

Description: EXT - OFFICE

| 3 Hinge, Full Mortise, Hvy Wt | T4A3386 x NRP 4-1/2" x 4-1/2" | US32D | MK |
|-------------------------------|-------------------------------|-------|----|
| 1 Apartment Corridor Lock | 8255 WTL | US32D | SA |
| 1 Cylinder | Cylinders by UF | US32D | SA |
| 1 Surface Closer | 4040XP SCUSH | .689 | LC |
| 1 Kick Plate | K1050 12" X 2" LDW CSK | US32D | RO |
| 1 Threshold | 2005AT | | PE |
| 1 Rain Guard | 346C | | PE |
| 1 Gasketing | 303AS | | PE |
| 1 Sweep | 315CN | | PE |

Notes: Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Set: 3.0

UF IFAS NFREC Building 8003 Remodel (2021-0011)

08 71 11 - 15 Door Hardware

Doors: 100, 100A

Description: EXT - TENANT

| 3 Hinge, Full Mortise, Hvy Wt | T4A3386 x NRP 4-1/2" x 4-1/2" | US32D | MK |
|-------------------------------|-------------------------------|-------|----|
| 1 Dormitory/Exit Lock | 8255 WTL | US32D | SA |
| 1 Cylinder | Cylinders by UF | US32D | SA |
| 1 Surface Closer | 4040XP SCUSH | .689 | LC |
| 1 Kick Plate | K1050 12" X 2" LDW CSK | US32D | RO |
| 1 Threshold | 2005AT | | PE |
| 1 Rain Guard | 346C | | PE |
| 1 Gasketing | 303AS | | PE |
| 1 Sweep | 315CN | | PE |

Notes: Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Set: 4.0

Doors: 120

Description: BREAK - A/O

| 3 Cam lift hinges | By STC mfg | | OT | |
|---------------------|------------------------|-------|------|---|
| 1 Office/Entry Lock | 8255 WTL | US32D | SA | |
| 1 Cylinder | Cylinders by UF | US32D | SA | |
| 1 Kick Plate | K1050 12" X 2" LDW CSK | US32D | RO 4 | 5 |
| 1 Door Stop | 409 / 446 as required | US26D | RO | |
| 1 STC gasketing | By STC Door mfg | | OT | |

Set: 5.0

Doors: TR01
Description: MEP

| 3 Hinge, Full Mortise | TA2314 4-1/2" x 4-1/2" | US32D | MK |
|-------------------------|------------------------|-------|----|
| 1 Storeroom/Closet Lock | 76 8204 WTL | US32D | SA |
| 1 Cylinder | Cylinders by UF | US32D | SA |
| 1 Surface Closer | 4040XP Reg / PA | .689 | LC |
| 1 Kick Plate | K1050 12" X 2" LDW CSK | US32D | RO |
| 1 Door Stop | 409 / 446 as required | US26D | RO |
| 3 Silencer | 608 | | RO |

UF IFAS NFREC Building 8003 Remodel (2021-0011)

08 71 11 - 16 Door Hardware

Set: 6.0

Doors: 123

Description: TOILET

| 3 Hinge, Full Mortise | TA2314 4-1/2" x 4-1/2" | US32D | MK |
|-----------------------|------------------------|-------|----|
| 1 Privacy Lock | V54 8266 VN1L | US26D | SA |
| 1 Surface Closer | 4040XP Reg / PA | .689 | LC |
| 1 Mop Plate | K1050 5" X 1" LDW CSK | US32D | RO |
| 1 Kick Plate | K1050 12" X 2" LDW CSK | US32D | RO |
| 1 Door Stop | 409 / 446 as required | US26D | RO |
| 1 Gasketing | S88BL 25' | | PE |
| | | | |

Set: 7.0

Doors: 124

Description: CONF

| 3 Cam lift hinges | By STC mfg | | OT |
|---------------------|------------------------|-------|----|
| 1 Office/Entry Lock | 8255 WTL | US32D | SA |
| 1 Kick Plate | K1050 12" X 2" LDW CSK | US32D | RO |
| 1 Door Stop | 409 / 446 as required | US26D | RO |
| 1 STC gasketing | By STC Door mfg | | OT |

Set: 8.0

Doors: 121

Description: JAN

| 3 Hinge, Full Mortise | TA2314 4-1/2" x 4-1/2" | US32D | MK |
|-----------------------|------------------------|-------|----|
| 1 Storeroom Lock | 8204 WTL | US32D | SA |
| 1 Kick Plate | K1050 12" X 2" LDW CSK | US32D | RO |
| 1 Door Stop | 409 / 446 as required | US26D | RO |
| 1 Gasketing | S88BL 25' | | PE |
| | | | |

Set: 9.0

Doors: 125, 127, 129 Description: OFFICE

| 3 Cam lift hinges | By STC mfg | | OT |
|---------------------|------------------------|-------|----|
| 1 Office/Entry Lock | 8255 WTL | US32D | SA |
| 1 Cylinder | Cylinders by UF | US32D | SA |
| 1 Kick Plate | K1050 12" X 2" LDW CSK | US32D | RO |
| 1 Door Stop | 409 / 446 as required | US26D | RO |
| 1 STC gasketing | By STC Door mfg | | OT |

END OF SECTION 087100

SECTION 08 80 00 - GLASS AND GLAZING

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 glazing for the following products, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - Division 08 Section "Hollow Metal Doors and Frames."
 - 2. Division 08 Section "Flush Wood Doors."
 - Division 08 Section "Aluminum Windows."
- B. Refer to Drawings for Glazing Schedule.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacturer, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
 - Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
 - 1. For monolithic glass lites, properties are based on units with lites 6.0 mm thick.
 - 2. For insulating glass units, properties are based on units with lites 6.0 mm thick and a nominal 1/2 inch wide interspace.

- Center-of-Glass U-Values: Based on using LBL-35298 WINDOW 5.2 computer program for the following methodologies:
 - a. U-Factors: NFRC 100 expressed as Btu/sq. ft. x h x deg F.
 - b. Solar Heat Gain Coefficient: NFRC 200.
 - c. Solar Optical Properties: NFRC 300.

1.4 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: Glass samples as requested by Architect.
- C. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
- D. Qualification Data: For installers.
- E. Research/Evaluation Reports: For glazing assemblies.
- F. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: GANA's "Glazing Manual."
 - IGMA Publication for Insulating Glass: SIGMA TM-3000 "Glazing Guidelines for Sealed Insulating Glass Units."
- B. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201.
 - Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.
- C. Insulating Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the Insulating Glass Certification Council.
- D. Glazier Qualifications: An experienced glazier who has completed glazing similar in material, design, and extent to that indicated for Project with a record of successful inservice performance.
- E. Source Limitations for Glass: Obtain the following through one source from a single manufacturer for each glass type: clear float glass, coated float glass, and insulating glass.
- F. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source for each product and installation method indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials to comply with manufacturer's directions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1.8 WARRANTY

- A. Manufacturer's Special Warranty for Coated Glass Products: Manufacturer's standard form, made out to Owner and signed by coated glass manufacturer agreeing to replace coated glass units that deteriorate due to defects including peeling, cracking, and other indications of deterioration in metallic coating.
 - 1. Warranty Period: Ten years from date of Substantial Completion.
- B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating glass manufacturer agreeing to replace insulating glass units that deteriorate due to failure of hermetic seal causing obstruction of vision by dust, moisture, or film on interior surfaces of glass.
 - 1. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRIMARY FLOAT GLASS PRODUCTS

- A. Heat Treated Float Glass: ASTM C 1036, Type I (transparent glass, flat), Class as indicated below, and Quality q3 (glazing select). 1/4 inch glass thickness.
 - 1. Class 1 (clear) FT for interior lites.
- B. Basis of Design: PPG Industries, Inc. Subject to compliance with requirements, equivalent heat-treated glass units by one of the following manufacturers is also acceptable:
 - AFG Industries, Inc.
 - Guardian Industries Corp.
 - 3. Pilkington Building Products
 - 4. Viracon, Inc.
- C. Fabrication Process: By horizontal (roller hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated

2.5 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent, nonstaining and nonmigrating in contact with nonporous surfaces, with or without spacer rod as recommended by tape and glass manufacturers for application indicated, packaged on rolls with a release paper backing, and complying with AAMA 800, AAMA 804.1, and AAMA 806.1.
- B. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Back-Bedding Mastic Glazing Tape Without Spacer Rod:
 - a. "Dyna-Seal"; Pecora Corp.
 - b. "PTI 606 Architectural Sealant Tape"; H.B. Fuller, Inc.
 - c. "PTI 626 Architectural Sealant Tape"; H.B. Fuller, Inc.
 - d. "SST-800 Tape"; Tremco Inc.
 - 2. Back-Bedding Mastic Glazing Tape With Spacer Rod:
 - a. "PTI 303 Glazing Tape (with shim)"; H.B. Fuller, Inc.
 - b. "Pre-Shimmed Tremco 440 Tape"; Tremco, Inc.

2.6 GLAZING GASKETS

- A. Dense Elastomeric Compression Seal Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
 - 1. Neoprene, ASTM C 864.
- B. Soft Compression Gaskets: Extruded or molded closed cell, integral-skinned gaskets of material indicated below, complying with ASTM C 509, Type II, black, of profile and hardness required to maintain watertight seal:
 - Neoprene.
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Advanced Elastomer Systems, L.P.
 - 2. Schnee-Morehead, Inc.
 - 3. Tremco, Inc.

2.7 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials involved for glazing application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.

- C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85 plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side-walking).
- F. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonextruding, nonoutgassing, strips of closed-cell plastic foam of density, size, and shape to control sealant depth and otherwise contribute to produce optimum sealant performance.

2.8 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine glass framing, with glazier present, for compliance with the following:
 - Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
 - 2. Presence and functioning of weep system.
 - 3. Minimum required face or edge clearances.
 - 4. Effective sealing between joints of glass framing members.
- B. Do not proceed with glazing until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

3.3 GLAZING, GENERAL

- A. Comply with combined recommendations of manufacturers of glass, sealants, gaskets, and other glazing materials, except where more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions as indicated on Drawings provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

- C. Protect glass from edge damage during handling and installation as follows:
 - Use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass lites with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so edges are located at top of opening, unless otherwise indicated by manufacturer's label.
 - 2. Remove damaged glass from project and legally dispose off site.

 Damaged glass is glass with edge damage or other imperfections that, when installed, weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants.
- E. Install elastomeric setting blocks in sill rabbets, sized and located to comply with referenced glazing standard, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass sizes larger than 50 united inches (length plus height) as follows:
 - Locate spacers inside, outside, and directly opposite each other. Install correct size and spacing to preserve required face clearances, except where gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and comply with system performance requirements.
 - 2. Provide 1/8 inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking to comply with requirements of referenced glazing publications, unless otherwise required by glass manufacturer.
- I. Set glass lites in each series with uniform pattern, draw, bow and similar characteristics.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot not "walk" out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that when compressed by glass their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously but not in one continuous length. Do not stretch tapes to make them fit opening.
- C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.

 Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

- E. Do not remove release paper from tape until just before each lite is installed.
- F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

3.5 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Secure compression gaskets in place with joints located at corners to compress gaskets producing a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- C. Install gaskets so they protrude past face of glazing tapes.

3.6 PROTECTION AND CLEANING

- A. Protect exterior glass from breakage immediately after installation by attaching crossed streamers attached to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including welding spatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkali deposits, or stains, and remove as recommended by glass manufacturer.
- D. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in any way, including natural causes, accidents and vandalism, during construction period.

3.7 INSULATING GLASS SCHEDULE

- A. Glass Type GL-1: Pyrolytic-coated, self-cleaning, low-maintenance, low-E coated, clear insulating glass.
 - 1. Basis-of-Design Product: PPG Solarban 67.
 - Overall Unit Thickness: 1-15/16" inch (28.57 mm).
 - 3. Minimum Thickness of Each Glass Lite: 1/4-inch.

- 4. Outdoor Lite: Pyrolytic-coated, self-cleaning, low-maintenance, clear fully tempered float glass.
- 5. Interspace Content: Air.
- 6. Indoor Lite: Fully tempered float glass.
- 7. Low-E Coating: Pyrolytic or sputtered on second or third surface.
- 8. Winter Nighttime U-Factor: .29 maximum.
- 9. Summer Daytime U-Factor: .26 maximum.
- 10. Visible Light Transmittance: 48% percent minimum.
- 11. Solar Heat Gain Coefficient: .25 maximum.
- 12. Safety glazing required.
- 13. Large missile impact rated at assembly.

1.1 INSULATING-LAMINATED-ACCOUSTICAL-GLASS SCHEDULE

- A. Glass Type GL-2: Clear insulating laminated accoustical glass.
 - 1. Basis-of-Design Product: PPG.
 - 2. Overall Unit Thickness: 1-inch.
 - 3. Minimum Thickness of Outdoor Lite: 1/4-inch.
 - 4. Outdoor Lite: Fully tempered float glass.
 - 5. Interspace Content: Air.
 - 6. Indoor Lite: Clear laminated glass with two plies of fully tempered float glass.
 - a. Minimum Thickness of Each Glass Ply: 1/4-inch.
 - b. Interlayer Thickness: 1/2-inch.
 - 7. STC: 40 minimum.
 - 8. Safety glazing required.

END OF SECTION 08 80 00

SECTION 08 83 00 - MIRRORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Glass mirrors.

1.3 PERFORMANCE REQUIREMENTS

A. Provide mirrored glass that will not fail under normal usage. Failure includes glass breakage and deterioration attributable to defective manufacture, fabrication, and installation.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - Silvered mirrored glass. Include description of materials and process used to produce mirrored glass that indicates source of glass, glass coating components, edge sealer, and quality-control provisions.
 - 2. Mirror hardware.
- B. Shop Drawings: Include elevations, sections, details, and attachments to other Work.
- C. Samples for Verification: For the following products, in sizes indicated below:
 - 1. Mirrored glass, 12 inches square, including edge treatment on 2 adjoining edges.
- D. Product Certificates: Signed by manufacturers of mirrored glass certifying that products furnished comply with requirements.
- E. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in mirrored glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

B. Installer Qualifications: An experienced installer who has completed mirrored glass installations similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

- C. Source Limitations for Mirrored Glass: Obtain mirrored glass from one source for each type of mirrored glass indicated.
- D. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each type of accessory indicated.
- E. Glazing Publications: Comply with published recommendations in GANA's "Glazing Manual," unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.
- F. NAAMM's Publication: For silvered mirrored glass, comply with recommendations in NAAMM's "Mirrors, Handle with Extreme Care, Tips for the Professional on the Care and Handling of Mirrors."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to mirrored glass manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For silvered mirrored glass, comply with mirrored glass manufacturer's written instructions for shipping, storing, and handling mirrored glass as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install mirrored glass until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.8 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer's Special Warranty for Mirrored Glass: Written warranty, made out to Owner and signed by mirrored glass manufacturer agreeing to replace silvered mirrored glass units that deteriorate as defined in "Definitions" Article, f.o.b. to Project site, within specified warranty period indicated below, at no additional cost to the Owner:
 - 1. Warranty Period: Five years from date of manufacture.

PART 2 - PRODUCTS

2.1 FLOAT GLASS

- A. Annealed Float Glass: ASTM C 1036, Type I (transparent glass, flat), class, quality, and other properties as indicated below:
 - 1. Clear Annealed Float Glass: Class 1 (clear), Quality q2 (mirror).
 - a. Thickness: 6 mm.

2.2 MIRRORED GLASS

A. Silvered Mirrored Glass: Annealed, clear float glass with successive layers of chemically deposited silver, electrically or chemically deposited copper, and manufacturer's standard organic protective coating applied to second glass surface to produce a coating system complying with FS DD-M-411.

2.3 FABRICATION

- A. Mirrored Glass Edge Treatment: Treat edges as indicated below.
 - 1. Flat polished edge.
 - 2. Seal edges of silvered mirrored glass after edge treatment to prevent chemical or atmospheric penetration of glass coating.
- B. Vinyl-Backed Safety Mirrored Glass: Apply vinyl backing with pressure-sensitive adhesive coating over glass coating as recommended by vinyl-backing manufacturer to produce a surface free of bubbles, blisters, and other imperfections. Use adhesives and vinyl backing compatible with mirrored glass as certified by organic coating manufacturer.

2.4 MISCELLANEOUS MATERIALS

- A. Setting Blocks: Neoprene, 70 to 90 Shore A hardness.
- B. Edge Sealer: Coating compatible with glass coating and approved by mirrored glass manufacturer for use in protecting against silver deterioration at mirrored glass edges.
- C. Mirror Clip Set:
 - 1. Basis of Design: E-Z Mirror Clip Set; C.R. Lawrence Co, Inc.
 - a. Provide with non-corrosive fasteners compatible with substrates indicated.
 - 2. Other Manufacturers: Subject to compliance with requirements, manufacturers offering products that meet project requirements will be considered.
- D. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

E. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates over which mirrored glass units are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance.
 - 1. Verify compatibility with and suitability of substrates with existing finishes or primers.
 - 2. Proceed with mirrored glass installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

A. Comply with mirror manufacturer's written installation instructions for preparation of substrates.

3.3 GLAZING

- A. General: Install mirrored glass units to comply with written instructions of mirrored glass manufacturer and with referenced GANA and NAAMM publications. Mount mirrored glass accurately in place in a manner that avoids distorting reflected images.
- B. Provide space for air circulation between back of mirrored glass units and face of mounting surface.
- C. For wall-mounted mirrored glass units, install permanent means of support at bottom and top edges with bottom support designed to withstand mirrored glass weight and top support designed to prevent mirrored glass from coming away from wall along top edges.
 - 1. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrored glass units.
 - 2. For metal clips, place a felt or plastic pad between mirrored glass and each clip to prevent spalling of mirrored glass edges.

3.4 PROTECTION AND CLEANING

- A. Protect mirrored glass from breakage and contaminating substances resulting from construction operations.
 - 1. Do not permit edges of silvered mirrored glass to be exposed to standing water.
 - 2. Maintain environmental conditions that will prevent silvered mirrored glass from being exposed to moisture from condensation or other sources for continuous periods of time.
- B. Wash mirrored glass, so that it can be visually inspected for defects before date scheduled for inspections intended to establish date for Substantial Completion. Wash mirrored glass by methods recommended in NAAMM publication and in writing by mirrored glass manufacturer.

Use water and glass cleaners free from substances capable of damaging mirrored glass edges or coatings.

END OF SECTION 08 83 00

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section 09

FINISHES

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SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes non-structural metal framing members for the following applications:
 - 1. Interior framing systems (e.g., supports for partition walls, framed soffits and bulkheads, furring, etc.).
 - 2. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.)
 - 3. Interior framing for built-in millwork, casework or cabinetry.
- B. Related Sections include the following:
 - 1. Section 01 33 00 "Submittal Procedures" for requirements related to delegated design submittals, verification of framing requirements per manufacturer recommendations and shop drawing requirements.
 - 2. Section 01 73 00 "Execution" for requirements for general requirements for product installation and field engineering.
 - 3. Section 05 40 00 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs.
 - 4. Section 06 10 00 "Rough Carpentry" for furring and blocking.
 - 5. Section 07 21 00 "Thermal Insulation" for acoustical insulation.
 - 6. Section 09 25 00 "Gypsum Board."

1.3 SUBMITTALS

- A. Product Data: For each type of product specified.
 - 1. Provide manufacturer product data confirming installation parameters for spacing and bracing based on gauge, height, length and span.
 - Studs and Runners: Provide documentation that framing members' certification is according to SIFA's "Code Compliance Certification Program for Cold-Formed Steel Structural and Non-Structural Framing Members."

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For embossed steel studs and runners and firestop tracks – as applicable, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

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

identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Horizontal Deflection: For wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft. (480 Pa).

2.2 ACCEPTABLE MANUFACTURERS

- A. Basis of Design: ClarkDietrich Building Systems.
- B. Manufacturers: Subject to compliance, provide products by one of the following manufacturers:
 - 1. Dale/Incor.
 - 2. MarinoWare.
 - Steeler Construction Supply.

2.3 NON-STRUCTURAL METAL FRAMING, GENERAL

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653, G40, hot-dip galvanized zinc coating, unless otherwise indicated.

2.4 SUSPENSION SYSTEM COMPONENTS

- A. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.0625 inch diameter wire, or double strand of 0.0475 inch diameter wire.
- B. Hanger Attachments to Concrete:
 - Anchors: Fabricate from corrosion-resistant materials with holes or loops for attaching hanger wires and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 conducted by an independent testing agency.
 - a. Type: Cast-in-place type designed for attachment to concrete forms, postinstalled, chemical anchor, and postinstalled, expansion anchor.
 - 2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from

corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

- C. Wire Hangers: ASTM A 641, Class 1 zinc coating, soft temper, 0.162 inch diameter.
- D. Flat Hangers: Steel sheet, in size indicated on Drawings.
- E. Carrying Channels: Cold-rolled, commercial steel sheet with a base metal thickness of 0.0478 inch (18 gauge minimum) and minimum 1/2 inch wide flanges.
 - 1. Depth: 1-1/2 inches.
 - 2. Spacing: 16 inches on center maximum but no more than manufacturer's recommended spacing based on depth, gauge and span.
- F. Furring Channels (Furring Members):
 - 1. Cold Rolled Channels: 0.0598 inch (16 gauge minimum) bare steel thickness, with minimum 1/2 inch wide flanges, 3/4 inch deep.
 - 2. Steel Studs: ASTM C 645.
 - b. Depth: 3-5/8 inches, unless indicated otherwise in drawings.
 - 3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
 - a. Minimum Base Metal Thickness: 0.0478 inch (18 gauge minimum).
 - b. Spacing: 16 inches on center maximum but no more than manufacturer's recommended spacing based on depth, gauge and span.
 - 4. Resilient Furring Channels: 1/2 inch deep members designed to reduce sound transmission.
 - a. Configuration: Asymmetrical or hat shaped.
 - b. Minimum Base Metal Thickness: 0.0478 inch (18 gauge minimum).
 - c. Spacing: 16 inches on center maximum but no more than manufacturer's recommended spacing based on depth, gauge and span.
- G. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross furring members that interlock.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Drywall Grid Systems"; Armstrong World Industries, Inc.
 - b. "Drywall Furring System"; Chicago Metallic Corporation.
 - c. "Drywall Suspension System"; USG Corporation.

2.5 METAL FRAMING FOR FRAMED ASSEMBLIES

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Steel Studs and Runners: ASTM C 645.
 - 1. Minimum Base Metal Thickness: 33 mil (20 gauge minimum), unless otherwise indicated.

- 2. Depth: 3-5/8 inches unless otherwise indicated in drawings, or 6-inch as required by construction (i.e. plumbing piping) within partitions.
- 3. Spacing: 16 inches on center maximum but no more than manufacturer's recommended spacing based on depth, gauge and span..
- C. Slip-Type Head Joints: Where indicated, provide one of the following:
 - 1. Single Long-Leg Runner System: ASTM C 645 top runner with 2 inch deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
 - 2. Double-Runner System: ASTM C 645 top runners, inside runner with 2 inch deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
 - a. Product: Subject to compliance with requirements, provide one of the following:
 - 1) "VertiClip SLD" or "VertiTrack VTD" Series; Steel Network Inc.
 - 2) "Superior Flex Track System (SFT)"; Superior Metal Trim.
- Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 - 1. Minimum Base Metal Thickness: 0.0478 inch (18 gauge minimum).
- E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 - 1. Minimum Base Metal Thickness: 0.0478 inch (18 gauge minimum).
 - 2. Depth: 7/8 inch.
 - 3. Spacing: 16 inches on center maximum but no more than manufacturer's recommended spacing based on depth, gauge and span.
- F. Resilient Furring Channels: 1/2 inch deep, steel sheet members designed to reduce sound transmission.
 - 1. Configuration: Asymmetric or hat shaped.
 - 2. Minimum Base Metal Thickness: 0.0478 inch (18 gauge minimum)
 - 3. Spacing: 16 inches on center maximum but no more than manufacturer's recommended spacing based on depth, gauge and span.
- G. Cold-Rolled Furring Channels: 0.0598 inch (16 gauge minimum) bare steel thickness, with minimum 1/2 inch wide flanges.
 - 1. Depth: 3/4 inch.
 - 2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare steel thickness of 0.0312 inch.
 - 3. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.0625 inch diameter wire, or double strand of 0.0475 inch diameter wire.
 - 4. Spacing: 16 inches on center maximum but no more than manufacturer's recommended spacing based on depth, gauge and span.
- H. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare metal thickness of 0.0478 inch (18 gauge minimum), and depth required to fit insulation thickness indicated.

2.6 AUXILIARY MATERIALS

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
 - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (610 mm) o.c.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install suspension system components in sizes and spacings indicated on Drawings, but not

less than those required by referenced installation standards for assembly types and other assembly components indicated.

- Single-Layer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
- 2. Multilayer Application: 16 inches (406 mm) unless otherwise indicated.
- 3. Tile Backing Panels: 16 inches (406 mm) unless otherwise indicated.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.
- F. For partitions spanning greater than 10'-0", brace vertical studs as necessary to maintain rigidity of partition system and to comply with referenced standards and manufacturer's written installation instructions.

3.4 INSTALLING SUSPENSION SYSTEMS

- A. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- B. Suspend ceiling hangers from building structure as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system.
 - Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
 - 3. Wire Hangers: Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 5. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 - 6. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- C. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

D. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.5 INSTALLING FRAMED ASSEMBLIES

- A. Where studs are installed directly against exterior walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install studs so flanges within framing system point in same direction.
- C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each head and jamb, unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2 inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 - Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 - 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

D. Direct Furring:

1. Attach to concrete or masonry with stub nails, screw designed for masonry attachment, or powder-driven fasteners spaced 16 inches o.c.

E. Z-Furring Members:

- 1. Erect insulation (specified in Section 07 21 00 "Thermal Insulation") vertically and hold in place with Z-furring members spaced 16 inches o.c.
- 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 16 inches o.c.
- 3. At exterior corners, attach wide flange of furring members to wall with short flange

extending beyond corner; on adjacent wall surface, screw attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION 09 22 16

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Interior gypsum wallboard.
 - 2. Tile backing panels.
- B. Related Sections include the following:
 - 1. Division 5 Section "Cold-Formed Metal Framing" for load-bearing steel framing that supports gypsum board.
 - 2. Division 6 Section "Rough Carpentry".
 - 3. Division 6 Section "Sheathing" for gypsum sheathing.
 - 3. Division 7 Section "Fire-Resistive Joint Systems" for head-of-wall assemblies that incorporate gypsum board.
 - 4. Division 9 Section "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board.
 - 5. Division 9 Section "Gypsum Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.
 - 6. Division 9 Section "Painting" for primers applied to gypsum board surfaces.

1.3 SUBMITTALS

- A. Product Data: For each type of product specified.
- B. Shop Drawings: Showing locations of control joints at all walls and ceilings to receive gypsum board.
 - 1. Control joint locations to be approved by Architect for visual effect.

1.4 QUALITY ASSURANCE

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

1.5 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.6 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 PANELS, GENERAL

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

2.2 INTERIOR GYPSUM WALLBOARD

- A. General: Complying with ASTM C 36 or ASTM C 1396, as applicable to type of gypsum board indicated and whichever is more stringent.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corp.
 - b. G-P Gypsum.
 - c. National Gypsum Company.
 - d. USG Corporation.
 - 2. Gypsum board shall be manufactured in America.
- B. Regular Type:
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered.
- C. Impact/Abuse Resistant: Provide at all corridors up to 4'-0" high.
 - 1. Thickness: 5/8 inch.
 - Long Edges: Tapered.
- C. Type X:
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered.
- D. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered.

- E. Mold and Mildew Resistant Wallboard: Provide at interior side of all exterior walls and at locations that must be installed prior the HVAC system providing a humidity-controlled environment. These locations are the electrical, mechanical, tele/com rooms, elevator equipment room, and OA and exhaust shafts.
 - 1. Basis of Design: Sheetrock Brand Mold Tough Gypsum Panels; USG Corporation.
 - 2. Thickness: 5/8 inch.
 - 3. Long Edges: Tapered
- F. Water-Resistant Gypsum Panels: Provide at all walls to receive FRP Panel.
 - Basis of Design: Sheetrock Brand Gypsum Panels Water-Resistant; USG Corporation.
 - 2. Thickness: 5/8 inch.
 - 3. Long Edge: Tapered
- G. Exterior Gypsum Ceiling Board:
 - 1. Basis of Design: Sheetrock Exterior Ceiling Board; USG Corporation.
 - 2. Thickness: 5/8"
- 3. Long Edge: Tapered

2.3 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9.
 - 1. To be installed at all walls to receive tile.

 Products: Subject to compliance with requirements, provide one of the following:
 - a. Basis of Design: "DUROCK Cement Board"; United States Gypsum Co.
 - b. "Wonderboard"; Custom Building Products.
 - c. "Util-A-Crete Concrete Backer Board"; FinPan, Inc.
 - 2. Thickness: 5/8 inch.

2.4 FRP AND STAINLESS SHEET BACKING PANELS

- A. Water-Resistant Gypsum Backing Board: ASTM C 630.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corp
 - b. G-P Gypsum.
 - c. National Gypsum Company.
 - d. USG Corporation.
 - 2. Core: 5/8 inch, Type X.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.

2. Shapes:

- a. Cornerbead.
- b. LC-Bead: J-Bead; exposed long flange receives joint compound.
- c. U-Bead: J-shaped; exposed short flange does not receive joint compound and between dissimilar finish materials including concrete or masonry.
- d. Expansion (control) joint.

2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475.
- B. Joint Tape:
 - 1. Interior Gypsum Wallboard: Paper.
 - 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound or drying-type, all-purpose compound.
 - Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping compound or drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping compound or dry-type, all-purpose compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound or drying-type, all-purpose compound.
- D. Joint Compound for Tile Backing Panels:
 - 1. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.
 - 2. Cementitious Backer Units: As recommended by manufacturer.

2.7 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from

- 0.033 to 0.112 inch thick.
- 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- C. Sound Attenuation Blankets: Specified in Division 7 Section "Thermal Insulation".
 - 1. Install at all walls extending to the underside of deck, typical.
 - 2. Fire-Resistance-Rated Assemblies: Comply with mineral fiber requirements of assembly.
- D. Acoustical Sealant: As specified in Division 7 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4-to-1/2-inch-wide spaces at these locations, and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Regular Type: Vertical surfaces, unless otherwise indicated.
 - 2. Type X: Where required for fire-resistance-rated assembly and as indicated.
 - 3. Ceiling Type: As indicated on Drawings.
 - 4. Impact/ Abuse Resistant: All vertical surfaces in corridors, dining rooms and classrooms up to 48-inches.
 - 5. Water Resistant Type:
 - a. At all locations to receive FRP panel
 - b. All other "Wet" areas not scheduled otherwise, including toilet room walls not scheduled to receive tile.
 - 6. Exterior Type: As indicated on Drawings.
 - 7. Cementitious Backer Type: All vertical surfaces to receive tile.

B. Single-Layer Application:

- 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
- 2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of board.
 - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
- 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
- 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
 - Fasteners at wet and moisture prone areas shall be stainless or galvanized, typical.

C. Multilayer Application:

- On ceilings, apply gypsum board indicated for base layers prior to applying base layers on walls/partitions; apply face layers same sequence. Apply base layers at right angles to framing members and offset face layer joints 1 framing member, 16 inches minimum, from parallel base layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
- On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face layer joints offset at least one stud or furring member with base

- layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
- On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
- 4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.4 APPLYING TILE BACKING PANELS

- A. Water-Resistant Gypsum Backing Board: Kitchen sink locations, restroom wet walls and where indicated on Drawings. Install with 1/4 inch gap where panels abut other construction or penetrations.
- B. Cementitious Backer Units: ANSI A108.1, Install at showers, whirlpool, hydrostatic weight tank and where indicated on Drawings.
- C. Where tile backing panels abut other types of panels in the same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

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

3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, flanges of corner beads, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below, and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, mechanical and electrical rooms, and where indicated.
 - 2. Level 2: Storage rooms and panels that are substrate for tile.
 - 3. Level 3: Where indicated on Drawings.
 - 4. Level 4: Typical finish level, unless otherwise specified.
 - 5. Level 5: Partitions/walls greater than 10'-0" high and curved walls.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discolorations.

END OF SECTION 09 29 00

SECTION 09 30 00 - TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Quarry tile and trim units to match existing
- Ceramic wall tile and trim units.
- 3. Porcelain large format wall tile and trim units.
- Glass Mosaic wall tile and trim units.
- 5. Waterproof membrane.
- 6. Crack isolation membrane.
- 7. Metal edge strips.

B. Related Sections:

- Section 071416 "Cold Fluid-Applied Waterproofing" for waterproofing under thickset mortar beds.
- 2. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
- 3. Section 092900 "Gypsum Board" for cementitious backer units.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

1.4 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
 - 1. Level Surfaces: Minimum 0.60.

- 2. Step Treads: Minimum 0.80.
- 3. Ramp Surfaces: Minimum 0.80.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations of each type of tile and tile pattern factoring joint widths. Show overall dimensions with work points and matching alignment as indicated in the Drawings. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- D. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

E. Samples for Verification:

- Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches (300 mm) square, but not fewer than 4 tiles. Use grout of type and in color or colors approved for completed Work.
- 2. Full-size units of each type of trim and accessory for each color and finish required.
- 3. Metal edge strips in 6-inch (150-mm) lengths.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- C. Product Certificates: For each type of product.
- D. Product Test Reports: For each tile-setting and -grouting product and certified porcelain tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 10 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.8 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain tile of each type and color or finish from one source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:
 - 1. Waterproof membrane.
 - 2. Joint sealants.
 - 3. Cementitious backer units.
 - 4. Metal edge strips.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup of glass mosaic wall tile installation.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- E. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.
- C. FloorScore Compliance: Tile for floors shall comply with requirements of FloorScore Standard.
- D. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
 - Where tile is indicated for installation on exteriors or in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.
- F. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.2 TILE PRODUCTS

- A. Porcelain Floor Tile: PCT-1 As indicated on Drawings.
 - 1. Composition: Through Body Porcelain
 - 2. Module Size: 9.5 inches by 11 inches; Nominal Thickness: 1/4 inch
 - 3. Face: Plain with reticulated edges
- B. Porcelain Wall Tile and Trim Units: PWT-1 As indicated on Drawings;
 - 1. Modular Size: 4 inches x 16 inches;
 - 2. Provide manufacturer's standard shapes to suit installation conditions
 - 3. Base: Fry reglet coved stainless steel base at Water Coolers
 - 4. Internal Corners: Field-butted square corners, except with coved base and cap angle pieces designed to member with stretcher shapes
 - 5. Install with Schluter style strips at cove base.

C. Quarry Tile:

Match existing

2.3 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.

2.4 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Basis of Design: Bonsal American; an Oldcastle company; B 6000 Waterproof Membrane.
 - b. Bostik, Inc.; Hydroment Gold.
 - c. Laticrete International, Inc.; Laticrete Watertight Floor N' Wall Waterproofing.
 - d. MAPEI Corporation; Mapelastic HPG.
 - e. TEC; a subsidiary of H. B. Fuller Company; HydraFlex Waterproofing Crack Isolation Membrane.

2.5 SETTING MATERIALS

- A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4, composed as follows:
 - 1. Prepackaged dry mortar mix containing dry, redispersible, ethylene vinyl acetate additive to which only water must be added at Project site.
- B. Organic Adhesive: ANSI A136.1, Type I.
- C. Tile Grout: ANSI A118.7, color as indicated.
 - 1. SpectraLock Pro Premium Epoxy Grout with integral sealer
 - a. Unsanded grout mixture for joints 1/8 inch and narrower.

2.6 ELASTOMERIC SEALANTS

- A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with requirements of Section 07 92 00 "Joint Sealants."
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.
- C. One-Part Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated

with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and temperature extremes.

1. Products:

- a. "Dow Corning 786"; Dow Corning Corporation.
- b. "Sanitary 1700"; GE Silicones.
- c. "Pecora 898 Sanitary Silicone Sealant"; Pecora Corp.
- d. Tremsil 600 White; Tremco, Inc.

2.7 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle of L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications, white zinc alloy exposed edge material.
 - 1. Basis of Design: Schluter or equal; install per manufacturer recommendations.
- C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.8 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers= written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

- Verify that concrete substrates for tile floors installed with thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
- 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
- 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 TILE INSTALLATION

- A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
 - a. Exterior tile floors.
 - b. Tile floors in wet areas.
 - c. Tile floors composed of tiles 8 by 8 inches (200 by 200 mm) or larger.
 - Tile floors composed of rib-backed tiles.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).
 - 2. Quarry Tile: 1/4 inch (6.35 mm).
 - 3. Paver Tile: 1/4 inch (6.35 mm).
 - 4. Glazed Wall Tile: 1/16 inch (1.6 mm).
 - 5. Decorative Thin Wall Tile: 1/16 inch (1.6 mm).
 - 6. Reticulated or Large Format Porcelain Tile: Per Manufacturers recommendation.
- G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them
 - 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- I. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

3.4 TILE BACKING PANEL INSTALLATION

A. Install cementitious backer units and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 WATERPROOFING INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.

B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.6 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove epoxy and latex-portland cement grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 - 3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
- B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 09 30 00

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SECTION 095123 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Acoustical tiles for ceilings.
 - 2. Concealed suspension systems.
- B. Related Requirements:
 - 1. Section 018113 "Sustainable Design Requirements" for LEED requirements.
- C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, 6-inches- (150-mm-) in size.
- C. Samples for Initial Selection: For components with factory-applied color finishes.
- D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Tile: Set of full-size Samples of each type, color, pattern, and texture.
 - 2. Concealed Suspension-System Members: 6-inch- (150-mm-) long Sample of each type.
 - 3. Exposed Moldings and Trim: Set of 6-inch- (150-mm-) long Samples of each type and color.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Ceiling suspension-system members.
 - 2. Method of attaching hangers to building structure.

- a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
- 3. Size and location of initial access modules for acoustical tile.
- 4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
- 5. Minimum Drawing Scale: 1/4 inch = 1 foot (1:48)
- B. Qualification Data: For testing agency.
- C. Product Test Reports: For each acoustical tile ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.
- D. Evaluation Reports: For each acoustical tile ceiling suspension system and anchor and fastener type, from ICC-ES.
- E. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

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

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Units: Full-size tiles equal to 10 percent of quantity installed.
 - 2. Suspension-System Components: Quantity of each concealed grid and exposed component equal to 10 percent of quantity installed.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to the National Voluntary Laboratory Accreditation Program (NVLAP) for testing indicated.
- B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup of typical ceiling area as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

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

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

C. Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E 1264 for Class B materials.
 - 2. Smoke-Developed Index: 450 or less.
- B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ACOUSTICAL TILES, GENERAL

A. Low-Emitting Materials: Acoustical tile ceilings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Source Limitations:

- 1. Acoustical Ceiling Tile: Obtain each type from single source from single manufacturer.
- 2. Suspension System: Obtain each type from single source from single manufacturer.
- C. Source Limitations: Obtain each type of acoustical ceiling tile and supporting suspension system from single source from single manufacturer.
- D. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.

E. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.

- 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface according to ASTM E 795.
- F. Acoustical Tile Colors and Patterns: Match appearance characteristics indicated for each product type.
 - 1. Where appearance characteristics of acoustical tiles are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.3 ACOUSTICAL TILES ACT-01

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
- B. Basis-of-Design Product (ACT-1): Match existing lay-in ceiling tiles and grid. Field verify and confirm by submittal.
- C. Classification: Provide tiles complying with ASTM E 1264 for type, form, and pattern as follows:
 - Type and Form: Type IV, Form 2, water felted.
 - 2. Pattern: E (lightly textured.
 - Factory-applied latex paint: Washable, scratch-resistant, soil-resistant
 - 1. Fire performance: Class A (UL).
- D. Color: White
- E. LR: Not less than 0.85.
- F. NRC: Not less than 0.60.
- G. CAC: Not less than 35.
- H. Thickness: 3/4 inch (19 mm.
- I. Modular Size: 24 inches by 24 inches.

2.4 ACOUSTICAL TILES ACT-01

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
- B. Basis-of-Design Product (ACT-2):
 - Subject to compliance with requirements, provide Armstrong Ultima Tegular (#1902) with 15/16" Exposed Tee (white) suspension system or comparable product by one of the following:
 - a. Rockfon
 - b. USG

- 2. Surface Texture: Fine
- 3. Composition: Mineral Fiber
- 4. Color: White
- 5. Size: 24 in x 24 in
- 6. Edge Profile: Beveled Tegular 9/16 in for interface with SUPRAFINE XL 9/16" Exposed Tee grid.
- 7. Noise Reduction Coefficient(NRC): ASTM C 423; Classified with UL label on product carton 0.75
- 8. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton 35
- 9. Sabin:N/A
- 10. Articulation Class (AC):
- 11. Flame Spread: ASTM E 1264; Class A (UL)
- 12. Light Reflectance (LR) White Panel: ASTM E 1477; 0.90
- 13. Dimensional Stability: HumiGuard Plus
- 14. Recycle Content: Post-Consumer 0% Pre-Consumer 76%
- 15. Material Ingredient Transparency: Health Product Declaration (HPD); Declare Label
- 16. Life Cycle Assessment: Third Party Certified Environment Product Declaration (EPD)

2.5 ACOUSTICAL TILES ACT-03

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
- B. Basis-of-Design Product: Match existing lay-in ceiling tiles and grid for wet/kitchen areas. Field verify and confirm by submittal.
 - 1. Similar to "Kitchen Zone" by Armstrong
- C. Color: White
- D. Size: 24 in x 24 in.
- E. Edge Profile: Square, Lay-in, 15/16 for interface with grid system to match existing; white.
- F. Durable Water-repellent, Washable, Scratch-resistant, Soil-resistant
- G. Smooth surface meets USDA/FSIS guidelines for use in food processing areas
- H. Fire performance: Class A (UL).

2.6 METAL SUSPENSION SYSTEMS, GENERAL

- A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
- B. Metal Suspension-System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a

load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.

- a. Type: Postinstalled expansion anchors.
- b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
- c. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchors.
- 2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.135-inch- (3.5-mm-) diameter wire.
- E. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- F. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch-(1-mm-) thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.
- G. Seismic Struts: Manufacturer's standard compression struts designed to accommodate lateral forces.
- H. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical tiles in-place.

2.7 METAL SUSPENSION SYSTEM ACT-01

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong product to match existing, field verify by one of the following:
 - 1. USG Interiors, Inc.; Subsidiary of USG Corporation.
- C. Direct-Hung, Double-Web, Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 (Z90) coating designation.
 - 1. Structural Classification: Heavy-duty system.
 - Access: Downward and end pivoted or side pivoted, with initial access openings of size
 indicated below and located throughout ceiling within each module formed by main and

cross runners, with additional access available by progressively removing remaining acoustical tiles.

a. Initial Access Opening: In each module as required by type.

2.8 METAL SUSPENSION SYSTEM ACT-01

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Prelude 15/16-inch (white) or comparable product by one of the following:
 - 1. USG Interiors, Inc.; Subsidiary of USG Corporation.
- C. Direct-Hung, Double-Web, Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 (Z90) coating designation. For all wet areas suspension system shall be aluminum.
 - 1. Structural Classification: Heavy-duty system.
 - Access: Downward and end pivoted or side pivoted, with initial access openings of size
 indicated below and located throughout ceiling within each module formed by main and
 cross runners, with additional access available by progressively removing remaining
 acoustical tiles.
 - a. Initial Access Opening: In each module as required by type.

2.9 METAL EDGE MOLDINGS AND TRIM ACT-01

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Axiom 4–inch Vector Trim or comparable product as required by one of the following:
 - CertainTeed Corp.
 - 2. Chicago Metallic Corporation.
 - 3. Fry Reglet Corporation.
 - 4. USG Interiors, Inc.; Subsidiary of USG Corporation.
- C. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
 - 1. Provide manufacturer's standard edge moldings that fit acoustical tile edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
 - 2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
- D. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's

designations, including splice plates, corner pieces, and attachment and other clips and complying with seismic design requirements and the following:

- Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated and with not less than the strength and durability properties of aluminum extrusions complying with ASTM B 221 (ASTM B 221M) for Alloy and Temper 6063-T5.
- 2. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
- 3. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils (0.04 mm). Comply with ASTM C 635/C 635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.10 MISCELLANEUS MATERIALS

- A. Acoustical Tile Adhesive: Type recommended by acoustical tile manufacturer, bearing UL label for Class 0-25 flame spread.
 - 1. Adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Staples: 5/16-inch- (8-mm-) long, divergent-point staples.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Testing Substrates: Before installing adhesively applied tiles on wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.
- B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

- 1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 - 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 - 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 - 8. Do not attach hangers to steel deck tabs.
 - 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 - 10. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
 - 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles.
 - 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 - 2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
 - 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

- F. Arrange directionally patterned acoustical tiles as follows:
 - 1. As indicated on reflected ceiling plans.
- G. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.
 - 1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.
 - 2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced 12 inches (305 mm) o.c.
 - 3. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections of completed installations of acoustical tile ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion but no tiles have been installed. Do not proceed with installations of acoustical tile ceiling hangers for the next area until test results for previously completed installations of acoustical tile ceiling hangers show compliance with requirements.
 - 1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf (890 N) of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf (1957 N) of tension.
 - 2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- B. Acoustical tile ceiling hangers and anchors and fasteners will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.5 CLEANING

A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 23

SECTION 09 65 13 - RESILIENT WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - Resilient base.
 - 2. Resilient molding accessories.
- B. Related Sections:
 - 1. Division 9 Section "Resinous Flooring"

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of product indicated.
- C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.
- D. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Coordinate mockups in this Section with mockups specified in other Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.7 PROJECT CONDITIONS

- A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

- A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Johnsonite.
 - 2. Armstrong World Industries, Inc.
 - 3. Burke Mercer Flooring Products.
- B. RB-1: Resilient Base Standard: ASTM F 1861.
 - 1. Material Requirement: Type TP (rubber, thermoplastic).
 - 2. Manufacturing Method: Group I (solid, homogeneous).
 - 3. Style: "Traditional".
 - 4. Basis of Design: Johnsonite.
 - 5. Height: 4-inch.
 - 6. Location: As scheduled.
- C. RB-2: Resilient Base Standard: ASTM F 1861.
 - 1. Material Requirement: Type TP (rubber, thermoplastic).
 - 2. Manufacturing Method: Group I (solid, homogeneous).
 - Style: "Equinox".
- 4. Basis of Design: Johnsonite.
- 5. Height: 4.5-inch.
 - 6. Location: As scheduled.
- D. Lengths: Coils in manufacturer's standard length; length to extend wall corner to wall corner at minimum with piecing permitted only when interrupted by millwork. No piecing at continuous walls/partitions.

- E. Outside Corners: Job formed or preformed.
- F. Inside Corners: RB-1 job formed using heat; RB-2 Mitered or coped corners.
- G. Finish: Matte.
- H. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 RESILIENT MOLDING ACCESSORY

- A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Johnsonite.
 - 2. Flexco.
 - 3. Burke.
- B. Description: For applications as indicated on Drawings...
- C. Material: Rubber.
- D. Profile and Dimensions: As indicated.
- E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, with Installer present, for compliance with requirements for maximum moisture content, and other conditions affecting performance.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer=s written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions using trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

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09 65 13 - 3 Resilient Wall Base and Accessories

C. Do not install resilient products until they are same temperature as space where they are to be installed.

- Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to Substrates throughout length of each piece. Install reducer strips at edges of carpet and resilient floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products until Substantial Completion.

END OF SECTION 09 65 13

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SECTION 09 77 20 - DECORATIVE FIBERGLASS REINFORCED WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Prefinished polyester glass reinforced plastic sheets and adhered to unfinished gypsum wallboard.
 - 1. PVC trim.
- B. Products Not Furnished or Installed under This Section:
 - 1. Gypsum substrate board.
 - Resilient Base.

1.2 RELATED SECTIONS

- A. Section 07 92 00 Joint Sealants
- B. Section 09 22 16 Galvanized Metal Stud Framing
- C. Section 09 29 00 Gypsum substrate board.
- D. Section 09 91 20 Painting & Transparent Finishes.
- E. Section 09 65 13 Resilient Base.

1.3 REFERENCES

- A. American Society for Testing and Materials: Standard Specifications (ASTM)
 - 1. ASTM D 256 Izod Impact Strengths (ft #/in)
 - 2. ASTM D 570 Water Absorption (%)
 - 3. ASTM D 638 Tensile Strengths (psi) & Tensile Modulus (psi)
 - 4. ASTM D 790 Flexural Strengths (psi) & Flexural Modulus (psi)
 - 5. ASTM D 2583- Barcol Hardness
 - ASTM D 5319 Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
 - 7. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. Product Data: Submit sufficient manufacturer's data to indicate compliance with these specifications, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- B. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.

- C. Selection Samples: Submit manufacturer's standard color pattern selection samples representing manufacturer's full range of available colors and patterns.
- D. Samples for Verification: Submit appropriate section of panel for each finish selected indicating the color, texture, and pattern required.
 - 1. Submit complete with specified applied finish.
 - 2. For selected patterns show complete pattern repeat.
 - 3. Exposed Molding and Trim: Provide samples of each type, finish, and color.
- E. Manufacturers Material Safety Data Sheets (MSDS) for adhesives, sealants and other pertinent materials prior to their delivery to the site (available as downloads for most Marlite's products at http://www.marlite.com/tech-details.aspx or by contacting Marlite at info@marlite.com).

1.5 QUALITY ASSURANCE

- A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:
 - ASTM E 84 (Method of test for surface burning characteristics of building Materials)
 - Wall Required Rating Class A.
- B. Sanitary Standards: System components and finishes to comply with:
 - United States Department of Agriculture (USDA) requirements for food preparation facilities, incidental contact.
 - 2. Food and Drug Administration (FDA) 1999 Food Code 6-101.11.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials factory packaged on strong pallets.
- B. Store panels and trim lying flat, under cover and protected from the elements. Allow panels to acclimate to room temperature (range of 60 to 75°F) for 48 hours prior to installation.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Building are to be fully enclosed prior to installation with sufficient heat (70°) and ventilation consistent with good working conditions for finish work
- B. During installation and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.
 - 1. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

1.8 WARRANTY

A. Furnish one year guarantee against defects in material and workmanship.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

- A. Marlite; 1 Marlite Drive, Dover, OH 44622. 800-377-1221 FAX (330) 343-4668 Email: info@marlite.com www.marlite.com.
- B. Product:
 - Standard FRP

2.2 PANELS

- A. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.
 - 1. Coating: Multi-layer print, primer and finish coats or applied over-layer.
 - 2. Dimensions:
 - a. Thickness 0.090 " (2.29mm) nominal
 - b. Width 4'-0" (1.22m) nominal
 - c. Length 10'-0" (3.0m) nominal
 - 3. Tolerance:
 - a. Length and Width: +/-1/8 " (3.175mm)
- B. Properties: Resistant to rot, corrosion, staining, denting, peeling, and splintering.
 - 1. Flexural Strength 1.0 x 10⁴ psi per ASTM D 790. (7.0 kilogram-force/square millimeter)
 - 2. Flexural Modulus 3.1 x 10⁵ psi per ASTM D 790. (217.9 kilogram-force/square millimeter)
 - 3. Tensile Strength 7.0 x 10³ psi per ASTM D 638. (4.9 kilogram-force/square millimeter)
 - 4. Tensile Modulus 1.6 x 10⁵ psi per ASTM D 638. (112.5 kilogram-force/square millimeter)
 - 5. Water Absorption 0.72% per ASTM D 570.
 - 6. Barcol Hardness (scratch resistance) of 35 55 as per ASTM D 2583.
 - 7. Izod Impact Strength of 72 ft. lbs./in ASTM D 256
- C. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.
- D. Front Finish: As Indicated on the Drawings
 - a. Color:
 - 1) Marlite Standard FRP Color: SG100 White
 - 2) Marlite Laminated FRP substrate:
 - a) Standard FRP laminated to 5/8" Gypsum
 - b. Surface Marlite Standard FRP: Smooth.
 - c. Fire Rating: Class A.
 - d. Size: 48" x 120" [1.2m x 3m] x .090" (3mm) nom.

2.3 MOLDINGS

- A. PVC Trim: Thin-wall semi-rigid extruded PVC.
 - 1. M 350 Inside Corner, 10' length
 - 2. M 360 Outside Corner, 10' length
 - 3. M 365 Division, 10' length
 - 4. M 370 Edge, 10' length
 - 5. Color: White
- B. Outside Corner Guard:
 - 1. F 560SS Stainless Corner Guard, [8' length][10' length]
 - 2. Finish: #4 brushed satin

2.4 ACCESSORIES

- A. Fasteners: Non-staining nylon drive rivets.
 - 1. Match panel colors.
 - 2. Length to suit project conditions.
- B. Adhesive: Either of the following construction adhesives complying with ASTM C 557.
 - 1. Titebond Advanced Polymer Panel Adhesive VOC compliant, non-flammable, environmentally safe adhesive.
- C. Sealant: Marlite Brand MS-250 Clear Silicone Sealant.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface.
 - 1. Verify that stud spacing does not exceed 16" (61cm) on-center.
 - 2. Hold gypsum board off floor 3/4-inch at all locations to receive FRP, typical.
- B. Repair defects prior to installation.
 - Level wall surfaces to panel manufacturer's requirements. Remove protrusions and fill indentations.

3.2 INSTALLATION

- A. Comply with manufacturer's recommended procedures and installation sequence.
- B. Cut sheets to meet supports allowing 1/8" (3 mm) clearance for every 8 foot (2.4m) of panel.

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- 1. Cut and drill with carbide tipped saw blades or drill bits, or cut with shears.
- 2. Pre-drill fastener holes 1/8" (3mm) oversize with high speed drill bit.
 - a. Space at 8" (200mm) maximum on center at perimeter, approximately 1" from panel edge.
 - b. Space at in field in rows 16' (40.64cm) on center, with fasteners spaced at 12" (30.48 cm) maximum on center.
- C. Apply panels to board substrate, above base, vertically oriented with seams plumb and pattern aligned with adjoining panels.
 - 1. Install panels with manufacturer's recommended gap for panel field and corner joints.
 - Adhesive trowel and application method to conform to adhesive manufacturer's recommendations ensuring uniform application of adhesive with no bubbles or warpage.
 - b. Drive fasteners for snug fit. Do not over-tighten.
- D. Apply panel moldings to all panel edges using silicone sealant providing for required clearances.
 - 1. All moldings must provide for a minimum 1/8 " (3mm) of panel expansion at joints and edges, to insure proper installation.
 - 2. Apply sealant to all moldings, channels and joints between the system and different materials to assure watertight installation.

3.3 CLEANING

- A. Remove excess sealant from panels and moldings. Wipe panel down using a damp cloth and mild soap solution or cleaner.
- B. Refer to manufacturer's specific cleaning recommendations Do not use abrasive cleaners.

END OF SECTION 09 77 20

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SECTION 09 91 20 - PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes surface preparation and field painting of the following:
 - 1. Exposed exterior items and surfaces.
 - 2. Exposed interior items and surfaces.
 - 3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment installed under Division 22, Division 23, and Division 26 and application of paint coats to all finish coated mechanical and electrical equipment in exterior locations, except as otherwise indicated.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
- D. Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.2 SUBMITTALS

- A. Product Data: For each paint system specified. Include block fillers and primers.
 - 1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
- B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.
 - 1. After color selection, the Architect will furnish color chips for surfaces to be coated.
- C. Samples for Verification: Of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
 - 1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
 - 2. Provide a list of materials and applications for each coat of each sample. Label each sample for location and application.

3. On actual wall surfaces and other exterior and interior building components, duplicate painted finishes of prepared samples. On at least 100 square feet of surface, as directed, provide full-coat finish samples until required sheen level., color and texture is obtained; simulate finished lighting conditions for review of in-place work.

D. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.3 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.
- B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
 - 8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.5 PROJECT CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 degrees F.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 degrees F.
- C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and conditioned within temperature limits specified by manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers Specified:
 - 1. Pittsburgh Paints
- B. Other Acceptable Manufacturers:
 - 1. Sherwin Williams
 - 2. Benjamin Moore and Company

2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
 - Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
- C. All block fillers, primers, paints and coatings shall be lead-free.
- D. All paints shall contain the highest proportion available of titanium dioxide.
- E. Colors: Provide color selections made by the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.
 - 1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 - 2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
 - 1. Coordinate with section "Gypsum Board" and drawings for required level of finish.
- D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
- E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.
 - 1. Follow manufacturer recommendations for primer/ undercoat for darker or lighter colors.
 - 2. Undercoats must be visually inspected by the Architect/Engineer prior to subsequent coat(s).

3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
 - 1. Use gages to verify the thickness applied on the job.
- B. Doors: Paint all surfaces of doors including tops and bottoms and sides of exterior and interior doors. Paint tops and bottoms and sides of doors using the same coating system specified for face surfaces.
- C. All hollow metal door frames shall be backpainted prior to installation.

3.4 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

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1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.5 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
 - 1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.6 SCHEDULE

- A. Areas requiring specific paint types and colors are given below. Color as indicated on Drawings.
 - 1. Concrete Masonry Units (CMU)
 - Basis of Design: Latex Semi-Glossl Finish Low Odor -Low VOC: PPG Industries, Pittsburgh Paints
 - b. 1st Coat: PPG PURE PERFORMANCE Interior Latex Primer 9-900.
 - c. 2nd Coat: PPG PURE PERFORMANCE Interior Eggshell Latex 9-300 Series.
 - d. 3rd Coat: PPG PURE PERFORMANCE Interior Semi-Gloss Latex 9-300 Series. (4.0 mils wet, 1.5 mils dry per coat)
 - 2. Concrete Masonry Units (CMU)
 - Basis of Design: Epoxy (Water Base) Semi Gloss Finish: PPG Industries,
 Pittsburgh Paints (Design Standard)
 - b. 1st Coat: PPG PITT-GLAZE®Interior/Exterior Block Filler Latex 16-90. (64-138 sq. ft/gal 6-13 mils dry)
 - c. 2nd Coat: PPG Pitt-Glaze WB Water Borne Acrylic Epoxy 16-551 Series.
 - d. 3rd Coat: PPG Pitt-Glaze WB Water Borne Acrylic Epoxy 16-551 Series. (8.2 mils wet, 3.0 mils dry per coat)
 - 3. Concrete Masonry Units (CMU)
 - a. Basis of Design: High Build Epoxy (Solvent Base) Gloss Finish: Squeegee a base coat after applying with spray or roller. CMU surface shall be pinhole free before applying intermediate and finish coats.PPG Industries, Pittsburgh Paints
 - b. 1st Coat: PPG Cementitous Waterproofing Block Filler 95-217. (60-80 mils DFT)
 - c. 2nd Coat: PPG Cementitous Waterproofing Block Filler 95-217. (60-80 mils DFT).
 - d. 3rd Coat: PPG Pitt-Guard Rapid Coat D-T-R Epoxy Coating 95-245 Series (4-7 miles DFT) roller applied. 4th Coat: PPG Pitthane Ultra Gloss Urethane Enamel 95-812 Series. (2-3 mils DFT) roller applied.

4. Metal-Aluminum

- a. Basis of Design: Latex Semi Gloss Finish Low Odor -Low VOC: PPG Industries, Pittsburgh Paints
- b. 1st Coat: PPG PURE PERFORMANCE Interior Semi-Gloss Latex 9-500 Series.

c. 2nd Coat: PPG PURE PERFORMANCE Interior Semi-Gloss Latex 9-500 Series. (4.6 mils wet, 1.7 mils dry per coat)

Metal-Aluminum

- Basis of Design: Latex Eggshell Finish-Low Odor-Low VOC: PPG Industries, Pittsburgh Paints
- b. 1st Coat: PPG PURE PERFORMANCE Interior Eggshell Latex 9-300 Series.
- c. 2nd Coat: PPG PURE PERFORMANCE Interior Eggshell Latex 9-300 Series. (4.0 mils wet, 1.5 mils dry per coat)

6. Metal-Aluminum

- Basis of Design: Epoxy (Water Base) Semi Gloss Finish: PPG Industries, Pittsburgh Paints
- b. 1st Coat: PPG Pitt-Glaze WB Water Borne Acrylic Epoxy 16-551 Series.
- c. 2nd Coat: PPG Pitt-Glaze WB Water Borne Acrylic Epoxy 16-551 Series. (8.2 mils wet, 3.0 mils dry per coat)

7. Metal-Galvanized

- Basis of Design: Latex Semi Gloss Finish Low Odor -Low VOC: PPG Industries, Pittsburgh Paints
- b. 1st Coat: PPG Pitt-Tech Int/Ext Industrial DTM Primer/Finish Enamel 90- 712 Series. (7.7 mils wet, 3.0 mils dry).
- c. 2nd Coat: PPG PURE PERFORMANCE Interior Semi-Gloss Latex 9-500 Series.
- d. 3rd Coat: PPG PURE PERFORMANCE Interior Semi-Gloss Latex 9-500 Series. (4.6 mils wet, 1.7 mils dry per coat)

8. Metal-Galvanized

- Basis of Design: Epoxy (Water Base) Semi Gloss Finish: PPG Industries, Pittsburgh Paints
- b. 1st Coat: PPG Pitt-Glaze WB Water Borne Acrylic Epoxy 16-551 Series.
- c. 2nd Coat: PPG Pitt-Glaze WB Water Borne Acrylic Epoxy 16-551 Series. (8.2 mils wet, 3.0 mils dry per coat)

9. Metal-Shop Primed

- a. Basis of Design: Latex Semi Gloss Finish: PPG Industries, Pittsburgh Paints
- b. 1st Coat: PPG Pitt-Tech Int/Ext Industrial DTM Primer/Finish Enamel 90- 712 Series. (7.7 mils wet, 3.0 mils dry).
- c. 2nd Coat: PPG Speedhide Interior Semi Gloss Acrylic Latex 6-500 Series.
- d. 3rd Coat: PPG Speedhide Interior Semi Gloss Acrylic Latex 6-500 Series. (4.6 mils wet, 1.7 mils dry per coat)

10. Metal-Shop Primed

a. Basis of Design: Epoxy (Water Base) Semi Gloss Finish: PPG Industries, Pittsburgh Paints

- b. 1st Coat: PPG Aquapon WB Waterborne Epoxy Primer 98-46. (8.4 mils wet, 3.0 mils dry)
- c. 2nd Coat: PPG Pitt-Glaze WB Water Borne Acrylic Epoxy 16-551 Series.
- d. 3rd Coat: PPG Pitt-Glaze WB Water Borne Acrylic Epoxy 16-551 Series. (8.2 mils wet, 3.0 mils dry per coat)

11. Metal-Ceilings: Structural Steel, Joists, Trusses, Beams

- a. Basis of Design: Drywall Waterborne Semi Gloss Finish: PPG Industries, Pittsburgh Paints (Design Standard)
- b. 1st Coat: PPG Pitt-Tech Int/Ext Industrial DTM Primer/Finish Enamel 90- 712 Series. (7.7 mils wet, 3.0 mils dry).
- c. 2nd Coat: PPG SPEEDHIDE® Interior Spray Paint Semi-Gloss Latex 6-714XI. (6.4-8.0 mils wet, 2.0-3.2 mils dry)

12. Wood - Doors, Trim, Cabinet Work

- a. Basis of Design: Latex Semi Gloss Finish -Low Odor, Low VOC: PPG Industries, Pittsburgh Paints
- b. 1st Coat: PPG PURE PERFORMANCE Interior Latex Primer 9-900.
- c. 2nd Coat: PPG PURE PERFORMANCE Interior Semi-Gloss Latex 9-500 Series.
- d. 3rd Coat: PPG PURE PERFORMANCE Interior Semi-Gloss Latex 9-500 Series. (4.6 mils wet, 1.7 mils dry per coat))

13. Wood - Doors, Trim, Cabinet Work

- Basis of Design: Stain and Varnish (Clear Finish)-Open Grain Wood: PPG Industries, Pittsburgh Paints
- b. 1st Coat: Filler not required.
- c. 2nd Coat: PPG REZ Interior Stain Semi-Transparent Oil 77-560.
- d. 3rd Coat: PPG REZ Interior Acrylic Polyurethane Gloss Clear Finish 77-45 or PPG REZ Interior Acrylic Polyurethane Satin Clear Finish 77-49.
- e. 4th Coat: PPG REZ Interior Acrylic Polyurethane Gloss Clear Finish 77- 45 or PPG REZ Interior Acrylic Polyurethane Satin Clear Finish 77-49.

14. Wood - Doors, Trim, Cabinet Work

- a. Basis of Design: Stain and Varnish (Clear Finish)-Closed Grain Wood: PPG Industries, Pittsburgh Paints
- b. 1st Coat: PPG REZ Interior Stain Semi-Transparent Oil 77-560.
- 2nd Coat: PPG REZ Interior Acrylic Polyurethane Gloss Clear Finish 77-45 or PPG REZ Interior Acrylic Polyurethane Satin Clear Finish 77-49.
- d. 3rd Coat: PPG REZ Interior Acrylic Polyurethane Gloss Clear Finish 77- 45 or PPG REZ Interior Acrylic Polyurethane Satin Clear Finish 77-49.

15. Wood – Interior and Exterior Paneling, Exterior Wood Decking (Alternate)

- a. Basis of Design: Transparent Sealer INSECO, Inc., Wood RX Ultra, Product No. 625
- b. 2 Coat application, allow 1-2 hours between coats.
- Flame spread class A rating.

16. Gypsum Board

- Basis of Design: Latex Semi-Gloss Finish-Low Odor-Low VOC: PPG Industries, Pittsburgh Paints
- b. 1st Coat: PPG PURE PERFORMANCE Interior Latex Primer 9-900.
- c. 2nd Coat: PPG PURE PERFORMANCE Interior Semi-Gloss Latex 9-500 Series.
- d. 3rd Coat: PPG PURE PERFORMANCE Interior Semi-Gloss Latex 9-500 Series. (4.6 mils wet, 1.7 mils dry per coat)

Note: Paint at gypsum board walls applied to the interior of an exterior wall must be semi-permeable.

17. Gypsum Board

- a. Basis of Design: High Build Epoxy (Solvent Base) Gloss Finish: Surface shall be pinhole free. PPG Industries, Pittsburgh Paints
- b. 1st Coat: PPG Speedhide Interior Latex Primer Sealer 6-2. (4.5 mils wet, 1.3 mils dry)
- c. 2nd Coat: PPG Pitt-Guard Rapid Coat D-T-R Epoxy Coating 95-245 Series. (4-7 mils DFT) roller applied.
- d. 3rd Coat: PPG Pitthane Ultra Gloss Urethane Enamel 95-812 Series. (2-3 mils DFT) roller applied.

Note: To be used at areas adjacent to water coolers, trash receptacles, vending rooms and all restrooms.

18. Canvas- Wall Covering, Pipe Wrapping

- Basis of Design: Latex Finish: PPG Industries, Pittsburgh Paints (Design Standard)
- b. 1st Coat: PPG Speedhide Interior Latex Primer Sealer 6-2. (4.5 mils wet, 1.3 mils dry)
- c. 2nd Coat: PPG Speedhide Interior Semi Gloss 6-70 Series. (4.0 mils wet, 1.3 mils dry).

19. Heat Resistant Coatings

- a. Basis of Design: Oleoresinous-Max. Temperature 400 Degrees F, Aluminum Finish: PPG Industries, Pittsburgh Paints (Design Standard)
- b. 1st Coat: PPG Speedhide Int/Ext Aluminum Paint 6-230.
- c. 2nd Coat: PPG Speedhide Int/Ext Aluminum Paint 6-230. (3.2 mils wet, 1.5 mils dry per coat)

20. Heat Resistant Coatings

- a. Basis of Design: Oleoresinous-Max. Temperature 400 to 700 Degrees F, Aluminum Finish (Interior use only): PPG Industries, Pittsburgh Paints
- b. 1st Coat: PPG Speedhide Int/Ext Aluminum Paint 6-220.
- c. 2nd Coat: PPG Speedhide Int/Ext Aluminum Paint 6-220. (6.7 mils wet, 1.5 mils dry per coat)

- 21. Pipe Identification
 - a. Refer to MEP drawings and specifications.
- 24. Tele/Data Rooms
 - a. Refer to MEP drawings and specifications.

Note: Do not paint over fire rating, UL or other permananet labels.

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section 10

SPECIALTIES

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SECTION 10 14 23 - PANEL SIGNAGE

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 types of signs:
 - 1. Panel signs.
 - 2. Room Identification Signs

1.3 DEFINITIONS

A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities: Architectural Barriers Act (ABA) Accessibility Guidelines.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
 - 1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 2. Provide message list, typestyles, graphic elements including tactile characters and Braille, and layout for each sign.
- C. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
 - 1. Acrylic Sheet: 8 by 10 inches for each color required.
 - 2. Panel Signs: Not less than 12 inches square.
- D. Sign Schedule: Use same designations indicated on Drawings.
- E. Qualification Data: For Installer and fabricator.
- F. Maintenance Data: For signs to include in maintenance manuals.
- G. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful inservice performance.

 Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.

D. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines.

1.6 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturer's written instructions and warranty requirements.
- B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on shop drawings.

1.7 COORDINATION

A. Coordinate placement of anchorage devices with templates for installing signs.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metal and polymer finishes beyond normal weathering.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Castings: ASTM B 26, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.
- B. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.
- C. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.
- D. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).

2.3 PANEL SIGNS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. APCO Graphics, Inc.

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- 2. ASI-Modulex, Inc.
- Best Sign Systems Inc.
- 4. Gemini Incorporated.
- 5. Matthews International Corporation; Bronze Division.
- 6. Mills Manufacturing Company.
- 7. Mohawk Sign Systems.
- 8. Nelson-Harkins Industries.
- 9. Seton Identification Products.
- B. Interior Panel Signs: Produce smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner, complying with the following requirements:
 - 1. Acrylic Sheet: 0.060 inch thick.
 - 2. Edge Condition: Square cut.
 - 3. Corner Condition: Square.
 - 4. Mounting: As indicated.
 - 5. Color: As selected by Architect from manufacturer's full range.
 - 6. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch above surface with contrasting colors.
- C. Brackets: Fabricate brackets and fittings for bracket-mounted signs from extruded aluminum to suit sign panel construction and mounting conditions indicated. Factory-paint brackets in a color matching the background color of panel sign.
- D. Tactile and Braille Sign: Manufacturer=s standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shaped.
 - 1. Panel Material: Opaque acrylic sheet.
 - 2. Raised-Copy Thickness: Not less than 1/32 inch.
- E. Panel Sign Schedule:
 - 1. Sign Size: As indicated.
 - 2. Message Panel Material: As indicated.
 - 3. Character Size: As indicated.
 - Text/Message: As indicated.
 - Location: As indicated.

2.4 ACCESSORIES

A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.5 FABRICATION

- A. General: Provide manufacturer'=s standard signs of configurations indicated.
 - Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and

- dress exposed and contact surfaces.
- 2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
- Preassemble signs in the shop to greatest extend possible. Disassemble signs only
 as necessary for shipping and handling limitations. Clearly mark units for
 reassembly and installation, in location not exposed to view after final assembly.
- 4. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.6 FINISHES, GENERAL

- A. Comply with NAAMM "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

A. Clear Anodic Finish: Manufacturer=s standard Class I clear anodic coating, 0.018 mm or thicker, over a nonspecular as fabricated mechanical finish, complying with AAMA 611.

2.8 ACRYLIC SHEET FINISHES

A. Colored Coatings for Acrylic Sheet: For copy and background colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for three years for application intended.

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 work.
- B. Verify that items, including anchor inserts, are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of the type described and complying with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free from distortion or other defects in appearance.
 - 2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on

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nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.

- B. Wall Mounted Panel Signs: comply with sign manufacturer=s written instructions except where more stringent requirements apply.
- C. Bracket-Mounted Units: Provide the manufacturer's standard brackets, fittings, and hardware as appropriate for mounting signs that project at right angles from walls and ceilings. Attach brackets and fittings securely to walls or ceilings with concealed fasteners and anchoring devices to comply with manufacturer's written instructions.
- D. Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.
 - 1. Flush Mounting: Mount characters with backs in contact with the wall surface.
 - Projected Mounting: Mount characters at projection distance the wall surface indicated.

3.3 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 10 14 00

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SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

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. Provide toilet and bath accessories as indicated on the Drawings, Schedules, and specified herein.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify products using room designations indicated on Drawings.
- C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.
- B. 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.

1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.6 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.0312 inch minimum nominal thickness, unless otherwise indicated.
- B. Steel Sheet: ASTM A 1008, Designation CS (cold rolled, commercial steel), 0.0359 inch minimum nominal thickness.
- C. Galvanized Steel Sheet: ASTM A 653, with G60 hot-dip zinc coating.
- D. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.
- E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamperand-theft resistant where exposed, and of galvanized steel where concealed.
- F. Mirror Glass: ASTM C 1053, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.2 ACCEPTABLE MANUFACTURERS

- A. Manufacturers: Basis of Design is Bobrick Washroom Equipment. Subject to compliance with requirements including UF Design Guidelines, provide toilet and bath accessories by one of the following manufacturers; and as specified herein. Note: UF Facilities Services will furnish all soap, paper towel and toilet paper dispensers, and sanitary napkin waste receptacle.
 - 1. A&J Washroom Accessories, Inc.
 - 2. American Specialties, Inc.
 - 3. Bradley Corporation.
 - 4. General Accessory Manufacturing co. (GAMCO).

2.3 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plate.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate as recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 TOILET ACCESSORIES SCHEDULE

- A. Furnish and install items as listed and included in the drawings. The items listed herein are based on products by Bobrick Washroom Equipment, Inc. unless otherwise noted.
 - 1. All toilet accessories shall be ADA compliant and installed per accessibility requirements in the Florida Building Code.
- B. Toilet Paper Dispenser: Install one at each water closet.
 - 1. Basis of Design: Bobrick B-2892. Furnished by Owner
- C. Feminine Napkin Disposal:
 - 1. Basis of Design: Bobrick Model No. B-270 Classic Series Furnished by Owner.
 - 2. Size: 7-1/2" x 10" x 3-13/16".
 - 3. Material: 18-8, Type 304 Stainless Steel, 22-gauge all welded construction.
 - 4. Install one at Unisex restroom.
- D. Surface Mounted Paper Towel Dispenser: Furnished by Owner
 - 1. Basis of Design: Bobrick Model No. B-2621 Classic Series
 - a. Multi-fold towels.b. Flush tumbler lock.
- 2. Size: 17.5" wide x 56-5/16" high x 8-1/4"" maximum depth with 12.0 gallon waste receptacle capacity (part number 368-60)
 - 3. Material: Satin-finish stainless steel
 - 4. Install one at every sink.
- D. Surface Mounted Waste Receptacle:
 - 1. Basis of Design: Bobrick Model No. B-368-60 Classic Series
 - a. Recessed with liner.
 - 2. Size: 17.5" wide x 56-5/16" high x 8-1/4"" maximum depth with 12.0 gallon waste

- receptacle capacity (part number 368-60)
- Material: Satin-finish stainless steel
- 4. Install one each toilet room and one each ADA accessible toilet stall, typical.
- E. Soap Dispenser: Install one surface mounted soap dispenser at toilet room sink.
 - 1. Basis of Design: B-2111 Classic Series. Furnished by Owner.
 - Install one in Unisex toilet room.
- E. Soap Dispenser: Install one sink mounted soap dispenser at breakroom sink.
 - 1. Basis of Design: B-8221.
 - 2. Install one as indicated in drawings.
- F. Grab Bars: Stainless steel grab bars, 36 inches long.
 - 1. Bobrick Model No. B-6806 x 36.
 - 2. Install per drawings.
- G. Grab Bars: Stainless steel grab bars, 42 inches long.
 - 1. Bobrick Model No. B-6806 x 42.
 - 2. Install per drawings.
- H. ADA Channel-Frame Mirror: Fixed tilt mirror.
 - 1. Bobrick Model No. B-293 x size indicated.
 - 2. Install per drawings.
- I. Hook:
 - 1. Bobrick Model No. B-672.
 - 2. Install one hook at the back of the Unisex door.
- J. Stainless Steel Shelf:
 - 1. Bobrick Model No. B-295-24.
 - 2. Install one shelf above the water closet in the Unisex restroom.
- K. Stainless Steel Mop and Broom Holder with Shelf:
 - 1. Bobrick Model No. B239 x 34
 - 2. Install one in Custodial Room
- L. Glass Mirror:
 - 1. Bobrick Model No B290 2436
 - 2. Install one in Unisex Restroom

END OF SECTION 10 28 00

SECTION 10 44 10 - FIRE-PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Portable fire extinguishers.
 - 2. Fire-protection cabinets for portable fire extinguishers.
 - Mounting brackets for fire extinguishers.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection cabinets.
 - 1. Fire Extinguishers: Include rating and classification.
 - 2. Fire-Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- B. Samples for Verification: For each type of exposed factory-applied color finish required for fire protection cabinets, prepared on samples of size indicated below.
 - 1. Size: 6 by 6 inches square.
- C. Maintenance Data: For fire extinguishers and fire-protection cabinets to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain fire extinguishers and fire-protection cabinets through one source from a single manufacturer.
- B. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.
- C. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."
- D. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
 - 1. Provide fire extinguishers approved, listed, and labeled by FMG.

1.5 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B.
- B. Stainless Steel Sheet: ASTM A 666, Type 304.
- C. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, type I, Quality q3, 3mm thick, Class 1 (clear).
- 2.2 PORTABLE FIRE EXTINGUISHERS: Furnished and Installed by Owner
 - A. Acceptable Manufacturers:
 - 1. Amerex Corporation.
 - 2. Ansul Incorporated.
 - 3. Buckeye Fire Equipment Company.
 - 4. J.L Industries, Inc.
 - B. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet and mounting bracket indicated and as required by University Design Guidelines.
 - Valves: Manufacturer-s standard.
 - 2. Handles and Levers: Manufacturer-s standard.
 - Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
 - Rooms housing only HVAC systems, small electrical rooms, janitor's closets do not require fire extinguishers unless otherwise determined by the University.
 - C. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 3-A:40-B:C, 5 lb. and 4-A:60-B:C, 10 lb. nominal capacity fire extinguishers; locations as indicated on Drawings. Monoammomium phosphate-based dry chemical in enameled-steel container. Use 5 lb. units except 10 lb. units may be used in work shops, large mechanical rooms, elevator equipment rooms, and labs containing large quantities of flammable liquids.
 - D. Clean-Agent Type in Steel Container: UL-rated 1-A:10-B:C, 10 lb nominal capacity, with Halotron or FE2000 clean agent and inert material in enameled-steel container; with pressure-indicating gage. Acceptable for use in computer rooms and laboratories where sensitive equipment is located.
- E. Stored-Pressure Water-Mist Type: UL-rated 2-A:C, 2.5 gal. nominal capacity, with water in enameled-steel container; with pressure-indicating gage. Acceptable for use in computer server rooms or laboratories with University approval.

2.3 FIRE-PROTECTION CABINETS

- A. Acceptable Manufacturers:
 - 1. JL Industries, Inc.
 - 2. Larsen's Manufacturing Company.
 - 3. Modern Metal Products; Division of Technico Inc.
 - 4. Potter Roemer LLC.
 - 5. Watrous Division, American Specialties, Inc.
- B. Cabinet Type: Suitable for minimum 10 lb. ABC fire extinguisher. Flat shelf bottom without interior hanger.

- C. Cabinet Construction: Rating to match wall where installed.
 - 1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.0428 inch thick, cold-rolled steel sheet lined with minimum 5/8 inch thick, fire-barrier material. Provide factory-drilled mounting holes.
- D. Cabinet Material: Stainless steel sheet, unless steel sheet required for rated cabinet construction.
- E. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated.
 - 1. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend) of 1/4 to 5/16 inch.
- F. Cabinet Trim Material: Stainless steel sheet.
- G. Door Material: Stainless steel sheet.
- H. Door Style: Vertical duo panel with frame.
- I. Door Glazing: Tempered float glass.
- J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - 1. Provide projecting lever handle with cam-action latch or recessed door pull and friction latch.
 - 2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

K. Accessories:

- 1. Mounting Brackets: Manufacturer=s standard steel, designed to secure extinguisher to fire-protection cabinet, of sizes required for types and capacities of extinguishers indicated, with plated or baked enamel finish.
- Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
- 3. Identification: Lettering complying with authorities having jurisdiction for letter style, color, size, spacing, and location. Locate as indicated by Architect.
 - a. Identify fire extinguisher in cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet door.
 - 2) Application Process: Decals.
 - 3) Lettering Color: Red.
 - 4) Orientation: Vertical.
 - b. Identify bracket-mounted extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to wall surface.

L. Finishes:

- Stainless Steel: No. 2B finish.
- 2. Steel: Baked enamel or powder coat.

2.4 MOUNTING BRACKETS

A. Manufacturers:

1. Ansul Incorporated.

- 2. Badger Fire Protection.
- 3. General Fire Extinguisher Corporation.
- 4. JL Industries, Inc.
- 5. Larsen's Manufacturing Company.
- 6. Potter Roemer; Div. of Smith Industries, Inc.

2.5 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer=s standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 - 1. Weld joints and grind smooth.
 - 2. Construct fire-rated cabinets with double walls fabricated from 0.0428 inch thick, cold-rolled steel sheet lined with minimum 5/8 inch thick, fire-barrier material.
 - a. Provide factory-drilled mounting holes.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
 - 1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
 - 2. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.6 FINISHES, GENERAL

- A. Comply with NAAMM "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire-protection cabinets after assembly.
- D. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.

2.7 STAINLESS STEEL FINISHES

- A. General: Remove tool and die marks and stretch lines or blend into finish.
 - 1. Grind and polish surfaces to produce uniform, directionally textured polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- B. Bright, Cold-Rolled Unpolished Finish: No. 2B finish.
- C. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.8 STEEL FINISHES

A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1 "White Metal Blast Cleaning." After cleaning, apply a conversion coating suited to the organic coating to be applied over it.

B. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2.0 mils.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets are to be installed.
- B. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged units.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for recessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. Install fire-protection specialties in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- B. Fire-Protection Cabinets: Fasten fire-protection cabinets to structure, square and plumb.
 - Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semirecessed fireprotection cabinets.
 - 2. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
- C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.
- D. Identification: Apply decals at locations indicated.

3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire-protection specialties are installed, unless otherwise indicated in manufacturer=s written installation instructions.
- B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet manufacturer.
- E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 10

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SECTION 22 00 00 - PLUMBING GENERAL

PART 1 - GENERAL

1.1 The work covered by this division consists of providing all labor, equipment, and materials and performing all operations necessary for the installation of the plumbing work as herein called for and shown on the drawings.

1.2 Related Documents:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- B. This is a Basic Requirements Section. Provisions of this section apply to work of all Division 22 sections.
- C. Review all other contract documents to be aware of conditions affecting work herein.
- D. Definitions:
 - 1. Provide: Furnish and install, complete and ready for intended use.
 - 2. Furnish: Supply and deliver to project site, ready for subsequent requirements.
 - 3. Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar requirements.
- 1.3 <u>Permits and Fees</u>: Contractor shall obtain all necessary permits, meters, and inspections required for his work and pay all fees and charges incidental thereto.
- 1.4 <u>Verification of Owner's Data</u>: Prior to commencing any work the Contractor shall satisfy himself as to the accuracy of all data as indicated in these plans and specifications and/or as provided by the Owner. Should the Contractor discover any inaccuracies, errors, or omissions in the data, he shall immediately notify the Architect/Engineer in order that proper adjustments can be anticipated and ordered. Commencement by the Contractor of any work shall be held as an acceptance of the data by him after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions, or inaccuracies of the said data.
- 1.5 <u>Delivery and Storage of Materials</u>: Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. All material shall be stored to provide protection from the weather and accidental damage.
- 1.6 Extent of work is indicated by the drawings, schedules, and the requirements of the specifications. Singular references shall not be construed as requiring only one device if multiple devices are shown on the drawings or are required for proper system operation.
- 1.7 Field Measurements and Coordination:
 - A. The intent of the drawings and specifications is to obtain a complete and satisfactory installation. Separate divisional drawings and specifications shall not relieve the Contractor or subcontractors from full compliance of work of his trade indicated on any of the drawings or in any section of the specifications.
 - B. Verify all field dimensions and locations of equipment to ensure close, neat fit with other trades' work. Make use of all contract documents and approved shop drawings to verify exact dimension and locations.
 - C. Coordinate work in this division with all other trades in proper sequence to ensure that the total work is completed within contract time schedule and with a minimum cutting and patching.

D. Locate all apparatus symmetrical with architectural elements. Install to exact height and locations when shown on architectural drawings. When locations are shown only on plumbing drawings, be guided by architectural details and conditions existing at job and correlate this work with that of others.

- E. Install work as required to fit structure, avoid obstructions, and retain clearance, headroom, openings, and passageways. <u>Cut no structural members without written approval</u>.
- F. Carefully examine any existing conditions, piping, and premises. Compare drawings with existing conditions. Report any observed discrepancies. It shall be the Contractor's responsibility to properly coordinate the work and to identify problems in a timely manner. Written instructions will be issued to resolve discrepancies.
- G. Because of the small scale of the drawings, it is not possible to indicate all offsets and fittings or to locate every accessory. Drawings are essentially diagrammatic. Study carefully the sizes and locations of structural members, wall and partition locations, trusses, and room dimensions and take actual measurements on the job. Locate piping, equipment and accessories with sufficient space for installing and servicing. Contractor is responsible for accuracy of his measurements and for coordination with all trades. Contractor shall not order materials or perform work without such verification. No extra compensation will be allowed because field measurements vary from the dimensions on the drawings. If field measurements show that equipment or piping cannot be fitted, the Architect/Engineer shall be consulted. Remove and relocate, without additional compensation, any item that is installed and is later found to encroach on space assigned to another use.

1.8 Guarantee:

- A. The Contractor shall guarantee labor, materials, and equipment for a period of one (1) year from Substantial Completion, or from Owner's occupancy, whichever is earlier. Contractor shall make good any defects and shall include all necessary adjustments to and replacement of defective items without expense to the Owner.
- B. Owner reserves right to make emergency repairs as required to keep equipment in operation without voiding Contractor's Guarantee Bond nor relieving Contractor of his responsibilities during guarantee period.

1.9 Approval Submittals:

- A. When approved, the submittal control log and submittals shall be an addition to the specifications herewith, and shall be of equal force in that no deviation will be permitted except with the approval of the Architect/Engineer.
 - Shop drawings, product literature, and other approval submittals will only be reviewed if they are submitted in full accordance with the General and Supplementary Conditions and Division 1 Specification sections <u>and</u> the following.
 - a. Submittals shall be properly organized in accordance with the approved submittal control log.
 - b. Submittals shall not include items from more than one specification section in the same submittal package unless approved in the submittal control log.
 - c. Submittals shall be properly identified by a cover sheet showing the project name, Architect and Engineer names, submittal control number, specification section, a list of products or item names with model numbers in the order they appear in the package, and spaces for approval stamps. A sample cover sheet is included at the end of this section.

d. Submittals shall have been reviewed and approved by the General Contractor (or Prime Contractor). Evidence of this review and approval shall be an "Approved" stamp with a signature and date on the cover sheet.

- e. Submittals that include a series of fixtures or devices (such as plumbing fixtures or valves) shall be organized by the fixture number or valve type and be marked accordingly. Each fixture must include <u>all</u> items associated with that fixture regardless of whether or not those items are used on other fixtures.
- f. The electrical design shown on the drawings supports the plumbing equipment basis of design specifications at the time of design. If plumbing equipment is submitted with different electrical requirements, it is the responsibility of the plumbing contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the plumbing submittal with a written statement that this change will be provided at no additional cost. Plumbing submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.
- B. If the shop drawings show variation from the requirements of contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variation in writing in his letter of transmittal and on the submittal cover sheet in order that, if acceptable, Contractor will not be relieved of the responsibility for executing the work in accordance with the contract.
- C. Review of shop drawings, product literature, catalog data, or schedules shall not relieve the Contractor from responsibility for deviations from contract drawings or specifications, unless he has in writing called to the attention of the Architect/Engineer each such deviation in writing at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings, product literature, catalog data, or schedules. Any feature or function specified but not mentioned in the submittal shall be assumed to be included per the specification.
- D. Submit shop drawings as called for in other sections after award of the contract and before any material is ordered or fabricated. Shop drawings shall consist of plans, sections, elevations, and details to scale (not smaller than 1/4" per foot), with dimensions clearly showing the installation. Direct copies of small scale project drawings issued to the Contractor are not acceptable. Drawings shall take into account equipment furnished under other sections and shall show space allotted for it. Include construction details and materials.
- 1.10 <u>Test Reports and Verification Submittals</u>: Submit test reports, certifications, and verification letters as called for in other sections. Contractor shall coordinate the required testing and documentation of system performance such that sufficient time exists to prepare the reports, submit the reports, review the reports, and take corrective action within the scheduled contract time.
- 1.11 O&M Data Submittals: Submit Operation and Maintenance data as called for in other sections. When a copy of approval submittals is included in the O&M Manual, only the final "Approved" or "Approved as Noted" copy shall be used. Contractor shall organize these data in the O&M Manuals tabbed by specification number. Prepare O&M Manuals as required by Division 1 and as described herein. Submit manuals at the Substantial Completion inspection.

PART 2 - PRODUCTS

2.1 All materials shall be new or Owner-supplied reused as shown on the drawings, the best of their respective kinds, suitable for the conditions and duties imposed on them at the building and shall be of reputable manufacturers. The description, characteristics, and requirements of materials to be used shall be in accordance with qualifying conditions established in the following sections.

2.2 Equipment and Materials:

- A. All equipment and materials shall be new and the most suitable grade for the purpose intended. Equipment furnished under this division shall be the product of a manufacturer regularly engaged in the manufacture of such items for a period of three years. Where practical, all of the components shall be products of a single manufacturer in order to provide proper coordination and responsibility. Where required, Contractor shall furnish proof of installation of similar units or equipment.
- B. Each item of equipment shall bear a name plate showing the manufacturer's name, trade name, model number, serial number, ratings, and other information necessary to fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated, or painted.
- C. The label of the approving agency, such as UL or FM, by which a standard has been established for the particular item shall be in full view.
- D. The equipment shall be essentially the standard product of a manufacturer regularly engaged in the production of such equipment and shall be a product of the manufacturer's latest design.
- E. A service organization with personnel and spare parts shall be available within two hours for each type of equipment furnished.
- F. Install in accordance with manufacturer's recommendations. Place in service by a factory trained representative where required.
- G. Materials and equipment are specified herein by a single or by multiple manufacturers to indicate quality, material, and type of construction desired. Manufacturer's products shown on the drawings have been used as basis for design; it shall be the Contractor's responsibility to ascertain that alternate manufacturer's products, or the particular products of named manufacturers, meet the detailed specifications and that size and arrangement of equipment are suitable for installation.
- H. Model Numbers: Catalog numbers and model numbers indicated in the drawings and specifications are used as a guide in the selection of the equipment and are only listed for the contractor's convenience. The contractor shall determine the actual model numbers for ordering materials in accordance with the written description of each item and with the intent of the drawings and specifications.

2.3 Requests for Substitution:

- A. Where a particular system, product, or material is specified by name, consider it as standard basis for bidding, and base proposal on the particular system, product, or material specified.
- B. Requests by Contractor for substitution will be considered only when reasonable, timely, fully documented, and qualifying under one or more of the following circumstances.
 - 1. Required product cannot be supplied in time for compliance with Contract time requirements.
 - 2. Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by Contractor.

- Substantial cost advantage is offered Owner after deducting offsetting disadvantages including delays, additional compensation for redesign, investigation, evaluation and other necessary services, and similar considerations.
- C. All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design and the product proposed for substitution. Differences shall include but shall not be limited to data as follows for both the specified and substituted products:
 - 1. Principal of operation.
 - 2. Materials of construction or finishes.
 - 3. Thickness of gauge of materials.
 - 4. Weight of item.
 - 5. Deleted features or items.
 - 6. Added features or items.
 - 7. Changes in other work caused by the substitution.
 - 8. Performance curves.
 - 9. If the approved substitution contains differences or omissions not specifically called to the attention of the Architect/Engineer, the Owner reserves the right to require equal or similar features to be added to the substituted products (or to have the substituted products replaced) at the Contractor's expense.

PART 3 - EXECUTION

- 3.1 <u>Workmanship</u>: All materials and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any materials installed which do not present an orderly and reasonably neat and/or workmanlike appearance, or do not allow adequate space for maintenance, shall be removed and replaced when so directed by the Architect/Engineer.
- 3.2 <u>Coordination</u>:
 - A. The Contractor shall be responsible for full coordination of the plumbing systems with shop drawings of the building construction so the proper openings and sleeves or supports are provided for piping or other equipment passing through slabs or walls.
 - B. Any additional steel supports required for the installation of any plumbing equipment or piping shall be furnished and installed under the section of the specifications requiring the additional supports.
 - C. It shall be the Contractor's responsibility to see that all equipment such as valves, filters, and such other apparatus or equipment that may require maintenance and operation are made easily accessible, regardless of the diagrammatic location shown on the drawings.
 - D. All connections to fixtures and equipment shown on the drawings shall be considered diagrammatic unless otherwise indicated by detail. The actual connections shall be made to fully suit the requirements of each case and adequately provide for expansion and servicing.
 - E. The contractor shall protect equipment, material, and fixtures at all times. He shall replace all equipment, material, and fixtures which are damaged as a result of inadequate protection.
 - F. Prior to starting and during progress of work, examine work and materials installed by others as they apply to work in this division. Report conditions which will prevent satisfactory installation.

- G. Start of work will be construed as acceptance of suitability of work of others.
- 3.3 <u>Interruption of Service</u>: Before any equipment is shut down for disconnecting or tieins, arrangements shall be made with the Architect/Engineer and this work shall be
 done at the time best suited to the Owner. This will typically be on weekends and/or
 holidays and/or after normal working hours. Services shall be restored the same day
 unless prior arrangements are made. All overtime or premium costs associated with
 this work shall be included in the base bid.
- 3.4 <u>Phasing</u>: Provide all required temporary valves, piping, equipment, and devices as required. Maintain temporary services to areas as required. Remove all temporary material and equipment on completion of work unless Engineer concurs that such material and equipment would be beneficial to the Owner on a permanent basis.
- 3.5 <u>Cutting and Patching</u>: Notify General Contractor to do all cutting and patching of all holes, chases, sleeves, and other openings required for installation of equipment furnished and installed under this section. Utilize experienced trades for cutting and patching. Obtain permission from Architect/Engineer before cutting any structural items.
- 3.6 <u>Equipment Setting</u>: Bolt equipment directly to concrete pads or vibration isolators as required, using hot-dipped galvanized anchor bolts, nuts, and washers. Level equipment.
- 3.7 <u>Painting</u>: Touch-up factory finishes on equipment located inside and outside shall be done under Division 22. Obtain matched color coatings from the manufacturer and apply as directed. If corrosion is found during inspection on the surface of any equipment, clean, prime, and paint, as required.
- 3.8 <u>Clean-up</u>: Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials and remove all oil and grease spots. Repaint or touch up as required to look like new. During progress of work, contractor is to carefully clean up and leave premises and all portions of building free from debris and in a clean and safe condition.
- 3.9 <u>Start-up and Operational Test</u>: Start each item of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specification, start-up shall be done by a qualified representative of the manufacturer. Alignment, lubrication, safety, and operating control shall be included in start-up check.
- 3.10 Record Drawings:
 - A. During the progress of the work the Contractor shall record on their field set of drawings the exact location, as installed, of all piping, equipment, and other systems which are not installed exactly as shown on the contract drawings.
 - B. Upon completion of the work, record drawings shall be prepared as described in the General Conditions, Supplementary Conditions, and Division 1 sections.

3.11 <u>Acceptance</u>:

- A. Punch List: Submit written confirmation that all punch lists have been checked and the required work completed.
- B. Instructions: At completion of the work, provide a competent and experienced person who is thoroughly familiar with project, for one day to instruct permanent operating personnel in operation of equipment and control systems. This is in addition to any specific equipment operation and maintenance training.
- C. Operation and Maintenance Manuals: Furnish complete manual Table of Contents, organized, and tabbed by specification section. Manuals shall contain:
 - 1. Detailed operating instructions and instructions for making minor adjustments.

- 2. Complete wiring and control diagrams.
- 3. Routine maintenance operations.
- 4. Manufacturer's catalog data, service instructions, and parts lists for each piece of operating equipment.
- 5. Copies of approved submittals.
- 6. Copies of all manufacturer's warranties.
- 7. Copies of test reports and verification submittals.
- D. Record Drawings: Submit record drawings.
- E. Acceptance will be made on the basis of tests and inspections of job. Contractor shall furnish necessary mechanics to operate system, make any necessary adjustments and assist with final inspection.

PROJECT NAME PROJECT NUMBER

ARCHITECT: Company Name

ENGINEER: Mitchell Gulledge Engineering

CONTRACTOR: Contractor Name

SUBCONTRACTOR: Sub Name

SUPPLIER: Supply Company

MANUFACTURER: Manufacturer

DATE: mm/dd/yyyy

SECTION: 22 XX XX/Section Name

1. Product 1: Manufacturer, Model

2. Product 2: Manufacturer, Model

3. Product 3: Manufacturer, Model

4. Product 4: Manufacturer, Model

5. Product 5: Manufacturer, Model

Include GC or CM Approval stamp indicating review and acceptance by responsible contractor.

END OF SECTION 22 00 00

SAMPLE

Any standard heading is acceptable.

List each product individually. Include manufacturer name and model.

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22 00 00 - 8 PLUMBING GENERAL

SECTION 22 05 01 - PLUMBING CODES AND STANDARDS

PART 1 - GENERAL

1.1 The work covered by this division consists of providing all labor, equipment, and materials and performing all operations necessary for the installation of the plumbing work as herein called for and shown on the drawings.

1.2 This is a Basic Plumbing Requirements section. Provisions of this section apply to work of all Division-22 sections.

PART 2 - CODES

- 2.1 All work under Division 22 shall be constructed in accordance with the codes listed herein. The design has been based on the requirements of these codes; and while it is not the responsibility of the Contractor to verify that all work called for complies with these codes, he shall be responsible for calling to the Architect/Engineer's attention any drawings or specifications that are not in conformance with these or other codes prior to ordering equipment or installing work.
- 2.2 Comply with regulations and codes of utility suppliers.
- 2.3 Where no specific method or form of construction is called for in the contract documents, the Contractor shall comply with code requirements when carrying out such work.
- 2.4 Where code conflict exists, generally the most restrictive requirement applies. Comply with current code edition, unless noted.
- 2.5 Additional codes or standards applying to a specific part of the work may be included in that section.
- 2.6 The following codes and standards shall govern all work:
 - A. Florida Building Code Seventh Edition (2020)
 - B. Florida Building Code Seventh Edition (2020) Existing Building
 - C. Florida Building Code Seventh Edition (2020) Energy Conservation
 - D. Florida Building Code Seventh Edition (2020) Mechanical
 - E. Florida Building Code Seventh Edition (2020) Plumbing
 - F. Florida Building Code Seventh Edition (2020) Accessibility
 - G. Florida Fire Prevention Code Seventh Edition
 - 1. Fire Code (NFPA 1 2018 Edition)
 - 2. Life Safety Code (NFPA 101 2018 Edition)
 - H. National Electric Code (NFPA 70 2017).

PART 3 - STANDARDS

All materials, installation, and systems shall meet the requirements of the following standards, including the latest addenda and amendments, to the extent referenced:

- 3.1 Underwriters' Laboratories (UL)
- 3.2 American National Standards Institution (ANSI)
- 3.3 American Society of Testing Materials (ASTM)
- 3.4 Air Conditioning and Refrigeration Institute (ARI)
- 3.5 National Fire Protection Association (NFPA)
- 3.6 National Electrical Manufacturers Association (NEMA)
- 3.7 Standards of the Hydronic Institute (IBR)

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SECTION 22 05 02 - PLUMBING RELATED WORK

PART 1 - DIVISION 01 - GENERAL REQUIREMENTS

- 1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This is a Basic Plumbing Requirements section. Provisions of this section apply to work of all Division-22 sections.
- 1.3 Coordinate with the General Contractor for all cutting and patching. Contractors performing Division-22 work shall inform the General Contractor of all cutting and patching required prior to bidding and shall coordinate installation.

PART 2 - DIVISION 03 - CONCRETE

- 2.1 Refer to Division 03, Concrete for:
 - A. Rough grouting in and around plumbing work.
 - B. Patching concrete cut to accommodate plumbing work.
- 2.2 <u>The following is part of Division-22 work</u>, complying with the requirements of Division 03:
 - A. Curbs, foundations, and pads for plumbing equipment.
 - B. Basins, sumps, and vaults of plumbing work.
 - C. Underground structural concrete to accommodate plumbing work.
 - D. Inertia bases.

PART 3 - DIVISION 04 - MASONRY

- 3.1 Refer to Division 04, Masonry for:
 - A. Installation of access doors in walls.

PART 4 - DIVISION 05 - METALS

- 4.1 <u>Refer to Division 05, Metals for:</u>
 - A. Framing openings for plumbing equipment.
- 4.2 The following is part of Division-22 work:
 - A. Supports for plumbing work.

PART 5 - DIVISION 06 - WOOD AND PLASTIC

- 5.1 Refer to Division 6, Wood for:
 - A. Framing openings for plumbing equipment.

PART 6 - DIVISION 07 - THERMAL AND MOISTURE PROTECTION

- 6.1 Refer to Division 07, Thermal and Moisture Protection for:
 - A. Installation of all roof curbs and roof supports for plumbing work.
 - B. Caulking and waterproofing of all wall and roof mounted plumbing work.
 - C. Providing all roof curbs and all vent flashing for metal roofs.
- 6.2 <u>The following is part of Division-22 work</u>, complying with the requirements of Division 07:
 - A. Fire barrier penetration seals.

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PART 7 - DIVISION 09 - FINISHES

7.1 Refer to Division 09, Finishes for:

- A. Painting exposed piping and equipment.
- B. Painting structural metal and concrete for plumbing work.
- C. Painting access panels.
- D. Painting color-coded plumbing work indicated for continuous painting. See color schedule in Division-22 section, "Plumbing Identification".
- E. Installation of access doors in gypsum drywall.
- 7.2 Colors shall be selected by the Architect for all painting of exposed plumbing work in occupied spaces, unless specified herein. Do not paint insulated or jacketed surfaces.
- 7.3 Perform the following as part of Division-22 work:
 - A. Touch up painting of factory finishes.
 - B. Painting of all hangers.

PART 8 - DIVISION 26 - ELECTRICAL

- 8.1 Plumbing contractor shall coordinate the exact electrical requirements of all plumbing equipment being provided with the electrical contractor. Where approval submittals are required, this coordination shall be accomplished prior to making the submittals. The electrical design shown on the drawings supports the plumbing equipment basis of design. If plumbing equipment is submitted with different electrical requirements, it is the responsibility of the plumbing contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the plumbing submittal with a written statement that this design will be provided at no additional cost. Plumbing submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.
- 8.2 Electrical contractor shall provide disconnect switches, starters, and contactors for plumbing equipment unless specifically noted as being furnished as part of plumbing equipment.
- 8.3 Electrical contractor shall provide all power wiring, raceway and devices, and make final electrical connections to all plumbing equipment, switches, starters, contactors, controllers, and similar equipment.

PART 9 - DIVISION 33 - SITE WORK

- 9.1 Specific requirements for excavation and backfill for underground piping are contained in Section 22 05 10.
- 9.2 The following work is part of Division 22:
 - A. All site water piping.
 - B. All site sewer piping.

SECTION 22 05 19 - PLUMBING METERS AND GAUGES

PART 1 - GENERAL

1.1 Related Documents:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this Section.

1.2 Description of Work:

- A. Extent of meters and gauges required by this Section is indicated on drawings and/or specified in other Division 22 sections. Types of meters and gauges specified in this Section include the following:
 - 1. Glass Thermometers.

1.3 Quality Assurance:

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of meters and gauges, of types and sizes required, whose products have been in satisfactory use in similar service for not less than five years.
- B. Comply with ANSI and Instrument Society of America (ISA) standards pertaining to construction and installation of meters and gauges.

1.4 Submittals:

A. Product Data: Submit manufacturer's technical product data, including installation instructions for each type of meter and gauge. Include scale range, ratings, and calibrated performance curves, certified where indicated. Submit meter and gauge schedule showing manufacturer's figure number, scale range, location, and accessories for each meter and gauge.

PART 2 - PRODUCTS

2.1 Thermometers:

- A. Glass Thermometers: Provide a die cast aluminum case finished in baked epoxy enamel, with glass front, spring secured, and nine inches long. The adjustable joint shall also be die cast aluminum with 180° adjustment in vertical plane, 360° adjustment in horizontal plane, with locking device. Provide a mercury filled tube and capillary with magnifying lens and 1% scale range accuracy. Scale shall be satin faced, nonreflective aluminum, with permanently etched markings. Stem shall be copperplated steel or brass, for separable socket. Ranges shall be as follows:
 - 1. Domestic Hot Water System: 30°F-240°F with 2°F scale divisions.

PART 3 - EXECUTION

3.1 <u>Inspection</u>:

A. Examine areas and conditions under which meters and gauges are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to the Installer.

3.2 Installation:

- A. Install all meters and gauges in accessible locations, positioned so as to be easily read by an observer standing on the floor.
- B. Install pressure gauge cocks in piping tees with snubber.

3.3 Adjusting and Cleaning:

- A. Adjust faces of meters and gauges to proper angle for best visibility.
- B. Clean windows of meters and gauges and factory-finished surfaces. Replace cracked or broken windows, repair any scratched or marred surfaces with manufacturer's touch-up paint.

SECTION 22 05 23 - PLUMBING VALVES

PART 1 - GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to the work of this section.
- 1.2 This section is a Division-22 Basic Materials and Methods section, and is part of each Division-22 section making reference to or requiring valves specified herein.
- 1.3 Extent of valves required by this section is indicated on drawings and/or specified in other Division-22 sections.
- 1.4 Quality Assurance:
 - A. Valve Dimensions: For face-to-face and end-to-end dimensions of flanged or weldingend valve bodies, comply with ANSI B16.10.
 - B. Valve Types: Provide valves of same type by same manufacturer.
- Approval Submittals: When required by other Division-22 sections, submit product data, catalog cuts, specifications, and dimensioned drawings for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valves with Division-22 section using the valves, not as a separate submittal. For each valve, identify systems where the valve is intended for use.
 - A. Check Valves: Type CK.
 - B. Ball Valves: Type BA.

PART 2 - PRODUCTS

- 2.1 <u>General</u>: Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by Installer to comply with specifications and installation requirements. Provide sizes as indicated, and connections which properly mate with pipe, tube, and equipment connections.
- 2.2 <u>Acceptable Manufacturers</u>: Subject to compliance with requirements, provide valves of one of the producers listed for each valve type. The model numbers are listed for contractor's convenience only. In the case of a model number discrepancy, the written description shall govern.
- 2.3 Check Valves:
 - A. Construction: Construct valves of castings free of any impregnating materials. Construct valves with a bronze regrinding disc with a seating angle of 40° to 45°, unless a composition disc is specified. Provide stop plug as renewable stop for disc hanger, unless otherwise specified. Disc and hanger shall be separate parts with disc free to rotate. Support hanger pins on both ends by removable side plugs.
 - B. Comply with the following standards:
 - 1. Cast Iron Valves: MSS SP-71. Cast Iron Swing Check Valves, Flanged and Threaded Ends.
 - 2. Bronze Valves: MSS SP-80. Bronze Gate, Globe, Angle and Check Valves.
 - 3. Steel Valves: ANSI B16.34. Steel Standard Class Valve Ratings.
 - C. Types of check (CK) valves:
 - Threaded Ends 2" and Smaller (CK1): Class 125, bronze body, screwed cap, horizontal swing, bronze disc. Stockham B-319. Nibco T-413-BY. Crane 1707. Milwaukee 509.

2. Soldered Ends 2" and Smaller (CK2): Class 125, bronze body, screwed cap, horizontal swing, bronze disc. Stockham B-309. Nibco S-413-B. Crane 1707S. Milwaukee 1509.

- 3. Flanged Ends 2-1/2" and Larger (CK3): Class 125, iron body, bronze-mounted, bolted cap, horizontal swing, cast-iron or composition disc. Stockham G-931 or G-932 as applicable. Nibco F918-B. Crane 373. Milwaukee F2974 as applicable.
- 4. Threaded Ends 2" and Smaller (CK4): 200 WWP, bronze body, screwed cap, horizontal swing, regrinding type bronze disc, for fire sprinkler use. Nibco KT-403-W.
- 5. Flanged Ends 2-1/2" and Larger (CK5): 175 WWP, iron body, bolted cap, bronze mounted, composition disc, UL listed, with ball drip if required. Stockham G-940. Nibco F-908-W.
- 6. Threaded Ends 2" and Smaller (CK6): Class 200, bronze body, screwed cap, Y-pattern swing, regrinding bronze disc. Stockham B-345. Nibco T-453-B. Crane 36. Milwaukee 518/508.
- 7. Flanged Ends 2-1/2" and Larger (CK7): Class 250, iron body, bronze mounted, bolted cap, cast-iron disc. Stockham F-947. Nibco F-968-B. Crane 39E. Milwaukee F2970.
- 8. Threaded Ends 2" and Smaller (CK8): Class 300, bronze body, screwed cap, Y-pattern swing, regrinding bronze disc. Stockham B-375. Nibco T-473-B. Crane 76E. Milwaukee 517/507.
- Flanged Ends 2-1/2" and Larger (CK9): Class 300, cast steel body, bolted cap, horizontal swing, seal welded seat rings, chromium stainless disc. Stockham 30-SF. Crane 159.

2.4 Ball Valves:

- A. General: Select with port area equal to or greater than connecting pipe area, include seat ring designed to hold sealing material.
- B. Construction: Ball valves shall be rated for 600 psi non-shock cold water. Pressure containing parts shall be constructed of ASTM B-584 alloy 844, or ASTM B-124 alloy 377. Valves shall be furnished with blow-out proof bottom loaded stem constructed of ASTM B-371 alloy 694 or other approved low zinc material. Provide TFE packing, TFE thrust washer, chrome-plated ball and reinforced teflon seats. Valves 1" and smaller shall be full port design. Valves 1-1/4" and larger shall be conventional port design. Stem extensions shall be furnished for use in insulated piping where insulation exceeds 1/2" thickness.
- C. Comply with the following standards:
 - 1. MSS SP-72. Ball Valves with Flanged or Butt Welding Ends for General Service.
 - 2. MSS SP-110. Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

D. Types of ball (BA) valves:

- 1. Threaded Ends 2" and Smaller (BA1): Bronze two-piece full port body with adjustable stem packing. Nibco T-585-70. Stockham S216-BR-R-T. Milwaukee UPBA100. Apollo 77-100.
- 2. Soldered Ends 2" and Smaller (BA2): Bronze three-piece full port body with adjustable stem packing. Nibco S-595-Y-66. Milwaukee UPBA350S. Apollo 82-200.

3. Threaded Ends 1" and Smaller (BA3): Bronze two-piece full port body, UL listed (UL 842) for use with flammable liquids and LP gas. Nibco T-585-70-UL, Milwaukee UPBA10.

4. Flanged Ends 2-1/2" and Larger (BA7): Class 150, carbon steel full bore two-piece body with adjustable stem packing. Nibco F515-CS series. Apollo 88-240.

2.5 Valve Features:

- A. General: Provide valves with features indicated and, where not otherwise indicated, provide proper valve features as determined by Installer for installation requirements. Comply with ANSI B31.1.
- B. Valve features specified or required shall comply with the following:
 - 1. Flanged: Provide valve flanges complying with ANSI B16.1 (cast iron), ANSI B16.5 (steel), or ANSI B16.24 (bronze).
 - 2. Threaded: Provide valve ends complying with ANSI B2.1.
 - 3. Solder-Joint: Provide valve ends complying with ANSI B16.18.
 - 4. Trim: Fabricate pressure-containing components of valve, including stems (shafts) and seats from brass or bronze materials, of standard alloy recognized in valve manufacturing industry unless otherwise specified.
 - 5. Non-Metallic Disc: Provide non-metallic material selected for service indicated in accordance with manufacturer's published literature.
 - 6. Renewable Seat: Design seat of valve with removable disc, and assemble valve so disc can be replaced when worn.
 - 7. Extended Stem: Increase stem length by 2" minimum, to accommodate insulation applied over valve.

PART 3 - EXECUTION

3.1 Installation:

- A. General: Install valves where required for proper operation of piping and equipment, including valves in branch lines to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward below horizontal plane.
- B. Insulation: Where insulation is indicated, install extended-stem valves, arranged in proper manner to receive insulation.
- C. Applications Subject to Corrosion: Do not install bronze valves and valve components in direct contact with steel, unless bronze and steel are separated by dielectric insulator.
- D. Mechanical Actuators: Install mechanical actuators as recommended by valve manufacturer.
- 3.2 <u>Selection of Valve Ends (Pipe Connections)</u>: Except as otherwise indicated, select and install valves with the following ends or types of pipe/tube connections:
 - A. Tube Size 2" and Smaller: Threaded valves. Soldered-joint valves may also be used.
 - B. Pipe Size 2" and Smaller: Threaded valves.
 - C. Pipe Size 2-1/2" and Larger: Flanged valves.
- 3.3 <u>Non-Metallic Disc</u>: Limit selection and installation of valves with non-metallic disc to locations indicated and where foreign material in piping system can be expected to prevent tight shutoff of metal seated valves.

3.4 <u>Renewable Seats</u>: Select and install valves with renewable seats, except where otherwise indicated.

3.5 <u>Installation of Check Valves</u>: Install in horizontal position with hinge pin horizontally perpendicular to center line of pipe. Install for proper direction flow.

SECTION 22 05 29 - PLUMBING SUPPORTS ANCHORS AND SEALS

PART 1 - GENERAL

- 1.1 Drawings and general provisions of Contract, including General Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This section is a Division-22 Basic Materials and Methods section, and is a part of each Division-22 section making reference to or requiring supports, anchors, and seals specified herein.
- 1.3 Extent of supports, anchors, and seals required by this section is indicated on drawings and/or specified in other Division-22 sections.
- 1.4 <u>Code Compliance</u>: Comply with applicable codes pertaining to product materials and installation of supports, anchors, and seals.
- 1.5 <u>MSS Standard Compliance</u>:
 - A. Provide pipe hangers and supports of which materials, design, and manufacture comply with ANSI/MSS SP-58.
 - B. Select and apply pipe hangers and supports, complying with MSS SP-69.
 - C. Fabricate and install pipe hangers and supports, complying with MSS SP-89.
 - D. Terminology used in this section is defined in MSS SP-90.
- 1.6 <u>UL Compliance</u>: Provide products which are Underwriters Laboratories listed.

PART 2 - PRODUCTS

- 2.1 <u>Acceptable Manufacturers</u>: Subject to compliance with requirements, provide supports and hangers by Grinnel, Michigan Hanger Company, B-Line Systems, or approved equal.
- 2.2 <u>Horizontal-Piping Hangers and Supports</u>: Except as otherwise indicated, provide factory-fabricated horizontal-piping hangers and supports complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.
 - A. Adjustable Steel Clevises: MSS Type 1.
 - B. Steel Double Bolt Pipe Clamps: MSS Type 3.
 - C. Adjustable Steel Band Hangers: MSS Type 7.
 - D. Steel Pipe Clamps: MSS Type 4.
 - E. Pipe Stanchion Saddles: MSS Type 37, including steel pipe base support and castiron floor flange.
 - F. Single Pipe Rolls: MSS Type 41.
 - G. Adjustable Roller Hanger: MSS Type 43.
 - H. Pipe Roll Stands: MSS Type 44 or Type 47.
- Vertical-Piping Clamps: Except as otherwise indicated, provide factory-fabricated vertical-piping clamps complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.
 - A. Two-Bolt Riser Clamps: MSS Type 8.

- B. Four-Bolt Riser Clamps: MSS Type 42.
- 2.4 <u>Hanger-Rod Attachments</u>: Except as otherwise indicated, provide factory-fabricated hanger-rod attachments complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hanger-rod attachments to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.
 - A. Steel Turnbuckles: MSS Type 13.
 - B. Malleable Iron Sockets: MSS Type 16.
- 2.5 <u>Building Attachments</u>: Except as otherwise indicated, provide factory-fabricated building attachments complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods.
 - A. Center Beam Clamps: MSS Type 21.
 - B. C-Clamps: MSS Type 23.
 - C. Malleable Beam Clamps: MSS Type 30.
 - D. Side Beam Brackets: MSS Type 34.
 - E. Concrete Inserts: MSS Type 18.
- 2.6 <u>Saddles and Shields</u>: Except as otherwise indicated, provide saddles or shields under piping hangers and supports, factory-fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.
 - A. Protection Shields: MSS Type 40; of length recommended by manufacturer to prevent crushing of insulation.
 - B. Protection Saddles: MSS Type 39; use with rollers, fill interior voids with segments of insulation matching adjoining insulation.

2.7 Miscellaneous Materials:

- A. Metal Framing: Provide products complying with NEMA STD ML 1.
- B. Steel Plates, Shapes, and Bars: Provide products complying with ANSI/ASTM A 36.
- C. Cement Grout: Portland cement (ANSI/ASTM C 150, Type I or Type III) and clean uniformly graded, natural sand (ANSI/ASTM C 404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration.
- D. Heavy-Duty Steel Trapezes: Fabricate from steel shapes or continuous channel struts selected for loads required; weld steel in accordance with AWS standards.

PART 3 - EXECUTION

3.1 Preparation:

- A. Proceed with installation of hangers, supports, and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors, and other building structural attachments.
- B. Prior to installation of hangers, supports, anchors, and associated work, Installer shall meet at project site with Contractor, installer of each component of associated work, and installers of other work requiring coordination with work of this section for purpose

of reviewing material selections and procedures to be followed in performing the work in compliance with requirements specified.

3.2 <u>Installation of Building Attachments</u>:

A. In areas of work requiring attachments to existing concrete, use self-drilling rod inserts, Phillips Drill Co., "Red-Head" or equal.

3.3 Installation of Hangers and Supports:

A. General: Install hangers, supports, clamps, and attachments to support piping properly from building structure; comply with MSS SP-69. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacings complying with MSS SP-69 or as listed herein, whichever is most limiting. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.

Horizontal steel pipe and copper tube 1-1/2" diameter and smaller: support on 6 foot centers.

- 1. Horizontal steel pipe and copper tube over 1-1/2" diameter: support on 10-foot centers
- 2. Vertical steel pipe and copper tube: support at each floor.
- 3. Plastic pipe: support in accordance with manufacturer's recommendations.
- 4. Vertical cast iron pipe: support at each floor and at the base.
- B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- C. Paint all black steel hangers with black enamel. Galvanized steel and copper clad hangers do not require paint.
- D. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, or by other recognized industry methods.
- E. Provision for movement:
 - 1. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
 - 2. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
 - 3. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 are not exceeded.
- F. Insulated Piping: Comply with the following installation requirements.
 - 1. Shields: Where low-compressive-strength insulation or vapor barriers are indicated, install coated protective shields.
 - 2. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.
- G. Do not support plumbing piping from hangers used to support fire protection piping. Fire protection piping to be supported independently of other piping.
- 3.4 Installation of Anchors:

A. Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31, and to prevent transfer of loading and stresses to connected equipment.

- B. Fabricate and install anchors by welding steel shapes, plates and bars to piping and to structure. Comply with ANSI B31 and with AWS standards.
- C. Anchor Spacings: Where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and elbows. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.
- D. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions to limit movement of piping and forces to maximums recommended by manufacturer for each unit.

SECTION 22 05 53 - PLUMBING IDENTIFICATION

PART 1 - GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This section is a Division-22 Basic Plumbing Materials and Methods section, and is part of each Division-22 section making reference to or requiring identification devices specified herein.
- 1.3 Extent of plumbing identification work required by this section is indicated on drawings and/or specified in other Division-22 sections.
- 1.4 <u>Refer to Division-26</u> sections for identification requirements of electrical work; not work of this section. Refer to other Division-22 sections for identification requirements for controls; not work of this section.
- 1.5 <u>Codes and Standards</u>: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

PART 2 - PRODUCTS

2.1 <u>General</u>: Provide manufacturer's standard products of categories and types required for each application as referenced in other Division-22 sections. Where more than single type is specified for application, selection is Installer's option, but provide single selection for each product category.

2.2 Painted Identification Materials:

- A. Stencils: Standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendations of ANSI A13.1 for piping and similar applications, but not less than 3/4" high letters for access door signs and similar operational instructions.
- B. Stencil Paint: Standard exterior type stenciling enamel; black, except as otherwise indicated; either brushing grade or pressurized spray-can form and grade.
- C. Identification Paint: Standard identification enamel.

2.3 Plastic Pipe Markers:

- A. Pressure-Sensitive Type: Provide manufacturer's standard pre-printed, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers.
 - 1. Lettering: Manufacturer's standard pre-printed nomenclature which best describes piping system in each instance, as selected by Architect/Engineer in cases of variance with name as shown or specified.
 - 2. Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.

2.4 Valve Tags:

- A. Brass Valve Tags: Provide 19-gage polished brass valve tags with stamp-engraved piping system abbreviation in 1/4" high letters and sequenced valve numbers 1/2" high, and with 5/32" hole for fastener. Provide 1-1/2" diameter tags, except as otherwise indicated.
- B. Plastic Laminate Valve Tags: Provide manufacturer's standard 3/32" thick engraved plastic laminate valve tags, with piping system abbreviation in 1/4" high letters and sequenced valve numbers 1/2" high, and with 5/32" hole for fastener. Provide 1-1/2" square black tags with white lettering, except as otherwise indicated.

2.5 <u>Engraved Plastic-Laminate Signs</u>:

- A. General: Provide engraving stock melamine plastic laminate, in the sizes and thicknesses indicated, engraved with engraver's standard letter style a minimum of 3/4" tall and wording indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
- B. Thickness: 1/16" for units up to 20 sq. in. or 8" length; 1/8" for larger units.
- C. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.
- 2.6 <u>Stamped Nameplates</u>: Provide equipment manufacturer's standard stamped nameplates for motors, pumps, etc.

PART 3 - EXECUTION

- 3.1 <u>Coordination</u>: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.
- 3.2 Piping System Identification:
 - A. General: Install pipe markers of one of the following types on each system indicated to receive identification, and include arrows to show normal direction of flow:
 - 1. Plastic pipe markers.
 - 2. Stenciled markers, black or white for best contrast.
 - B. Locate pipe markers as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces, and exterior non-concealed locations.
 - 1. Near each valve and control device.
 - 2. Near each branch, excluding short take-offs for fixtures and equipment; mark each pipe at branch, where there could be question of flow pattern.
 - 3. Near locations where pipes pass through walls, floors, ceilings, or enter non-accessible enclosures.
 - 4. At access doors, manholes, and similar access points which permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.
 - 7. On piping above removable acoustical ceilings, except omit intermediately spaced markers.
- 3.3 <u>Valve Identification</u>: Provide coded valve tag on every valve, cock, and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience and lawn-watering hose bibs, and shut-off valves at plumbing fixtures, HVAC terminal devices and similar rough-in connections of end-use fixtures and units. Coordinate code with operating instructions.
- 3.4 <u>Plumbing Equipment Identification</u>: Install engraved plastic laminate sign on a vertical surface on or near each major item of plumbing equipment and each operational device. Label shall indicate type of system and area served. Provide signs for the following general categories of equipment and operational devices:

- A. Fuel-burning units including water heaters.
- B. Pumps and similar equipment.
- C. Tanks and pressure vessels.
- 3.5 <u>Stamped Nameplates</u>: Equipment manufacturers to provide standard stamped nameplates on all major equipment items such as motors, pumps, etc. Where motors are hidden from view (within equipment casing, or otherwise not easily accessible, etc.), the equipment supplier shall furnish a duplicate motor data nameplate to be affixed to the equipment casing in an easily visible location, unless data is already included on the equipment nameplate.
- 3.6 Adjusting and Cleaning:
 - A. Adjusting: Relocate any plumbing identification device which has become visually blocked by work of this division or other divisions.
 - B. Cleaning: Clean face of identification devices.

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SECTION 22 05 60 - PLUMBING ACCESS DOORS

PART 1 - GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This section is a Division-22 Basic Materials and Methods section, and is part of each Division-22 section making reference to or requiring access panels specified herein.
- 1.3 <u>Approval Submittals</u>:
 - A. Product Data: When required by other Division-22 sections, submit product data for access doors. Submit with Division-22 section using access doors, not as a separate submittal. Include rating data.
 - B. O&M Data Submittals: Submit a copy of approval submittal. Include this data in O&M Manuals.

PART 2 - PRODUCTS

- 2.1 <u>Acceptable Manufacturers</u>: Subject to compliance with requirements, provide access doors by Milcor, Jay R. Smith, Zurn, BOICO, Elmdor, or approved equal.
- 2.2 <u>General</u>: Where floors, walls, and ceilings must be penetrated for access to plumbing work, provide types of access doors indicated. Furnish sizes indicated or, where not otherwise indicated, furnish adequate size for intended and necessary access. Furnish manufacturer's complete units, of type recommended for application in indicated substrate construction, in each case, complete with anchorages and hardware.
- 2.3 <u>Access Door Construction</u>: Except as otherwise indicated, fabricate wall/ceiling door units of welded steel construction with welds ground smooth; 16-gauge frames and 14-gauge flush panel doors; 175° swing with concealed spring hinges; flush screw-driver-operated cam locks; factory-applied rust-inhibitive prime-coat paint finish.
- 2.4 <u>Locks</u>: Provide flat pass key type locks, individually keyed unless otherwise indicated, 2 keys.

PART 3 - EXECUTION

- 3.1 Access doors shall be installed to operate and service all plumbing equipment including valves, water hammer arrestors, trap primers, and other items requiring maintenance that are concealed above or behind finished construction. Access doors shall be installed in walls, chase, and floors as necessary, but are not required in accessible suspended ceiling systems. Access doors shall have factory applied protective phosphate coating and baked enamel primer suitable for field painting.
- 3.2 Access doors shall be installed by the Division installing the substrate construction. However, responsibility for furnishing and determining location of access doors is part of this Division's work. The style of access door shall be suitable for construction into which installed.
- 3.3 Access doors shall be sized and located as required to provide proper maintenance and service access in accordance with the manufacturer's recommendations and code authority requirements for all devices and equipment.

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SECTION 22 05 90 - PLUMBING EXCAVATION AND BACKFILL

PART 1 - GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This section is a Division-22 Basic Plumbing Materials and Methods section, and is part of each Division-22 section making reference to or requiring excavation and backfill specified herein.
- 1.3 <u>Existing Utilities</u>: Underground utilities shown were taken from old drawings. The exact location of these utilities and irrigation branches and abandoned services are not known. Use extreme caution when excavating.
- 1.4 <u>Refer to other Division-22</u> sections and/or drawings for specific requirements of the particular piping system being installed. Where another Division-22 section or the drawings conflict with requirements of this section, the other Division-22 section or the drawings shall take precedence over the general requirements herein.
- 1.5 <u>OSHA</u>: Contractor employee worker protection for all trenching and excavation operations shall comply with 29 CFR 1926.650 Subpart P and all current OSHA requirements.
- 1.6 <u>Trench Safety Act</u>: Contractor shall comply with all requirements of Florida Statutes Chapter 553, including the requirement to provide a separate line item to identify the cost to comply on a per lineal foot of trench and per square foot of shoring.

PART 2 - PRODUCTS

- 2.1 <u>Sand</u>: Clean, hard, uncoated grains free from organic matter or other deleterious substances. Sand for backfill shall be of a grade equal to mortar sand.
- 2.2 <u>Gravel</u>: Clean, well graded hard stone or gravel, free from organic material. Size range to be from No. 4 screen retentions to 1".
- 2.3 Earth: Fill free of clay, muck, stones, wood, roots or rubbish.
- 2.4 <u>Identification Tape</u>: Polyethylene 6 inches wide, 0.004 inches thick, continuously printed with "CAUTION" in large letters and type of pipe below.
- 2.5 <u>Copper Identification Wire</u>: 14-gauge.

PART 3 - EXECUTION

- 3.1 <u>Ditching and Excavation</u>: Shall be performed by hand wherever there is a possibility of encountering obstacles or any existing utility lines of any nature whatsoever. Where clear and unobstructed areas are to be excavated, appropriate machine excavation methods may be employed. Avoid use of machine excavators within the limits of the building lines.
- 3.2 <u>Bedding</u>: Excavate to bottom grade of pipe to be installed, and shape bed of undisturbed earth to contour of pipe for a width of at least 50% of pipe diameter. If earth conditions necessitate excavation below grade of the pipe, such as due to the presence of clay, muck, or roots, subcut and bring bed up to proper elevation with clean, new sand (as described in paragraph 2.1), deposited in 6" layers and tamped. Notify Architect/Engineer if subcut exceeds 12", or if bed is of an unstable nature. In this case a 6" minimum layer of gravel will be required before sand bedding begins. Submit cost proposal if the earth conditions require subcut in excess of 12" or if gravel is required to achieve proper bedding.
- 3.3 <u>Placing</u>: Pipe shall be carefully handled into place. Avoid knocking loose soil from the banks of the trench into the pipe bed. Rig heavier sections with nylon slings in lieu of

- wire rope to avoid crushing or chipping. Pipe which is handled with insulation in place, coated pipe, and jacketed pipe shall have special handling slings as required to prevent damage to the material.
- Backfilling: Deposit clean new sand (as described in paragraph 2.1) to 6" above the pipe and tamp. Then deposit sand or earth carefully in 6" layers, maintaining adequate side support, especially on nonferrous piping materials. Compact fill in 6" layers, using mechanical means, up to the top elevation of the pipe, and in 12" layers to rough or finish grade as required. Fine grade and restore surface to original condition.
- 3.5 <u>Special</u>: Excavations shall be installed and maintained in satisfactory condition during the progress of the work. Subsurface structures are to be constructed in adequately sized excavations. De-watering equipment shall be installed and properly maintained where required. Shoring shall be employed in the event of unstable soil condition, and in all cases where required by OSHA regulations and necessary to protect materials and personnel from injury.
- 3.6 <u>Identification</u>: Install identification tape directly above all underground piping, one tape for each pipe where multiple pipes are installed. Depth of tape shall be at least 6 inches below finished grade and 24 inches above buried pipe. Install copper wire above non-metallic pipes.
- 3.7 <u>Depth of Cover</u>: Minimum cover for underground piping is two feet unless indicated otherwise.
- 3.8 Existing Pavement: Where new piping passes below existing streets, driveways, parking lots, or other paved areas, the pavement shall be saw cut. Backfill shall be compacted to 95% density and the pavement shall be patched to match existing pavement. Provide compaction tests and reports as required.
- 3.9 Landscape Restoration:
 - A. Lawn or Unpaved Areas: The soil shall be replaced according to the original profile. Compact the top 6" of subgrade and each 6" layer of backfill or fill material at 85% maximum density for cohesive soils and 90% relative density for cohesionless soils.
 - 1. If additional soil is required, the Contractor shall supply weed free topsoil of a type to match existing topsoil.
 - B. Grass: Fine grade and solid sod with the type of grass to match the existing species and cultivar.
 - C. Landscape Maintenance: Contractor shall be responsible for watering and other grounds maintenance in the area of construction until the project is accepted.

SECTION 22 06 93 - TESTING ADJUSTING AND BALANCING OF PLUMBING SYSTEMS

PART 1 - GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-22 Basic Plumbing Materials Sections apply to work of this section.
- 1.3 Description of Work:
 - A. Extent of testing, adjusting, and balancing work (TAB) is indicated by requirements of this section, and also by drawings and schedules, and is defined to include, but is not necessarily limited to, domestic hot water and hot water recirculating systems. The work consists of setting volume (flow) adjusting facilities provided for systems, recording data, conducting tests, preparing and submitting reports, and recommending modifications to work as required.
 - B. Pretesting: Where required by the drawings as directed, report findings prior to start of demolition work or any other modifications to the existing systems. Results of pretesting shall be reported to the Engineer in a timely manner. Comply with standards for final TAB reports described herein.
 - C. Coordination: Coordinate with the General Contractor and Plumbing Contractor responsible for plumbing system installation as required to complete the TAB work.
 - D. Temperature Tolerances:
 - 1. Hot Water Temperatures: The domestic hot water controlled temperatures from water heaters thermostatic mixing valves shall be under control within 5°F but not outside of the building code required temperature range by any deviation.
 - E. Water Flow: Balance domestic water flow rates to within 10% of design values.

1.4 Job Conditions:

- A. Do not proceed with testing, adjusting, and balancing work until plumbing work (including Controls) has been completed and is operable. Ensure that there is no residual work still to be completed.
- B. Do not proceed until work scheduled for testing, adjusting, and balancing is clean and free from debris, dirt, and discarded building materials.

1.5 Test Reports and Verification Submittals:

A. Submit an electronic copy of the dated test and balance report upon completion of TAB work. The report shall include a list of instruments used for the work. The report shall be signed by the supervisor who performed the TAB work.

PART 2 - PRODUCTS

2.1 <u>Test Instruments</u>: Utilize test instruments and equipment of the type, precision, and capacity as recommended in the referenced standard. All instruments shall be in good condition and shall have been calibrated within the previous six (6) months (or more recently if required by standard).

PART 3 - EXECUTION

3.1 General:

A. Examine installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned, and is operable. Do not proceed with TAB work until unsatisfactory conditions have been corrected in a manner acceptable to Tester.

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B. Punch List: Prepare a deficiency (punch)list for the Contractor with a copy of the Engineer that lists all items that are incorrectly installed or are functioning improperly. Provide a retest after all items are corrected.

C. Prepare TAB report of test results, including instrumentation calibration reports, in format recommended by applicable standards, modified as required to include all data listed herein.

3.2 Water Balancing:

- A. Verify proper operation of all domestic water system devices to ensure the proper flowrate, flow direction, and pressure are maintained.
- B. Set balancing cocks and flow control devices to obtain specified water flow rates to all domestic hot water return legs of piping.

SECTION 22 07 00 - INSULATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-22 Basic Materials and Methods Sections apply to work of this section.
- 1.3 Approval Submittals:
 - A. Product Data: Submit a producer's data sheets and installation instructions on each insulation system including insulation, coverings, adhesives, sealers, protective finishes, and other material recommended by the manufacturer for applications indicated. Submit for:
 - 1. Fiberglass pipe insulation
- 1.4 <u>O&M Data Submittals</u>: Submit a copy of all approval submittals. Include in O&M Manual.

PART 2 - PRODUCTS

- 2.1 <u>Acceptable Manufacturers</u>: Subject to compliance with requirements, provide insulation products by Armstrong, Johns Manville, Knauf, Owens Corning, Pittsburgh Corning, U.S. Rubber, or approved equal. All products shall be asbestos-free.
- 2.2 <u>Flame/Smoke Ratings</u>: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics, and adhesive) with a flame-spread rating of 25 or less, and a smoke-developed rating of 50 or less, as tested by ANSI/ASTM E84.
- 2.3 Pipe Insulation Materials:
 - A. Fiberglass Pipe Insulation: ASTM C547, Class 1 unless otherwise indicated. (Preformed sleeving with white all-service jacket, suitable for temperatures up to 450°F.)
 - B. Staples, Bands, Wires, and Cement: As recommended by the insulation manufacturer for applications indicated.
 - C. Adhesives, Sealers, and Protective Finishes: Products recommended by the insulation manufacturer for the application indicated.
 - D. Jackets: ASTM C921, Type I (vapor barrier) for piping below ambient temperature, Type II (vapor permeable) for piping above ambient temperature. Type I may be used for all piping at installer's option.

PART 3 - EXECUTION

3.1 General:

- A. Install thermal insulation products in accordance with manufacturer's written instructions, and in compliance with recognized industry practices to ensure that insulation serves intended purpose.
- B. Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gapping joints and excessive voids resulting from poor workmanship.
- C. Maintain integrity of vapor-barrier on insulation and protect it to prevent puncture and other damage. Label all insulation "ASBESTOS FREE".
- D. Do not apply insulation to surfaces while they are hot or wet.
- E. Do not install insulation until systems have been checked and found free of leaks. Surfaces shall be clean and dry before attempting to apply insulation. A professional insulator with adequate experience and ability shall install insulation.

F. Do not install insulation on pipe systems until acceptance tests have been completed except for flexible unicellular insulation. Do not install insulation until the building is "dried-in".

3.2 <u>Fiberglass Pipe Insulation</u>:

- A. Insulate the following piping systems (indoor locations):
 - 1. Domestic Cold Water:
 - a. Cold water piping in unconditioned spaces: 1/2" thick
 - 2. Domestic hot water and hot water return, 140°F 180°F:

a. 1/2" - 1-1/4" pipe:
b. 1-1/2" pipe or greater:
1-1/2" thick
2" thick

3. Domestic hot water and hot water return, Under 140°F:

a. 1/2" - 3" pipe:b. 3" pipe or greater:1-1/2" thick2" thick

- B. Apply insulation to pipe with all side and end joints butted tightly. Seal longitudinal lap by pressurizing with plastic sealing tool. Apply 3-inch wide self-sealing butt strips to joints between insulation sections. Insulate all fittings, flanges, valves, and strainers with premolded insulation. Apply coat of insulating cement to fittings and wrap with glass cloth overlapping each wrap 1" and adjacent pipe 2". Finish with heavy coat of general purpose mastic. Premolded PVC covers may also be used, but no flexible inserts are allowed.
- C. Provide hanger or pipe support shields of 16 gauge (minimum) galvanized steel over the insulation which extends halfway up the pipe insulation cover and at least 6" on each side of the hanger.
- D. Omit insulation on exposed plumbing fixture runouts from faces of wall or floor to fixture; on unions, flanges, strainer blowoffs, flexible connections, and expansion joints.

SECTION 22 10 00 - PIPES AND FITTINGS

PART 1 - GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This section is a Division-22 Basic Plumbing Materials and Methods section, and is part of each Division-22 section making reference to pipes and pipe fittings specified herein.
- 1.3 Extent of pipes and pipe fittings required by this section is indicated on drawings and/or specified in other Division-22 sections.
- 1.4 Codes and Standards:
 - A. NSF Labels: Where plastic piping is indicated to transport potable water, provide pipes and pipe fittings bearing approval label by National Sanitation Foundations (NSF).

PART 2 - PRODUCTS

- 2.1 <u>Piping Materials</u>: Provide pipe and tube of type, joint type, grade, size and weight (wall thickness or Class) indicated for each service. Where type, grade, or class is not indicated, provide proper selection as determined by Installer for installation requirements, and comply with governing regulations and industry standards.
- 2.2 <u>Pipe/Tube Fittings</u>: Provide factory-fabricated fittings of type, materials, grade, class and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube, valve, or equipment connection in each case. Where not otherwise indicated, comply with governing regulations and industry standards for selections, and with pipe manufacturer's recommendations where applicable.
- 2.3 <u>Piping Materials/Products</u>:
 - A. Pipe Thread Tape: Teflon tape.
 - B. Protective Coating: Koppers Bitumastic No. 505 or equal.
- 2.4 <u>Plastic Pipes and Fittings</u>:
 - A. Pipes:
 - 1. PVC DWV Pipe: ASTM D-2665, Schedule 40.
 - 2. CPVC Pressure Pipe: ASTM F441, Schedule 40 or 80.
 - B. Fittings:
 - 1. PVC Solvent Cement: ASTM D-2564.
 - 2. PVC DWV Socket: ASTM D-2665.
 - 3. CPVC Schedule 80 Socket: ASTM F-439-13.
 - CPVC Schedule 80 Threaded: ASTM F-437-15.

PART 3 - EXECUTION

3.1 Installation:

A. General: Install pipes and pipe fittings in accordance with recognized industry practices which will achieve permanently-leakproof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings, but with adequate and accessible unions for disassembly and maintenance or replacement of valves and equipment. Reduce sizes (where

- indicated) by use of reducing fittings, not bushings. Align piping accurately at connections, within 1/16" misalignment tolerance.
- B. Comply with ANSI B31 Code for Pressure Piping.
- C. Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, columns and other structural and permanent-enclosure elements of building; limit clearance to 1/2" where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1" clearance outside insulation.
- D. Concealed Piping: Unless specifically noted as "Exposed" on the drawings, conceal piping from view in finished and occupied spaces, by locating in column enclosures, chases, in hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated.
- E. Electrical Equipment Spaces: Do not run piping through transformer vaults and other electrical, communications, or data equipment spaces and enclosures unless shown. Install drip pan under piping that must run through electrical spaces.
- F. Cut pipe from measurements taken at the site, not from drawings. Keep pipes free of contact with building construction and installed work.
- 3.2 <u>Piping System Joints</u>: Provide joints of the type indicated in each piping system.
 - A. Thread pipe in accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than 3 threads exposed. Paint exposed threads to retard rusting.
 - B. Plastic Pipe Joints: Comply with manufacturer's instructions and recommendations, and with applicable industry standards.
 - 1. Solvent-cemented joints shall be made in accordance with ASTM D-2235 and ASTM F-402.
 - 2. Provide factory adapter at transitions between piping components of differing materials. Threaded adapters are not acceptable.

3.3 Piping Installation:

- A. Install piping to allow for expansion and contraction.
- B. Isolate all copper tubing from steel and concrete by wrapping the pipe at the contact point, and for one inch on each side, with a continuous plastic sleeve. Isolate all copper tubing installed in block walls with a continuous plastic sleeve.
- C. Underground Piping:
 - 1. Provide plastic tape markers over all underground piping. Provide copper wire over all underground plastic piping. Locate markers 18" above piping.
 - 2. Coat the following underground (uninsulated) pipes with a heavy coat of bitumastic or provide an 8 mil polyvinyl sleeve: black steel pipe, galvanized steel pipe, copper tubing.

END OF SECTION 22 10 00

SECTION 22 10 19 - PLUMBING PIPING SPECIALTIES

PART 1 - GENERAL

- 1.1 Drawings and general provisions of contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This section is a Division-22 Basic Plumbing Materials and Methods section, and is part of each Division-22 section making reference to or requiring piping specialties specified herein.
- 1.3 Approval Submittals:
 - A. Product Data: Submit product data with installation instructions and UL listing for:
 - Fire barrier sealants.

PART 2 - PRODUCTS

- 2.1 <u>General</u>: Provide factory-fabricated piping specialties recommended by manufacturer for use in service indicated. Provide piping specialties of types and pressure ratings indicated for each service, or if not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes as indicated, and connections, which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.
- 2.2 Escutcheons:
 - A. General: Provide pipe escutcheons as specified herein with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.
 - B. Pipe Escutcheons for Moist Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons, solid or split hinged.
 - C. Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.
- 2.3 <u>Dielectric Waterways</u>: Provide dielectric waterways for use in service indicated, which effectively isolate ferrous from non-ferrous piping (electrical conductance), prevent galvanic action and stop corrosion. Dielectric unions are not acceptable.
- 2.4 <u>Dielectric Unions or Waterways</u>: Provide standard products recommended by manufacturer or Victaulic Style 47 dielectric waterways for use in service indicated, which effectively isolate ferrous from non-ferrous piping (electrical conductance), prevent galvanic action and stop corrosion.
- 2.5 <u>Fabricated Piping Specialties</u>:
 - A. Drip Pans: Provide drip pans fabricated from corrosion-resistant sheet metal with watertight joints, and with edges turned up 2-1/2". Reinforce top, either by structural angles or by rolling top over 1/4" steel rod. Provide hole, gasket, and flange at low point for watertight joint and 1" drain line connection.
 - B. Pipe Sleeves: Provide pipe sleeves of one of the following:
 - 1. Iron-Pipe: Fabricate from cast-iron or ductile-iron pipe; remove burrs.

- C. Sleeve Seals: Provide sleeve seals for sleeves located in foundation walls below grade, or in exterior walls, of one of the following:
 - 1. Caulking and Sealant: Provide foam or caulking and sealant compatible with piping materials used.

2.6 <u>Low Pressure Y-Type Pipeline Strainers</u>:

- A. General: Provide strainers full line size of connecting piping, with ends matching piping system materials. Provide Type 304 stainless steel screens.
 - 1. Water Strainers: Select for 200 psi working pressure (water, oil, or gas). Provide 20 mesh screens through 2" size and 1/16" perforations for 2-1/2" size and larger.
- B. Select from the following types:
 - 1. Threaded Ends, 2" and Smaller: Bronze body, screwed screen retainer with centered blowdown fitted with pipe plug.
 - 2. Threaded Ends, 2-1/2" and Larger: Cast-iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.
 - 3. Flanged Ends, 2-1/2" and Larger: Cast-iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.

PART 3 - EXECUTION

- 3.1 <u>Pipe Escutcheons</u>: Install pipe escutcheons on each pipe penetration through floors, walls, partitions, and ceilings where penetration is exposed to view; and on exterior of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole, and is flush with adjoining surface.
- 3.2 <u>Dielectric Waterways</u>: Install at each piping joint between ferrous and non-ferrous piping. Comply with manufacturer's installation instructions.
- 3.3 <u>Dielectric Unions or Waterways</u>: Install at each piping joint between ferrous and non-ferrous piping. Comply with manufacturer's installation instructions.
- 3.4 <u>Fire Barrier Penetration Seals</u>: Provide pipe sleeve as required. Fill entire opening with sealing compound. Adhere to manufacturer's installation instructions.
- 3.5 <u>Drip Pans</u>: Locate drip pans under piping passing over or within 3' horizontally of electrical equipment, and elsewhere as indicated. Hang from structure with rods and building attachments, weld rods to sides of drip pan. Brace to prevent sagging or swaying. Connect 1" drain line to drain connection, and run to nearest plumbing drain or elsewhere as indicated.
- Pipe Sleeves: Install pipe sleeves of types indicated where piping passes through walls, floors, ceilings, and roofs. Do not install sleeves through structural members of work, except as detailed on drawings, or as reviewed by Architect/Engineer. Install sleeves accurately centered on pipe runs. Size sleeves so that piping and insulation (if any) will have free movement in sleeve, including allowance for thermal expansion; but not less than 2 pipe sizes larger than piping run. Where insulation includes vapor-barrier jacket, provide sleeve with sufficient clearance for installation. Install length of sleeve equal to thickness of construction penetrated, and finish flush to surface; except floor sleeves. Extend floor sleeves 1/4" above level floor finish, and 3/4" above floor finish sloped to drain. Provide temporary support of sleeves during placement of concrete and other work around sleeves, and provide temporary closure to prevent concrete and other materials from entering sleeves.

A. Install sleeves in fire-rated assemblies in accordance with the listing of the assembly and the fire barrier sealant.

- B. Install sheet-metal sleeves at interior partitions and ceilings other than suspended ceilings. Fill annular space with caulking or fire barrier sealant as required.
- C. Install steel-pipe sleeves at floor penetrations. Fill annular space with caulking or fire barrier sealant as required.
- D. Install iron-pipe sleeves at all foundation wall penetrations and at exterior penetrations; both above and below grade. Fill annular space with caulking or mechanical sleeve seals.
- 3.7 <u>Y-Type Strainers</u>: Install Y-type strainers full size of pipeline, in accordance with manufacturer's installation instructions. Install pipe nipple and shutoff valve in strainer blow down connection, full size of connection, except for strainers 3/4" and smaller installed ahead of control valves feeding individual terminals. Where indicated, provide drain line from shutoff valve to plumbing drain, full size of blow down connection.
- 3.8 Locate Y-type strainers in supply line ahead of the following equipment, and elsewhere as indicated, if integral strainer is not included in equipment:
 - A. Pumps

END OF SECTION 22 10 19

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SECTION 22 11 13 - POTABLE WATER SYSTEM

PART 1 - GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-22 Basic Plumbing Requirements and Basic Plumbing Materials and Methods sections apply to work of this section.
- 1.3 Extent of potable water systems work, is indicated on drawings and schedules, and by requirements of this section.
- 1.4 Refer to other Division-22 sections for site water distribution system; not work of this section unless noted.

PART 2 - PRODUCTS

- 2.1 <u>General</u>: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with Referenced Codes in Specification Section 22 05 01 Plumbing Codes and Standards where applicable. Provide sizes and types matching pipe materials used in potable water systems. Where more than one type of materials or products is indicated, selection is Installer's option.
- 2.2 <u>Acceptable Manufacturers</u>: Subject to compliance with requirements, provide products of one of the following listed for each item.
- 2.3 <u>Identification</u>: Provide identification complying with Division-22 Basic Plumbing Materials and Methods section "Plumbing Identification". Provide manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct burial service; not less than 6" wide x 4 mils thick. Provide blue tape with black printing reading "CAUTION WATER LINE BURIED BELOW".
- 2.4 <u>Refer to appropriate Division-33 sections</u> for exterior potable water system; not work of this section unless noted.
- 2.5 Insulation for potable water piping is specified in other Division-22 sections, and is included as work of this section. Insulation requirements include:
 - A. Domestic hot water piping
- 2.6 Excavation and backfill required in conjunction with water piping is specified in other Division-22 sections, and is included as work of this section.
- 2.7 <u>Code Compliance</u>: Comply with applicable portions of Standard Plumbing Code pertaining to selection and installation of plumbing materials and products. Comply with local utility requirements.
- 2.8 Approval Submittals:
 - A. Product Data: Submit manufacturer's technical product data and installation instructions for:
 - 1. Valves
 - 2. Strainers
 - 3. Hose bibbs
 - 4. Relief valves
 - 5. Trap primers
 - 6. Access doors
- 2.9 <u>Test Reports and Verification Submittals:</u>

- A. Backflow Preventer Test Report: Submit Test Report for each backflow preventer.
- B. Disinfection: Submit report by Health Department.
- 2.10 <u>O&M Data Submittals</u>: Submit a copy of all approval submittals. Submit maintenance data and parts lists for valves, backflow preventers, pressure regulating valves, trap primers. Include these data in O&M manual.
- 2.11 <u>Pipes and Fittings</u>: Provide pipes and pipe fittings complying with Division-22 Basic Plumbing Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing:
 - A. Interior Water Piping:
 - 1. Chlorinated Polyvinyl Chloride pipe (CPVC), Schedule 80; CPVC socket fittings, solvent cement joints.
 - B. Exterior Water Piping:
 - 1. Chlorinated Polyvinyl Chloride pipe (CPVC), Schedule 80; CPVC socket fittings, solvent cement joints.
- 2.12 <u>Piping Specialties</u>: Provide piping specialties complying with Division-22 Basic Plumbing Materials and Methods section "Piping Specialties".
- 2.13 <u>Supports and Anchors</u>: Provide supports and anchors complying with Division-22 Basic Plumbing Materials and Methods section "Supports and Anchors".
- 2.14 <u>Interior Valves</u>: Provide valves complying with Division-22 Basic Plumbing Materials and Methods section "Valves", in accordance with the following listing:
 - A. Sectional and Shutoff Valves: BA1, BA2.
 - B. Drain Valves: BA1, BA2.
 - C. Throttling Valves: BA1, BA2.
 - D. Check Valves: CK1, CK2, CK3.
- 2.15 <u>Exterior Valves</u>: Provide as indicated, gate valves, AWWA C500, 175 psi working pressure. Provide threaded, flanged, hub, or other end configurations to suit size of valve and piping connections. Provide inside screw type for use with curb valve box, iron body, bronze-mounted, double disc, parallel seat, non-rising stem. Clow Corp., Dresser Mfg., Fairbanks Co., Kennedy, Stockham.
- 2.16 <u>Hose Bibbs</u>: Provide rough nickel plated hose bibbs with lock shield compression stop and removable handle, solid flange, female connection with 3/4" male threaded hose end, and straight line type non-removable vacuum breaker with 3/4" male threaded hose end. Acorn 8121 RCP or equal model by Woodford.
- 2.17 <u>Wall Hydrants</u>: Provide 3/4" wall hydrant with bronze casing, satin bronze box, straight inlet connection, and integral vacuum breaker backflow preventer. Wade W-8635-89 or approved equal.
- 2.18 Non-freeze Wall Hydrants: Provide 3/4" anti-syphon, non-freeze wall hydrant with bronze casing, satin bronze box, straight inlet connection, and integral vacuum breaker-backflow preventer, Wade W-8625 or approved equal.
- 2.19 <u>Water Hammer Arresters</u>: Provide bellows or piston type water hammer arresters with stainless steel casing, pressure rated for 250 psi, tested and certified in accordance with PDI Standards. Precision Plumbing Products, Josam, Zurn, Amtrol, Wade, Jay R. Smith, or approved equal.
- 2.20 Combined Pressure-Temperature Relief Valves: Provide relief valves as indicated, of size and capacity as selected by Installer for proper relieving capacity, in accordance with ASME Boiler and Pressure Vessel Code. Provide bronze body, test lever, and thermostat complying with ANSI Z21.22 listing requirements for temperature discharge

- capacity. Provide temperature relief at 210°F, and pressure relief at 150 psi. Watts, Cash, Zurn, or approved equal.
- 2.21 <u>Trap Primers</u>: Provide brass trap primers and distribution units to seal floor drains indicated on drawings. Trap primer valves shall be automatic, self contained type with no springs or diaphragms and shall not require adjustment. Trap primer valves shall be the type that can be installed anywhere on cold water piping. Distribution units shall supply 1-4 floor drains. Trap primer valves shall comply with ASSE 1018. Precision Plumbing Products PR-500, or approved equal. Where P-trap primers are indicated use "Prime-Eze" by Jay R. Smith, or approved equal.
- 2.22 <u>Access Doors</u>: Provide access doors to service all valves and other devices as required in accordance with Division-22 Basic Materials and Methods Section "Access Doors".

PART 3 - EXECUTION

- 3.1 <u>General</u>: Examine areas and conditions under which potable water systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.
- 3.2 Install plumbing identification in accordance with Division-22 Basic Plumbing Materials and Methods section "Plumbing Identification". Install underground plastic pipe markers during backfill, 6"-8" below grade.
- Install water distribution piping in accordance with Division-22 Basic Plumbing Materials and Methods section "Pipes and Pipe Fittings".
 - A. Install piping with 1/32" per foot (1/4%) downward slope towards drain point.
 - B. Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.
- 3.4 Install exterior water piping in compliance with local governing regulations. Water piping shall be installed with a minimum of 30 inches of cover unless otherwise indicated.
- 3.5 Install piping specialties in accordance with Division-22 Basic Plumbing Materials and Methods section "Piping Specialties".
- 3.6 Install supports and anchors in accordance with Division-22 Basic Plumbing Materials and Methods section "Supports and Anchors".
- 3.7 Install valves in accordance with Division-22 Basic Plumbing Materials and Methods section "Valves".
 - A. Sectional Valves: Install on each branch and riser, close to main, where branch or riser serves two or more plumbing fixtures or equipment connections, and elsewhere as indicated.
 - B. Shutoff Valves: Install on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated.
 - C. Drain Valves: Install on each plumbing equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system, and elsewhere where indicated or required to completely drain potable water system.
 - D. Check Valves: Install where indicated.
- 3.8 <u>Hose Bibbs and Wall Hydrants</u>: Install on concealed piping where indicated with vacuum breaker. Mount 18 inches above grade or finished floor.
- 3.9 <u>Install backflow preventers where indicated</u>, and where required by Standard Plumbing Code. Locate in same room as equipment being protected. Pipe relief outlet to

- nearest floor drain or outside as shown on the drawings. Provide test and report by State of Florida Certified Backflow Preventer Specialist.
- 3.10 Install meters and gauges in accordance with Division-22 Basic Plumbing Materials and Methods section "Meters and Gauges".
- 3.11 Install relief valves on each water heater, and where indicated in accordance with the manufacturer's instructions. Pipe full size outside or to floor drain. Cut the end of the pipe at a 45° angle and terminate 6 inches above the floor or grade.
- 3.12 <u>Piping Runouts to Fixtures</u>: Provide hot and cold water piping runouts to fixtures of sizes indicated, but in no case smaller than required by Standard Plumbing Code.
- 3.13 Install water hammer arresters in upright position, in locations and of sizes indicated in accordance with PDI Standard WH-201.
- 3.14 Install trap primers as indicated, and in accordance with manufacturer's installation instructions. Provide access panels to all trap primers unless accessible through a layin ceiling.
- 3.15 Locate and coordinate installation of access doors for all valves and devices in accordance with Division-22 Basic Plumbing Materials and Methods section "Access Doors".
- 3.16 <u>Piping Tests</u>: Test, clean, and sterilize potable water piping in accordance with testing requirements of Division-22 Basic Plumbing Materials and Methods section "Testing, Cleaning, and Sterilization of Piping Systems".

END OF SECTION 22 11 13

SECTION 22 13 16 - SOIL WASTE AND VENT SYSTEM

PART 1 - GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-22 Basic Plumbing Requirements and Basic Plumbing Materials and Methods sections apply to work of this section.
- 1.3 Extent of soil waste and vent systems work is indicated on drawings and schedules, and by requirements of this section.
- 1.4 Refer to other Division-22 sections for site sanitary system; not work of this section.
- 1.5 Refer to appropriate Division-33 sections for exterior sanitary sewer system required in conjunction with soil and waste systems; not work of this section.
- 1.6 Insulation for soil and waste systems is specified in other Division-22 sections, and is included as work of this section. Insulation requirements include:
 - A. Horizontal above grade waste pipes receiving discharge from ice machines, coolers, freezers, or similar units to points of connection receiving waste from 4 or more fixtures.
 - B. Horizontal above grade waste pipes receiving condensate from air conditioning equipment to point of connection receiving waste from 4 or more fixtures.
- 1.7 Excavation and backfill required in conjunction with soil, waste, and vent piping is specified in other Division-22 sections and is included as work of this section.
- 1.8 Refer to Division-7 section "Flashing and Sheet Metal" for flashings required in conjunction with soil and waste systems; not work of this section.
- 1.9 <u>Code Compliance</u>: Comply with applicable portions of Standard Plumbing Code pertaining to plumbing materials, construction and installation of products. Comply with local utility requirements.
- 1.10 Approval Submittals:
 - A. Product Data: Submit manufacturer's technical product data for:
 - 1. Cleanouts
 - 2. Floor drains
- 1.11 <u>O&M Data Submittals</u>: Submit a copy of all approval submittals. Submit maintenance data and parts lists for products. Include these data in O&M manual.

PART 2 - PRODUCTS

- 2.1 <u>General</u>: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in soil and waste systems. Where more than one type of materials or products is indicated, selection is Installer's option.
- 2.2 <u>Underground-Type Plastic Line Marker</u>: Manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6" wide x 4 mils thick. Provide green tape with black printing reading "CAUTION SEWER LINE BURIED BELOW".
- 2.3 <u>Acceptable Manufacturers</u>: Subject to compliance with requirements, provide products of one of the following listed for each item.

2.4 <u>Pipes and Fittings</u>: Provide pipes and pipe fittings complying with Division-22 Basic Plumbing Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing:

- A. Above Ground Soil, Waste, and Vent Piping:
 - Polyvinyl chloride plastic pipe (PVC); Type DWV; PVC plastic type DWV sockettype fitting, solvent cement joints. Do not use in fire-rated assemblies or return air plenums.
- B. Underground Building Drain Piping (within 5 feet of the building):
 - 1. Polyvinyl chloride sewer pipe (PVC); Type DWV; PVC plastic type DWV socket-type.
- 2.5 <u>Pipe Specialties</u>: Provide piping specialties complying with Division-22 Basic Materials and Methods section "Piping Specialties".
- 2.6 <u>Supports and Anchors</u>: Provide supports and anchors complying with Division-22 Basic Plumbing Materials and Methods section "Supports and Anchors".
- 2.7 <u>Cleanouts</u>: Provide factory-fabricated drainage piping products of size and type indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements and governing regulations. Josam, Jay R. Smith, Wade, Zurn.
 - A. Cleanout for PVC Systems:
 - 1. Floor Cleanouts: Cast-iron body with adjustable head, brass plug, and scoriated nick-brass cover. Furnish with carpet flange style for carpeted floors. Furnish with recessed cover for tile floors. Furnish with clamping ring for floors with membrane. Wade W-6030 hub outlet for push-on.
 - 2. Cleanouts in Piping: PVC cleanout adaptor with threaded PVC plug.
 - 3. Wall Cleanouts: PVC cleanout adaptor with tapped, countersunk, threaded brass plug and round stainless steel access cover with screw. Wade W-8304-75.
 - 4. Grade Cleanouts: PVC cleanout adaptor with countersunk, threaded brass plug. Wade W-8590-D plug. In sidewalks and other finished concrete, provide access cover frames with a non-tilting cover. Wade W-7035-Z or equal.
 - 5. Cleanouts in Paved Areas: Cast iron body, adjustable housing, ferrule with plug and round loose scoriated tractor cover. Wade W-8300-MF. Coordinate concrete depth at site with adjustable flange.
- 2.8 <u>Floor Drains</u>: Provide floor drains of size as indicated on drawings; and type, including features, as specified herein. Acceptable Manufacturers: J osam, Jay R. Smith, Wade, Zurn.
 - A. Floor Drains: Provide inside caulk bottom outlet or TY-Seal hub outlet with adaptor for cast iron trap installation and a 4" deep trap seal. Provide clamping rings for floors with membrane.
 - B. Strainer: Provide 5" satin-nickel bronze strainer.
 - C. Trap Primer Connection: Provide 1/2" trap primer tapping.
 - D. Funnel: Provide funnel where shown on the drawings.
 - E. Basis of Design: Wade Series 1100.

PART 3 - EXECUTION

3.1 Examine substrates and conditions under which soil and waste systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 <u>Piping Installation</u>:

A. Install above grade soil and waste piping in accordance with Division-22 Basic Plumbing Materials and Methods section "Pipes and Pipe Fittings", and with Standard Plumbing Code.

- B. Install underground soil and waste pipes as indicated and in accordance with Standard Plumbing Code. Lay underground piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clean interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag in line and pull past each joint as it is completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops.
- C. Install building soil and vent piping pitched to drain at minimum slope of 1/4" per foot (2%) for piping 3" and smaller, and 1/8" per foot (1%) for piping 4" and larger.
- 3.3 Install piping specialties in accordance with Division-22 Basic Plumbing Materials and Methods section "Piping Specialties".
- 3.4 Install supports and anchors in accordance with Division-22 Basic Plumbing Materials and Methods section "Supports and Anchors".
- 3.5 <u>Installation of Cleanouts</u>: Install in above ground piping and building drain piping as indicated, as required by Standard Plumbing Code; and at each change in direction of piping greater than 45°; at minimum intervals of 50' for piping 4" and smaller and 100' for larger piping; and at base of each vertical soil or waste stack. Install floor and wall cleanout covers for concealed piping, select type to match adjacent building finish.
 - A. Size: Cleanouts shall be full size up to 4". Piping over 4" shall have a reducing fitting to accommodate a 4" cleanout unless indicated otherwise on drawings.
 - B. Install cleanouts to allow adequate clearance for rodding.
 - C. Protect all finished surfaces of cleanouts with a suitable adhesive covering until construction is completed.
 - D. Cleanouts to Grade: Provide an 18" x 18" x 8" thick concrete pad around the cleanout. Set the cleanout ferrule, adapter, or access cover frame in the concrete as required. The cleanout shall be extended to the finished grade. The concrete pad shall slope away from the cleanout in all directions approximately one inch. Cover pad with fill to finished grade.
 - E. Cleanouts in Paved Areas: Provide concrete pad similar to cleanout to grade and coordinate concrete depth at site with adjustable flange. Access cover frames are required.
- 3.6 <u>Flashing Flanges</u>: Install flashing flange and clamping device with each stack and cleanout passing through waterproof membranes.
- 3.7 <u>Vent Flashing Sleeves</u>: Install on stack passing through roof, secure to stack flashing in accordance with manufacturer's instructions. For metal roofs, sleeves, and flashing are by Division-7.
- 3.8 <u>Installation of Floor Drains</u>: Install in accordance with manufacturer's written instructions and in locations indicated.
 - A. Coordinate flashing work with work of waterproofing and adjoining substrate work.
 - B. Install at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor.
 - C. Install flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.

- D. Position drains so that they are accessible and easy to maintain.
- 3.9 <u>Connection of Trap Primers</u>: Connect trap primers as indicated, and in accordance with manufacturer's installation instructions. Pitch piping towards drain trap, minimum of 1/8" per foot (1%). Adjust trap primer for proper flow.
- 3.10 <u>Piping Runouts to Fixtures</u>: Provide soil and waste piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated, but in no case smaller than required by Standard Plumbing Code.
- Test, clean, flush, and inspect soil and waste piping in accordance with requirements of Division-22 Basic Plumbing Materials and Methods section "Testing, Cleaning, and Sterilization of Piping Systems".

END OF SECTION 22 13 16

SECTION 22 24 00 - TESTING, CLEANING, AND STERILIZATION OF PLUMBING SYSTEMS

PART 1 - GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This section is a Division-22 Basic Plumbing Materials and Methods section and is part of each Division-22 section making reference to or requiring the testing and other procedures specified herein.
- 1.3 Notify the Architect/Engineer when system tests are ready to be witnessed at least 24 hours prior to the test.
- 1.4 All materials, test equipment, and devices required for cleaning, testing, sterilizing or purging shall be provided by the Contractor.

PART 2 - PRODUCTS

2.1 None.

PART 3 - EXECUTION

3.1 Pressure Tests:

- A. General: Provide temporary equipment for testing, including pump and gauges. Test piping systems before insulation is installed wherever feasible and remove control devices before testing. Test each natural section of each piping system independently but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with indicated medium and pressurize for indicated pressure and time.
- B. Required test period is 2 hours.
- C. No piping, fixtures, or equipment shall be concealed or covered until they have been tested. The contractor shall apply each test and ensure that it is satisfactory for the period specified before calling the Architect/Engineer to observe the test. Test shall be repeated upon request to the satisfaction of those making the inspection.
- D. Observe each test section for leakage at the end of the test period. Test fails if leakage is observed or if pressure drop exceeds 5% of the test pressure.
- E. Check of systems during application of test pressures should include visual check for water leakage and soap bubble or similar check for air and nitrogen leakage.
- F. During heating and cooling cycles, linear expansion shall be checked at all elbows and expansion joints for proper clearance.
- G. Repair piping systems sections which fail required piping test. Disassemble and reinstall using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.

3.2 Pressure Test Requirements:

- A. Soil, Waste, Vent: Test all piping within the building with a 10 foot head of water. Test piping in sections so that all joints are tested. Provide test tees as required. A smoke test can be used at the Contractor's option.
- B. Domestic Water: Perform hydrostatic test on all piping within the building at twice the normal static pressure at service point, but not less than 100 psig. Once tested, flush out piping and leave under pressure of the supply main or 40 psig for the balance of the construction period.

3.3 Cleaning and Sterilization:

A. General: Clean exterior surfaces of installed piping systems of superfluous materials, and prepare for application of specified coatings (if any). Flush out piping systems with clean water or blowdown with air before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items.

- B. Flush and drain all water systems at least three times. Reverse flush systems from smallest piping to largest piping. Replace startup strainers with operating strainers.
- C. Cleaning: After completion of all work and operational check out of the plumbing installations and prior to acceptance of the project by the Owner, the following shall be accomplished. The completed piping systems shall be thoroughly flushed (reversed flushing) and chemically cleaned as needed to remove all dirt, debris, and any foreign matter that may have been trapped in the piping systems during construction. After flushing of systems is complete, the Contractor shall clean all strainers.

3.4 Sterilization of Domestic Water Systems:

- A. Prerequisites: All new hot and cold water piping installed (complete), all fixtures connected, system flushed out, and system filled with water.
- B. The shut off valve at the point of connection shall be closed, all fixture outlets opened slightly, and a sterilizing solution shall be introduced at a manifold connection installed by the Contractor at the point of connection.
- C. The solution shall contain 50 parts per million of available chlorine. The chlorinating material shall be either liquid chlorine or calcium hypochlorite. The solution shall be allowed to stand in the system for at least eight hours after which the entire system shall be flushed.
- D. After final flushing, all aerators shall be removed, cleaned, and reinstalled. After final flush the residual chlorine shall not exceed 0.2 parts per million.
- E. The Architect/Engineer shall be notified 24 hours prior to the procedure so that it can be witnessed.
- F. Provide sampling and certified report by an independent testing lab. Provide written Health Department approval of disinfection samples.

END OF SECTION 22 24 00

SECTION 22 40 00 - PLUMBING FIXTURES AND EQUIPMENT

PART 1 - GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
 - A. Division-22 Basic Plumbing Requirements and Basic Plumbing Materials and Methods sections apply to work of this section.
 - B. Extent of plumbing fixtures work required by this section is indicated on drawings and schedules, and by requirements of this section.
 - C. Refer to Division-26 sections for field-installed electrical wiring required for plumbing fixtures; not work of this section.

1.2 <u>Codes and Standards</u>:

- A. Plumbing Fixture Standards: Comply with applicable portions of Standard Plumbing Code pertaining to materials and installation of plumbing fixtures.
- B. ANSI Standards: Comply with applicable ANSI standards pertaining to plumbing fixtures and systems.
- C. PDI Compliance: Comply with standards established by PDI pertaining to plumbing fixture supports.
- D. UL Listing: Construct plumbing fixtures requiring electrical power in accordance with UL standards and provide UL-listing and label.
- E. ARI Compliance: Construct and install water coolers in accordance with ARI Standard 1010 "Drinking-Fountains and Self-Contained Mechanically-Refrigerated Drinking-Water Coolers", and provide Certification Symbol.
- F. ANSI Compliance: Construct and install barrier-free plumbing fixtures in accordance with ANSI Standard A117.1 "Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People".

1.3 Approval Submittals:

- A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, furnished specialties and accessories; and installation instructions. Submit manufacturer's assembly-type drawings indicating dimensions, roughing-in requirements, required clearances, and methods of assembly of components and anchorages. The submittal shall be organized by "fixture number" and each fixture package shall be so identified. Each fixture package shall include all of the required fitting and trim, even if such devices are used for more than one fixture.
- B. O&M Data Submittals: Submit a copy of approval submittals. Submit maintenance data and parts lists for each type of plumbing fixture and accessory; including "trouble-shooting" maintenance guide. Include these data in O&M manual.
- 1.4 Handle plumbing fixtures carefully to prevent breakage, chipping, and scoring fixture finish. Do not install damaged plumbing fixtures; replace and return damaged units to equipment manufacturer.

PART 2 - PRODUCTS

2.1 <u>General</u>: Provide factory-fabricated fixtures of type, style, and material indicated. For each type fixture, provide trim, carrier, seats, and valves as specified. Where not specified, provide products as recommended by manufacturer, and as required for complete installation. Where more than one type is indicated, selection is Installer's

option; but, all fixtures of same type must be furnished by single manufacturer. Where type is not otherwise indicated, provide fixtures complying with governing regulations.

2.2 <u>Model Numbers</u>: Basis of design model numbers of a particular manufacturer are listed in the fixture schedule as an aid to contractors. Where conflicts between the model number and the written description occur, the written description shall govern. Where acceptable manufacturers are listed, products are subject to compliance with requirements.

2.3 Materials:

- A. Provide materials which have been selected for their surface flatness and smoothness. Exposed surfaces which exhibit pitting seam marks, roller marks, foundry sand holes, stains, discoloration, or other surface imperfections on finished units are not acceptable.
- B. All fixtures shall be white vitreous china unless otherwise specifically noted. Where enameled iron fixtures are specified, they shall be furnished with acid resisting enamel.
- C. Where fittings, trim, and accessories are exposed or semi-exposed provide bright chrome-plated or polished stainless steel units. Provide copper or brass where not exposed.
- D. Stainless Steel Sheets: ASTM A 167, Type 304, hardest workable temper. Finish shall be No. 4, bright, directional polish on exposed surfaces.
- E. Vitreous China: High quality, free from fire cracks, spots, blisters, pinholes, and specks; glaze exposed surfaces, and test for crazing resistance in accordance with ASTM C 554.
- F. Synthetic Stone: High quality, free from defects, glaze on exposed surfaces, stain resistant.
- G. Plumbing Fittings, Trim, and Accessories:
 - 1. Faucets: At locations where water is supplied (by manual, automatic, or remote control), provide commercial quality chrome-plated, cast-brass faucets, valves, or other dispensing devices, of type and size indicated, and as required to operate as indicated.
 - 2. Aerators: Provide aerators of types approved by Health Department having jurisdiction.
 - 3. Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Chicago Faucet Co., Symmons, Eljer Co., Kohler Co., Speakman Co., T & S Brass and Bronze Works, Water Saver Faucet Co.
 - 4. Stops: Provide chrome-plated brass, quarter-turn, angle type, manual shutoff valves, and chrome-plated flexible supply pipes to permit fixture servicing without shutdown of water supply piping systems for all fixtures. Coordinate with fixture requirements.
 - a. Provide standard stops.
 - b. Provide stops with integral piston type water hammer arrestor on all fixtures that have quick-closing valves. This includes, but is not limited to: Ice machines, clothes washing machines, bottle fillers, dishwashers, and electric water coolers.
 - 5. Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. McGuire, or approved equal.
 - 6. Waste Outlets: Provide removable P-traps, drains, waste arms, tailpieces, and wastes-to-wall where drains are indicated for direct connection to drainage system for all fixtures unless otherwise noted. Provide drains, tailpieces, and

waste arms where indirect drains are indicated. Waste outlets shall be full size of fixture drain connection.

- a. Provide PVC DWV Schedule 40 P-Traps
- 7. Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. McGuire, or approved equal.
- 8. Fixture Bolt Caps: Provide manufacturer's standard exposed fixture bolt caps finished to match fixture finish.
- 9. Escutcheons: Where fixture supplies and drains penetrate walls in exposed locations, provide chrome-plated brass escutcheons with friction clips.
- H. Carriers: Provide cast-iron supports for fixtures of either graphitic gray iron, ductile iron, or malleable iron or steel as indicated. Coordinate with specific fixture requirements and conditions of the project.
 - 1. Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Josam, Wade, Zurn, J.R. Smith.
- I. Comply with additional fixture requirements listed for each fixture and as required for a complete and functional system.

2.4 Water Closets:

- A. General: Provide white china siphon jet type unless otherwise noted.
- B. Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Crane, Kohler, Eljer, Gerber.
- C. Fixture Seats: Provide white, heavy molded plastic fixture seats with stainless steel self-sustaining check hinges.
- D. Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Bemis Mfg. Co., Beneke Corp., Church, Sperzel, Olsonite.
- E. Water Closet Schedule:
 - WC8 Accessible Floor-Mounted Tank Type Water Closet: Provide accessible floor-mounted, free standing, close-coupled, elongated bowl, 1.6 GPF tank type water closet. Provide open front seat, less cover.

1.6 GPF Water Closet Kohler K-3979
Open Front Seat Kohler K-4731-SC

2.5 <u>Urinals</u>:

- A. General: Provide white china siphon jet wall hung type with 3/4" top spud and 2" outlet unless otherwise noted.
- B. Fixture Carriers: Provide short foot, coated cast iron carrier with adjustable top and bottom hanger plates. Provide with horizontal or vertical piping connections based on installation type. Provide with vent connection. Coordinate installation for clearance within walls with general contractor and other trades.
- C. Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Crane, Kohler, Eljer, Gerber.
- D. Urinal Schedule:
 - 1. UR2 Accessible Urinal: Provide accessible urinal with manual 0.5 GPF flush valve.

Urinal American Standard 6541.132 0.5 GPF Flush Valve Sloan Regal 186-0.5

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2.6 <u>Lavatories</u>:

- A. General: Provide white china lavatories. Unless otherwise specified.
- B. Fixture Carriers: Provide short foot, coated cast iron carrier with adjustable top and bottom hanger plates. Provide with horizontal or vertical piping connections based on installation type. Provide with vent connection. Coordinate installation for clearance within walls with general contractor and other trades.
- C. Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Crane, Kohler, Eljer, Gerber.
- D. Lavatory Schedule:
 - 1. L9 Accessible Wall Hung Single Lever Lavatory: Provide accessible 20" x 18" wall hung lavatory with single lever centerset hot and cold water faucet. Provide with 0.5 gpm aerator. Provide grid drain.

Lavatory Kohler K-1728
Faucet and Grid Drain Symmons S-20-2-G

2.7 <u>Electric Water Coolers</u>:

- A. General: Provide self-contained electric water cooler with entire water system free of lead. All joints shall be made using silver solder. Units shall be complete with an air-cooled refrigeration system consisting of a hermetic compressor, cooler, pre-cooler, condenser fan, thermostat safety controls and all other related devices. The unit shall have a capacity of 8 gallons per hour. The cabinet shall be stainless steel with vermin proof insulation. The top shall be fabricated of stainless steel with a No. 4 finish. Where accessible units are indicated, the bubbler and fountain shall be ADA compliant.
- B. Fixture Carriers: Provide short foot, coated cast iron carrier with adjustable top and bottom hanger plates. Provide with horizontal or vertical piping connections based on installation type. Provide with vent connection. Coordinate installation for clearance within walls with general contractor and other trades.
- C. Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Elkay Mfg. Co., Halsey Taylor Div., Haws Drinking Faucet Co., Sunroc, Oasis.
- D. Electric Water Cooler Schedule:
 - 1. EWC4 Dual Wall Hung Electric Water Cooler with Bottle Filler: Provide combination dual wall hung unit with bottle filler.

Electric Water Cooler and Bottle Filler Elkay LZSTL8WSSP

2.8 Mop Receptors:

- A. General: Provide one piece mop receptors with 3" integral stainless steel grid drain. Provide wall-mounted faucet with arm handles, vacuum breaker, stops, hose connection and hose bracket. Provide 30" hose.
- B. Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Stern-Williams Co., Fiat.
- C. Mop Receptor Schedule:
 - MR2 Square Mop Receptor: Provide 24" x 24" precast terrazzo mop receptor with 12" high shoulders. Provide stainless steel caps on all curbs. Provide two panel stainless steel wall guard.

Mop Receptor 24" x 24" Fiat TSB - 100 Faucet Fiat 830-AA

Bracket Fiat 832-AA
Wall Guard Fiat MSG 2424

2.9 <u>Stainless Steel Sinks</u>:

A. General: Provide Type 302, 18 gauge self-rimming stainless steel back ledge with No. 4 finish. Provide sound deadening material on the sides and bottom of the sink. Provide grid drain or strainer with removable crumb cup and stopper as indicated.

- B. Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Elkay, Just
- C. Stainless Steel Sink Schedule:
 - 1. SK 1 Single Compartment Sink: Provide 22" x 19-1/2" x 7-1/2 " deep single compartment stainless steel sink with top mount single lever hot and cold water supply fitting. Provide strainer, crumb cup, and stopper.

Sink Elkay LR-2219

Faucet Chicago Faucet 201-GN8A-E3-317

Faucet with Spray Head Elkay LK-410

Strainer LK-35

PART 3 - EXECUTION

- 3.1 Examine roughing-in work of potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping, and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.
- 3.2 Install plumbing fixtures of types indicated where shown and at indicated heights. Install in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Install in accordance with ADA and applicable accessible code requirements. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of Standard Plumbing Code pertaining to installation of plumbing fixtures. Furnish templates for cut-outs in countertops. Coordinate exact fixture locations with countertop shop drawings.
- 3.3 Fasten plumbing fixtures securely to indicated supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies behind or within wall construction so as to be rigid, and not subject to pull or push movement. Mount at heights shown on the drawings. Fixture heights are floor-to-rim distance. Fitting heights are to centerline.
- 3.4 Install stop valve in water supply to each fixture.
- 3.5 After fixtures are set, the crack between the fixture and wall shall be caulked with DAP silicone-based caulking, or approved equal.
- 3.6 Protect installed fixtures from damage during remainder of construction period.
- 3.7 Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
- 3.8 Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect/Engineer. Remove cracked or dented units and replace with new units.

- 3.9 Clean plumbing fixtures, trim, aerators, and strainers of dirt and debris upon completion of installation.
- 3.10 Adjust water pressure at drinking fountains, faucets, shower valves, and flush valves to provide proper flow stream and specified gpm.
- 3.11 Adjust or replace washers to prevent leaks at faucets and stops.

END OF SECTION 22 40 00

SECTION 23 00 00 - HVAC GENERAL

PART 1 - GENERAL

1.1 The work covered by this division consists of providing all labor, equipment, and materials and performing all operations necessary for the installation of the mechanical work as herein called for and shown on the drawings.

1.2 Related Documents:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- B. This section is a Basic Mechanical Materials and Methods section. Provisions of this section apply to work of all Division 23 sections.
- C. Review all other contract documents to be aware of conditions affecting work herein.

1.3 Definitions:

- A. Provide: Furnish and install, complete and ready for intended use.
- B. Furnish: Supply and deliver to project site, ready for subsequent requirements.
- C. Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar requirements.
- 1.4 <u>Permits and Fees</u>: Contractor shall obtain all necessary permits, meters, and inspections required for his work and pay all fees and charges incidental thereto.
- 1.5 <u>Verification of Owner's Data</u>: Prior to commencing any work the Contractor shall satisfy himself as to the accuracy of all data as indicated in these plans and specifications and/or as provided by the Owner. Should the Contractor discover any inaccuracies, errors, or omissions in the data, he shall immediately notify the Architect/Engineer in order that proper adjustments can be anticipated and ordered. Commencement by the Contractor of any work shall be held as an acceptance of the data by him after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions, or inaccuracies of the said data.
- 1.6 <u>Delivery and Storage of Materials</u>: Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. All material shall be stored to provide protection from the weather and accidental damage.
- 1.7 Extent of work is indicated by the drawings, schedules, and the requirements of the specifications. Singular references shall not be construed as requiring only one device if multiple devices are shown on the drawings or are required for proper system operation.
- 1.8 Field Measurements and Coordination:
 - A. The intent of the drawings and specifications is to obtain a complete and satisfactory installation. Separate divisional drawings and specifications shall not relieve the Contractor or subcontractors from full compliance of work of his trade indicated on any of the drawings or in any section of the specifications.
 - B. Verify all field dimensions and locations of equipment to ensure close, neat fit with other trades' work. Make use of all contract documents and approved shop drawings to verify exact dimension and locations.
 - C. Coordinate work in this division with all other trades in proper sequence to ensure that the total work is completed within contract time schedule and with a minimum cutting and patching.

D. Locate all apparatus symmetrical with architectural elements. Install to exact height and locations when shown on architectural drawings. When locations are shown only on mechanical drawings, be guided by architectural details and conditions existing at job and correlate this work with that of others.

- E. Install work as required to fit structure, avoid obstructions, and retain clearance, headroom, openings, and passageways. <u>Cut no structural members without written approval</u>.
- F. Carefully examine any existing conditions, piping, and premises. Compare drawings with existing conditions. Report any observed discrepancies. It shall be the Contractor's responsibility to properly coordinate the work and to identify problems in a timely manner. Written instructions will be issued to resolve discrepancies.
- G. Because of the small scale of the drawings, it is not possible to indicate all offsets and fittings or to locate every accessory. Drawings are essentially diagrammatic. Study carefully the sizes and locations of structural members, wall and partition locations, trusses, and room dimensions and take actual measurements on the job. Locate piping, ductwork, equipment, and accessories with sufficient space for installing and servicing. Contractor is responsible for accuracy of his measurements and for coordination with all trades. Contractor shall not order materials or perform work without such verification. No extra compensation will be allowed because field measurements vary from the dimensions on the drawings. If field measurements show that equipment or piping cannot be fitted, the Architect/Engineer shall be consulted. Remove and relocate, without additional compensation, any item that is installed and is later found to encroach on space assigned to another use.

1.9 Guarantee:

- A. The Contractor shall guarantee labor, materials, and equipment for a period of one (1) year from Substantial Completion, or from Owner's occupancy, whichever is earlier. Contractor shall make good any defects and shall include all necessary adjustments to and replacement of defective items without expense to the Owner.
- B. Owner reserves right to make emergency repairs as required to keep equipment in operation without voiding Contractor's Guarantee Bond nor relieving Contractor of his responsibilities during guarantee period.

1.10 Approval Submittals:

- A. When approved, the submittal control log and submittals shall be an addition to the specifications herewith, and shall be of equal force in that no deviation will be permitted except with the approval of the Architect/Engineer.
 - 1. Shop drawings, product literature, and other approval submittals will only be reviewed if they are submitted in full accordance with the General and Supplementary Conditions <u>and</u> the following.
 - a. Submittals shall be properly organized in accordance with the approved submittal control log.
 - b. Submittals shall not include items from more than one specification section in the same submittal package unless approved in the submittal control log.
 - c. Submittals shall be properly identified by a cover sheet showing the project name, Architect and Engineer names, submittal control number, specification section, a list of products or item names with model numbers in the order they appear in the package, and spaces for approval stamps. A sample cover sheet is included at the end of this section.

d. Submittals shall have been reviewed and approved by the Builder. Evidence of this review and approval shall be an "Approved" stamp with a signature and date on the cover sheet.

- e. Submittals that include a series of fixtures or devices (such as plumbing fixtures or valves) shall be organized by the fixture number or valve type and be marked accordingly. Each fixture must include <u>all</u> items associated with that fixture regardless of whether or not those items are used on other fixtures.
- f. The electrical design shown on the drawings supports the mechanical equipment basis of design specifications at the time of design. If mechanical equipment is submitted with different electrical requirements, it is the responsibility of the mechanical contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the mechanical submittal with a written statement that this change will be provided at no additional cost. Mechanical submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.
- B. If the shop drawings show variation from the requirements of contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variation in writing in his letter of transmittal and on the submittal cover sheet in order that, if acceptable, Contractor will not be relieved of the responsibility for executing the work in accordance with the contract.
- C. Review of shop drawings, product literature, catalog data, or schedules shall not relieve the Contractor from responsibility for deviations from contract drawings or specifications, unless he has in writing called to the attention of the Architect/Engineer each such deviation in writing at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings, product literature, catalog data, or schedules. Any feature or function specified but not mentioned in the submittal shall be assumed to be included per the specification.
- D. Submit shop drawings as called for in other sections after award of the contract and before any material is ordered or fabricated. Shop drawings shall consist of plans, sections, elevations, and details to scale (not smaller than 1/4" per foot), with dimensions clearly showing the installation. Direct copies of small scale project drawings issued to the Contractor are not acceptable. Drawings shall take into account equipment furnished under other sections and shall show space allotted for it. Include construction details and materials.
- 1.11 Test Reports and Verification Submittals: Submit test reports, certifications, and verification letters as called for in other sections. Contractor shall coordinate the required testing and documentation of system performance such that sufficient time exists to prepare the reports, submit the reports, review the reports, and take corrective action within the scheduled contract time.
- 1.12 O&M Data Submittals: Submit Operation and Maintenance (O&M) data as called for in other sections. When a copy of approval submittals is included in the O&M Manual, only the final "Approved" or "Approved as Noted" copy shall be used. Contractor shall organize these data in the O&M Manuals tabbed by specification number. Prepare O&M Manuals as required and as described herein. Submit manuals at the Substantial Completion inspection.

PART 2 - PRODUCTS

2.1 All materials shall be new or Owner-supplied reused as shown on the drawings, the best of their respective kinds, suitable for the conditions and duties imposed on them at the building and shall be of reputable manufacturers. The description, characteristics, and requirements of materials to be used shall be in accordance with qualifying conditions established in the following sections.

2.2 Equipment and Materials:

- A. Shall be new and the most suitable grade for the purpose intended. Equipment furnished under this division shall be the product of a manufacturer regularly engaged in the manufacture of such items for a period of three years. Where practical, all of the components shall be products of a single manufacturer in order to provide proper coordination and responsibility. Where required, Contractor shall furnish proof of installation of similar units or equipment.
- B. Each item of equipment shall bear a name plate showing the manufacturer's name, trade name, model number, serial number, ratings, and other information necessary to fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated, or painted.
- C. The label of the approving agency, such as UL, IBR, ASME, ARI, AMCA, by which a standard has been established for the particular item shall be in full view.
- D. The equipment shall be essentially the standard product of a manufacturer regularly engaged in the production of such equipment and shall be a product of the manufacturer's latest design.
- E. A service organization with personnel and spare parts shall be available within two hours for each type of equipment furnished.
- F. Install in accordance with manufacturer's recommendations. Place in service by a factory trained representative where required.
- G. Materials and equipment are specified herein by a single or by multiple manufacturers to indicate quality, material, and type of construction desired. Manufacturer's products shown on the drawings have been used as basis for design; it shall be the Contractor's responsibility to ascertain that alternate manufacturer's products, or the particular products of named manufacturers, meet the detailed specifications and that size and arrangement of equipment are suitable for installation.
- H. Model Numbers: Catalog numbers and model numbers indicated in the drawings and specifications are used as a guide in the selection of the equipment and are only listed for the contractor's convenience. The contractor shall determine the actual model numbers for ordering materials in accordance with the written description of each item and with the intent of the drawings and specifications.

2.3 Requests for Substitution:

- A. Where a particular system, product, or material is specified by name, consider it as standard basis for bidding, and base proposal on the particular system, product, or material specified.
- B. Requests by Contractor for substitution will be considered only when reasonable, timely, fully documented, and qualifying under one or more of the following circumstances:
 - 1. Required product cannot be supplied in time for compliance with Contract time requirements.

2. Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted, or insured, or has other recognized disability as certified by Contractor.

- Substantial cost advantage is offered Owner after deducting offsetting disadvantages including delays, additional compensation for redesign, investigation, evaluation, and other necessary services and similar considerations.
- C. All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design and the product proposed for substitution. Differences shall include but shall not be limited to data as follows for both the specified and substituted products:
 - 1. Principal of operation.
 - 2. Materials of construction or finishes.
 - 3. Thickness of gauge of materials.
 - 4. Weight of item.
 - 5. Deleted features or items.
 - 6. Added features or items.
 - 7. Changes in other work caused by the substitution.
 - 8. Performance curves.
 - 9. If the approved substitution contains differences or omissions not specifically called to the attention of the Architect/Engineer, the Owner reserves the right to require equal or similar features to be added to the substituted products (or to have the substituted products replaced) at the Contractor's expense.

PART 3 - EXECUTION

- 3.1 <u>Workmanship</u>: All materials and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any materials installed which do not present an orderly and reasonably neat and/or workmanlike appearance, or do not allow adequate space for maintenance, shall be removed and replaced when so directed by the Architect/Engineer.
- 3.2 Coordination:
 - A. The Contractor shall be responsible for full coordination of the mechanical systems with shop drawings of the building construction so the proper openings and sleeves or supports are provided for piping, ductwork, or other equipment passing through slabs or walls.
 - B. Any additional steel supports required for the installation of any mechanical equipment, piping, or ductwork shall be furnished and installed under the section of the specifications requiring the additional supports.
 - C. It shall be the Contractor's responsibility to see that all equipment such as valves, dampers, filters, and such other apparatus or equipment that may require maintenance and operation are made easily accessible, regardless of the diagrammatic location shown on the drawings.
 - D. All connections to fixtures and equipment shown on the drawings shall be considered diagrammatic unless otherwise indicated by detail. The actual connections shall be made to fully suit the requirements of each case and adequately provide for expansion and servicing.

E. The contractor shall protect equipment, material, and fixtures at all times. He shall replace all equipment, material, and fixtures which are damaged as a result of inadequate protection.

- F. Prior to starting and during progress of work, examine work and materials installed by others as they apply to work in this division. Report conditions which will prevent satisfactory installation.
- 3.3 Start of work will be construed as acceptance of suitability of work of others.
- 3.4 <u>Interruption of Service</u>: Before any equipment is shut down for disconnecting or tieins, arrangements shall be made with the Architect/Engineer and this work shall be
 done at the time best suited to the Owner. This will typically be on weekends and/or
 holidays and/or after normal working hours. Services shall be restored the same day
 unless prior arrangements are made. All overtime or premium costs associated with
 this work shall be included in the base bid.
- 3.5 <u>Phasing</u>: Provide all required temporary valves, piping, ductwork, equipment, and devices as required. Maintain temporary services to areas as required. Remove all temporary material and equipment on completion of work unless Engineer concurs that such material and equipment would be beneficial to the Owner on a permanent basis.
- 3.6 <u>Cutting and Patching</u>: Notify Builder to do all cutting and patching of all holes, chases, sleeves, and other openings required for installation of equipment furnished and installed under this section. Utilize experienced trades for cutting and patching. Obtain permission from Architect/Engineer before cutting any structural items.
- 3.7 <u>Equipment Setting</u>: Bolt equipment directly to concrete pads or vibration isolators as required, using hot-dipped galvanized anchor bolts, nuts, and washers. Level equipment.
- 3.8 <u>Painting</u>: Touch-up factory finishes on equipment located inside and outside shall be done under Division 23. Obtain matched color coatings from the manufacturer and apply as directed. If corrosion is found during inspection on the surface of any equipment, clean, prime, and paint, as required.
- 3.9 <u>Clean-up</u>: Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials, and remove all oil and grease spots. Repaint or touch up as required to look like new. During progress of work, contractor is to carefully clean up and leave premises and all portions of building free from debris and in a clean and safe condition.
- 3.10 <u>Start-up and Operational Test</u>: Start each item of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specification, start-up shall be done by a qualified representative of the manufacturer. Alignment, lubrication, safety, and operating control shall be included in start-up check.
- 3.11 <u>Climate Control</u>: Operate heating and cooling systems as required after initial startup to maintain temperature and humidity conditions to avoid freeze damage and warping or sagging of ceilings and carpet.
- 3.12 Record Drawings:
 - A. During the progress of the work the Contractor shall record on their field set of drawings the exact location, as installed, of all piping, ductwork, equipment, and other systems which are not installed exactly as shown on the contract drawings.
 - B. Upon completion of the work, record drawings shall be prepared as described in the General Conditions and Supplementary Conditions.

3.13 <u>Acceptance</u>:

A. Punch List: Submit written confirmation that all punch lists have been checked and the required work completed.

B. Instructions: At completion of the work, provide a competent and experienced person who is thoroughly familiar with project, for one day to instruct permanent operating personnel in operation of equipment and control systems. This is in addition to any specific equipment operation and maintenance training.

- C. Operation and Maintenance Manuals: Furnish four complete manuals bound in ring binders with Table of Contents, organized, and tabbed by specification section.

 Manuals shall contain:
 - 1. Detailed operating instructions and instructions for making minor adjustments.
 - 2. Complete wiring and control diagrams.
 - 3. Routine maintenance operations.
 - 4. Manufacturer's catalog data, service instructions, and parts lists for each piece of operating equipment.
 - 5. Copies of approved submittals.
 - 6. Copies of all manufacturer's warranties.
 - 7. Copies of test reports and verification submittals.
- D. Record Drawings: Submit record drawings.
- E. Test and Balance Report: Submit four electronic certified copies. The Report shall be submitted for review prior to the Substantial Completion Inspection.
- F. Acceptance will be made on the basis of tests and inspections of job. A representative of firm that performed test and balance work shall be in attendance to assist. Contractor shall furnish necessary mechanics to operate system, make any necessary adjustments and assist with final inspection.

PROJECT NAME PROJECT NUMBER

ARCHITECT: Company Name

ENGINEER: Mitchell Gulledge Engineering

CONTRACTOR: Contractor Name

SUBCONTRACTOR: Sub Name

SUPPLIER: Supply Company

MANUFACTURER: Manufacturer

DATE: mm/dd/yyyy

SECTION: 23 XX XX/Section Name

1. Product 1: Manufacturer, Model

2. Product 2: Manufacturer, Model

3. Product 3: Manufacturer, Model

4. Product 4: Manufacturer, Model

5. Product 5: Manufacturer, Model

Include GC or CM Approval stamp indicating review and acceptance by responsible contractor.

END OF SECTION 23 00 00

SAMPLE

Any standard heading is acceptable.

List each product individually. Include manufacturer name and model.

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23 00 00 - 8 HVAC GENERAL

SECTION 23 05 01 - HVAC CODES AND STANDARDS

PART 1 - GENERAL

1.1 The work covered by this division consists of providing all labor, equipment, and materials and performing all operations necessary for the installation of the mechanical work as herein called for and shown on the drawings.

1.2 Related Documents:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- B. This section is a Basic Mechanical Materials and Methods section. Provisions of this section apply to work of all Division 23 sections.

1.3 Code Compliance:

- A. All work under Division 23 shall be constructed in accordance with the codes listed herein. The design has been based on the requirements of these codes; and while it is not the responsibility of the Contractor to verify that all work called for complies with these codes, he shall be responsible for calling to the Architect/Engineer's attention any drawings or specifications that are not in conformance with these or other codes prior to ordering equipment or installing work.
- B. The following codes and standards shall govern all work:
 - 1. Florida Building Code Seventh Edition (2020)
 - 2. Florida Building Code Seventh Edition (2020) Existing Building
 - 3. Florida Building Code Seventh Edition (2020) Energy Conservation
 - 4. Florida Building Code Seventh Edition (2020) Mechanical
 - 5. Florida Building Code Seventh Edition (2020) Plumbing
 - 6. Florida Building Code Seventh Edition (2020) Accessibility
 - 7. National Electric Code (NFPA 70 2017)
 - 8. Fire Alarm and Signaling Code (NFPA 72 2016)
 - 9. Standard for Air Conditioning and Ventilating Systems (NFPA 90A 2018)
 - 10. Florida Fire Prevention Code Seventh Edition
 - Fire Code (NFPA 1 2018)
 - b. Life Safety Code (NFPA 101 2018)

1.4 Standards:

- A. All mechanical materials, installation, and systems shall meet the requirements of the following standards, including the latest addenda and amendments, to the extent referenced:
 - 1. IFAS construction standards
 - 2. University of Florida Design and Construction Standards
 - 3. Underwriters' Laboratories (UL)
 - 4. American National Standards Institution (ANSI)
 - 5. American Society of Testing Materials (ASTM)
 - 6. National Fire Protection Association (NFPA)
 - 7. National Electrical Manufacturers Association (NEMA)
 - 8. Air Conditioning and Refrigeration Institute (ARI)
 - 9. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

- 10. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
- 11. Air Movement and Control Association (AMCA)

PART 2 - PRODUCTS

2.1 None.

PART 3 - EXECUTION

- 3.1 Comply with regulations and codes of utility suppliers.
- 3.2 Where no specific method or form of construction is called for in the contract documents, the Contractor shall comply with code requirements when carrying out such work.
- 3.3 Where code conflict exists, generally the most restrictive requirement applies. Comply with current code edition, unless noted.
- 3.4 Additional codes or standards applying to a specific part of the work may be included in that section.

END OF SECTION 23 05 01

SECTION 23 05 02 - HVAC RELATED WORK

PART 1 - GENERAL

1.1 The work covered by this division consists of providing all labor, equipment, and materials and performing all operations necessary for the installation of the mechanical work as herein called for and shown on the drawings.

1.2 Related Documents:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- B. This section is a Basic Mechanical Materials and Methods section. Provisions of this section apply to work of all Division 23 sections.
- C. Review all other contract documents to be aware of conditions affecting work herein.

PART 2 - DIVISION 3 - CONCRETE

- 2.1 Refer to local building codes and owner construction standard as well as Division 3 Concrete for:
 - A. Rough grouting in and around mechanical work.
 - B. Patching concrete cut to accommodate mechanical work.
- 2.2 <u>The following is part of Division 23 work</u>, complying with the following requirements of local building codes and owner construction standards as well as Division 3.
 - A. Curbs, foundations, and pads for mechanical equipment.
 - B. Basins, sumps, and vaults of mechanical work.
 - C. Underground structural concrete to accommodate mechanical work.
 - D. Inertia bases.

PART 3 - DIVISION 4 - MASONRY

- 3.1 Refer to local building codes and owner construction standard as well as Division 4 Masonry for:
 - Installation of wall louvers.
 - B. Installation of access doors in walls.

PART 4 - DIVISION 5 - METALS

- 4.1 Refer to local building codes and owner construction standards as well as Division 5, Metals for:
 - A. Framing openings for mechanical equipment.
- 4.2 <u>Perform the following is part of Division 23 work,</u> complying with local building codes and owner construction standards as well as Division 5.
 - A. Supports for mechanical work.

PART 5 - DIVISION 6 - WOOD AND PLASTIC

- 5.1 Refer to local building codes and owner construction standard as well as Division 6 Wood for:
 - A. Framing openings for mechanical equipment.

PART 6 - DIVISION 7 - THERMAL AND MOISTURE PROTECTION

- 6.1 <u>Refer to local building codes and owner construction standard as well as Division 7 Thermal and Moisture Protection for:</u>
 - A. Installation of all roof curbs and roof supports for mechanical work.
 - B. Caulking and waterproofing of all wall and roof mounted mechanical work.
 - C. Providing all roof curbs and all vent flashing for metal roofs.
- 6.2 <u>Perform the following is part of Division-23 work</u>, complying with local building codes and owner construction standards as well as Division 7 Thermal and Moisture Protection:
 - Fire barrier penetration seals.

PART 7 - DIVISION 8 - DOORS AND WINDOWS

- 7.1 Refer to local building codes and owner construction standard as well as Division 8 Doors and Windows for:
 - A. Installation of all door grilles.
 - B. Providing all undercuts.

PART 8 - DIVISION 9 - FINISHES

- 8.1 Refer to local building codes and owner construction standard as well as Division 9 Finishes for:
 - A. Painting exposed ductwork, piping, and equipment.
 - B. Painting structural metal and concrete for mechanical work.
 - C. Painting door grilles and access panels.
 - D. Painting color-coded mechanical work indicated for continuous painting.
 - E. Installation of access doors in gypsum drywall.
- 8.2 Colors shall be selected by the Architect for all painting of exposed mechanical work in occupied spaces, unless specified herein. Do not paint insulated or jacketed surfaces.
- 8.3 <u>Perform the following is part of Division-23 work,</u> complying with local building codes and owner construction standards as well as Division 9 Finishes:
 - A. Touch up painting of factory finishes.
 - B. Painting of all hangers.

PART 9 - DIVISION 10 - SPECIALTIES

- 9.1 Refer to local building codes and owner construction standard as well as Division 10 Specialties for:
 - A. Fire extinguishers and fire extinguisher cabinets and accessories.

PART 10 - DIVISION 11 - EQUIPMENT

- 10.1 <u>Perform the following is part of Division-23 work</u>, complying with local building codes and owner construction standards as well as Division 11 Equipment:
- 10.2 Refer to local building codes and owner construction standard as well as Division 11 Equipment for: all the laboratory equipment including cabinets, casework, student stations, demonstration desks, fume hoods, snorkel exhausts, canopy hoods, safety stations, eyewashes, and all related fixtures, fittings, and trim.
- 10.3 <u>Perform the following is part of Division-23 work,</u> complying with local building codes and owner construction standards as well as Division 11 Equipment:
 - A. All rigid ductwork, fans, related devices, and final connections necessary to make fume hoods, canopy hoods, and snorkel exhausts, canopy hoods.

PART 11 - DIVISION 26 - ELECTRICAL

- 11.1 Mechanical contractor shall coordinate the exact electrical requirements of all mechanical equipment being provided with the electrical contractor. Where approval submittals are required, this coordination shall be accomplished prior to making the submittals. The electrical design shown on the drawings supports the mechanical equipment basis of design. If mechanical equipment is submitted with different electrical requirements, it is the responsibility of the mechanical contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the mechanical submittal with a written statement that this design will be provided at no additional cost. Mechanical submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.
- Mechanical contractor shall provide all HVAC control wiring including the Energy Management Control system sensors, alarms, and input/output signals and all relays, interlocks, warning lights, and control devices, complying with the requirements of Division 26. The intent is for the mechanical contractor to be responsible for the entire HVAC control system, including point-to-point wiring.
- 11.3 Electrical contractor shall provide disconnect switches, starters, and contactors for mechanical equipment unless specifically noted as being furnished as part of mechanical equipment.
- 11.4 Electrical contractor shall provide all power wiring, raceway, and devices, and make final electrical connections to all mechanical equipment, switches, starters, contactors, controllers, and similar equipment.
- 11.5 All duct-mounted smoke detectors shall be furnished and wired by the electrical contractor and installed by the mechanical contractor.
 - A. Storm piping connecting to condensate system.

END OF SECTION 23 05 02

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SECTION 23 05 15 - HVAC IDENTIFICATION

PART 1 - GENERAL

1.1 The work covered by this division consists of providing all labor, equipment, and materials and performing all operations necessary for the installation of the mechanical work as herein called for and shown on the drawings.

1.2 Related Documents:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- B. This section is a Division 23 Basic Mechanical Materials and Methods section and is a part of each Division 23 section making reference to or requiring identification specified herein.
- C. Extent of identification required by this section is indicated on drawings and/or specified in other Division 23 sections.
- D. Refer to Division 26 sections for identification requirements of electrical work; not work of this section.
- E. Refer to Division 25 sections for identification requirements of building automation work; not work of this section.
- 1.3 <u>Codes and Standards</u>: Comply with applicable codes pertaining to product materials and installation of identification. Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.4 Quality Assurance:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of identification products, of types and sizes required, whose products have been in satisfactory use in similar service for not less than five years.

PART 2 - PRODUCTS

- 2.1 <u>General</u>: Provide manufacturer's standard products of categories and types required for each application as referenced in other Division-23 sections. Where more than single type is specified for application, selection is Installer's option, but provide single selection for each product category.
- 2.2 Painted Identification Materials:
 - A. Stencils: Standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendations of ANSI A13.1 for piping and similar applications, but not less than 1-1/4" high letters for ductwork and not less than 3/4" high letters for access door signs and similar operational instructions.
 - B. Stencil Paint: Standard exterior type stenciling enamel; black, except as otherwise indicated; either brushing grade or pressurized spray-can form and grade.
 - C. Identification Paint: Standard identification enamel.
 - D. Plastic Pipe Markers.
 - E. Pressure-Sensitive Type: Provide manufacturer's standard pre-printed, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers.
 - F. Lettering: Manufacturer's standard pre-printed nomenclature which best describes piping system in each instance, as selected by Architect/Engineer in cases of variance with name as shown or specified.

G. Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.

2.3 <u>Engraved Plastic-Laminate Signs</u>:

- A. General: Provide engraving stock melamine plastic laminate, in the sizes and thicknesses indicated, engraved with engraver's standard letter style a minimum of 3/4" tall and wording indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
- B. Thickness: 1/16" for units up to 20 sq. in. or 8" length; 3/32" for larger units.
- C. Fasteners: Self-tapping stainless-steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.
- 2.4 <u>Stamped Nameplates</u>: Provide equipment manufacturer's standard stamped nameplates for motors and AHUs.

PART 3 - EXECUTION

3.1 <u>Coordination</u>: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

3.2 Ductwork Identification:

- A. General: Identify air supply, return, exhaust, intake and relief ductwork with stenciled signs and arrows, showing ductwork service and direction of flow, in black or white.
- B. Location: In each space where ductwork is exposed, or concealed only by removable ceiling system, locate signs near points where ductwork originates or continues into concealed enclosures, and at 50' spacings along exposed runs.
- C. Access Doors: Provide stenciled signs on each access door in ductwork and housings, indicating purpose of access (to what equipment) and other maintenance and operating instructions, and appropriate and procedural information.

3.3 Piping System Identification:

- A. General: Install pipe markers of one of the following types on each system indicated to receive identification, and include arrows to show normal direction of flow:
- B. Plastic pipe markers.
- C. Stenciled markers, black or white for best contrast.
- D. Locate pipe markers as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces and exterior non-concealed locations.
- E. Near each valve and control device.
- F. Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch, where there could be question of flow pattern.
- G. Near locations where pipes pass through walls, floors, ceilings, or enter non-accessible enclosures.
- H. At access doors, manholes and similar access points which permit view of concealed piping.
- I. Near major equipment items and other points of origination and termination.
- J. Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.

- K. On piping above removable acoustical ceilings, except omit intermediately spaced markers.
- 3.4 <u>Mechanical Equipment Identification</u>: Install engraved plastic laminate sign on a vertical surface on or near each major item of mechanical equipment and each operational device. Label shall indicate type of system and area served. Install clear self adhesive labels on ceiling grid at serviceable locations for above ceiling equipment. Provide signs for the following general categories of equipment and operational devices:
 - A. Main control and operating valves, including safety devices.
 - B. Meters, gauges, thermometers, and similar units.
 - C. Fuel-burning units including boilers, furnaces, and heaters.
 - D. Pumps, compressors, chillers, condensers, and similar equipment.
 - E. Heat exchangers, coils, evaporators, cooling towers, heat recovery units, and similar equipment.
 - F. Fans, blowers, primary balancing dampers, and VAV boxes.
 - G. HVAC air handlers and fan coil units.
 - H. Tanks and pressure vessels.
 - I. Air conditioning indoor and outdoor units.
- 3.5 <u>Stamped Nameplates</u>: Equipment manufacturers to provide standard stamped nameplates on all major equipment items such as motors, pumps, AHUs, etc. Where motors are hidden from view (within equipment casing, or otherwise not easily accessible, etc.), the equipment supplier shall furnish a duplicate motor data nameplate to be affixed to the equipment casing in an easily visible location, unless data is already included on the equipment nameplate.

END OF SECTION 23 05 15

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SECTION 23 06 93 - TESTING ADJUSTING BALANCING OF HVAC SYSTEMS

PART 1 - GENERAL

1.1 The work covered by this division consists of providing all labor, equipment, and materials and performing all operations necessary for the installation of the mechanical work as herein called for and shown on the drawings.

1.2 Related Documents:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- B. This section is a Division 23 Basic Mechanical Materials and Methods section and is a part of each Division 23 section making reference to or requiring testing, adjusting, and balancing as specified herein.
- C. Extent of testing, adjusting, and balancing by this section is indicated on drawings and/or specified in other Division 23 sections.
- 1.3 <u>Codes and Standards</u>: Comply with applicable codes and standards pertaining to testing, adjusting, and balancing.

1.4 Quality Assurance:

A. Testing, adjusting, and balancing shall be performed by a licensed firm who regularly engages in facilities of similar size and scope, with satisfactory use in similar service for not less than five years. The qualified testing, adjusting, and balancing firm shall have an office within 2 hours travel time to the jobsite and provide emergency service capabilities.

1.5 <u>Description of Work:</u>

- A. Extent of testing, adjusting, and balancing work (TAB) is indicated by requirements of this section, and also by drawings and schedules, and is defined to include, but is not necessarily limited to, air distribution systems, hydronic distribution systems and associated equipment and apparatus of mechanical work. The work consists of setting speed and volume (flow) adjusting facilities provided for systems, recording data, conducting tests, preparing and submitting reports, and recommending modifications to work as required.
- B. Coordination: Coordinate with the General Contractor and Mechanical Contractor responsible for the HVAC system installation as required to complete the TAB work.
- 1.6 The intent of this specification is to balance HVAC systems within the tolerances listed, maintaining the pressure relationships indicated, with a minimum of noise.

A. Airflow Tolerances:

- 1. Air Handling: The supply air, return air, and outdoor air quantities shall be balanced within +/-5% of design values.
- Exhaust Fans: The exhaust fan quantities shall be set as required to maintain the design exhaust terminal flows within +/-5% of design values. If no exhaust terminals exist, exhaust fan air quantities shall be balanced within +/-10% of design values.
- 3. Ceiling Diffusers, Supply Registers, Return and Exhaust Inlets: Balance to an air quantity within +/-10% of the design values.
- B. Temperature Tolerances:

1. Air Handling Temperatures: The controlled temperatures at AHUs shall be verified to be under control within +/-1°F of design values.

1.7 <u>Quality Assurance</u>: The TAB Contractor shall be certified as follows:

- A. Tester: A firm certified by National Environmental Balancing Bureau (NEBB) in those testing and balancing disciplines required for this project, who is not the Installer of the systems to be tested and is otherwise independent of the project. Comply with NEBB's "Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems" as applicable to this work.
- B. Tester: A firm certified by Associated Air Balance Council (AABC) in those testing and balancing disciplines required for this project. AABC-certified firms are independent by definition. Comply with AABC's Manual MN-1 "AABC National Standards", as applicable to this work.
- C. Industry Standards: Comply with American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) recommendations pertaining to measurements, instruments and testing, adjusting and balancing, except as otherwise indicated.

1.8 <u>Job Conditions</u>:

- A. Do not proceed with testing, adjusting, and balancing work until HVAC work (including Controls) has been completed and is operable. Ensure that there is no residual work still to be completed.
- B. Do not proceed until work scheduled for testing, adjusting, and balancing is clean and free from debris, dirt, and discarded building materials.
- C. Do not proceed until architectural work that would affect balancing (walls, ceiling, windows, doors) have been installed.
- D. Testing may proceed system by system, but each HVAC system must be complete as describe herein.
- E. The mechanical contractor shall make any changes in pulleys, belts, and dampers, and/or add dampers as required for correct balancing.

1.9 <u>Approval Submittals</u>:

- A. Submit the name of the proposed test and balance company for the Engineer's approval within thirty (30) days after awarding of contract. Provide blank templates for all tests specified and proof of certification/qualifications.
- B. <u>O&M Data Submittals</u>: Submit a copy of all approval submittals. Submit maintenance data and parts list. Include this date in O&M Manual.

1.10 Test Reports and Verification Submittals:

A. Submit an electronic copy of the dated test and balance report upon completion of TAB work. The report shall include a list of instruments used for the work. The report shall be signed by the supervisor who performed the TAB work.

PART 2 - PRODUCTS

- 2.1 <u>Patching Materials</u>: Except as otherwise indicated, use same products as used by original Installer for patching holes in insulation, ductwork, and housings which have been cut or drilled for test purposes, including access for test instruments, attaching jigs, and similar purposes.
- 2.2 <u>Test Instruments</u>: Utilize test instruments and equipment of the type, precision, and capacity as recommended in the referenced standard. All instruments shall be in good

condition and shall have been calibrated within the previous six (6) months (or more recently if required by standard).

PART 3 - EXECUTION

3.1 General:

- A. Examine installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned, and is operable. Do not proceed with TAB work until unsatisfactory conditions have been corrected in manner acceptable to Tester.
- B. Test, adjust, and balance environmental systems and components, as indicated, in accordance with procedures outlined in applicable standards, and as modified or detailed herein.
- C. Test, adjust, and balance systems during summer season for air conditioning systems and during winter season for heating systems, including at least a period of operation at outside conditions within 5°F wet bulb temperature of maximum summer design condition, and within 10°F dry bulb temperature of minimum winter design condition. When seasonal operation does not permit measuring final temperatures, then take final temperature readings when seasonal operation does permit. The Contractor shall return for a change of seasons test at no additional cost to the Owner and submit the revised TAB report.
- D. Punch List: Prepare a deficiency (punch)list for the Contractor with a copy of the Engineer that lists all items that are incorrectly installed or are functioning improperly. Provide a retest after all items are corrected.
- E. Prepare TAB report of test results, including instrumentation calibration reports, in format recommended by applicable standards, modified as required to include all data listed herein.
- F. Patch holes in insulation, ductwork, and housings, which have been cut or drilled for test purposes, in manner recommended by original Installer.
- G. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings at completion of TAB work. Provide markings with paint or other suitable permanent identification materials.
- H. Include in the TAB report recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.
- I. Include an extended warranty of ninety (90) days after completion of test and balance work, during which time the Engineer, at his discretion, may request a recheck, or resetting of any component as listed in test report. The TAB company shall provide technicians and instruments and make any tests required by the Engineer during this time period.

3.2 Controls:

- A. Check all HVAC controls for proper location, calibration, and sequence of operation.
- B. Check operation of all controllers and controlled devices to verify proper action and direction. Check the operation of all interlocks.

3.3 Air Balancing:

- A. Leakage tests on ductwork must have been completed before air balancing.
- B. Set dampers, volume controls, and fan speeds to obtain specified air delivery with minimum noise level. Rebalance as required to accomplish this. Simulate fully loaded filters during test.

- C. Set grille deflections as noted on plans. Modify deflections if required to eliminate drafts or objectionable air movement.
- D. Record air terminal velocity after completion of balance work.
- E. Record final grille and register deflection settings if different from that specified on contract drawings.
- F. Record all fan speeds.

3.4 <u>Data Collection</u>:

- A. In addition to the data required for any specified performance tests, measure and record the temperatures, pressures, flow rates, and nameplate data for all components listed herein.
- B. It is the intent of this section to record data on balanced systems, under normal operating or design conditions.
- C. Temperatures:
 - 1. Outside dry and wet bulb temperatures.
 - 2. Dry bulb temperature in each room and at least one wet bulb temperature in each zone.
 - 3. Refrigerant liquid and suction temperatures.
 - 4. Inlet and outlet temperature of each heat exchange device both fluids.
- D. Pressures:
 - 1. Suction and discharge static pressure of each fan.
 - 2. Each refrigerant suction and discharge pressure.
- E. Flow rates:
 - 1. Flow rate through each fan.
- F. Nameplate Data:
 - 1. Complete nameplate data for all equipment.
 - 2. Motor data to include horsepower, phase, voltage, RPM, full load nameplate current, fuse rating in disconnect switch, number or manufacturer's size designation, and ampere rating of overcurrent and low voltage protection devices in starters.
- 3.5 All test openings in ductwork shall be resealed in an approved manner.

END OF SECTION 23 06 93

SECTION 23 07 13 - EXTERIOR DUCTWORK INSULATION

PART 1 - GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.3 <u>Approval Submittals</u>:
 - A. <u>Product Data</u>: Submit producer's data sheets and installation instructions on each insulation system including insulation, coverings, adhesives, sealers, protective finishes, and other material recommended by the manufacturer for applications indicated. Submit for:
 - 1. Rigid duct insulation
 - 2. Flexible duct insulation
- 1.4 <u>O&M Data Submittals</u>: Submit a copy of all approval submittals. Include in O&M Manual.

PART 2 - PRODUCTS

- 2.1 <u>Acceptable Manufacturers</u>: Subject to compliance with requirements, provide insulation products by Knauf, Owens-Corning, Johns Manville, Certainteed.
- 2.2 <u>Flame/Smoke Ratings</u>: Provide composite mechanical insulation (insulation, coverings, sealers, mastic, and adhesive) with a flame spread rating of 25 or less, and a smoke-developed rating of 50 or less as tested by ANSI/ASTM 84.
- 2.3 <u>Rigid Fiberglass Insulation Board</u>: ASTM C612, Class 1 (non-load bearing). Boards shall be 2" thick 3 pcf density with UL rated aluminum foil vapor barrier (FSK).
- 2.4 <u>Flexible Fiberglass Insulation</u>: ASTM C553, Type I, Class B-3 (temperature less than 350°F). Duct wrap shall be 1 pcf density with UL rated aluminum foil vapor barrier (FSK).
- 2.5 <u>General Purpose Mastic</u>: Benjamin Foster 35-00 Series, Childers CP-10, or approved equal. The final selection of this product for the specific application indicated is the responsibility of the insulation supplier. The insulation system must meet the specified application.
- 2.6 <u>Vapor Barrier Sealant</u>: Benjamin Foster 30-35, 3M EC-1378, Childers CP-30, or approved equal. Provide "Low Odor" type. The final selection of this product for the specific application indicated is the responsibility of the insulation supplier. The insulation system must meet the specified application.
- 2.7 <u>Adhesive</u>: Benjamin Foster 85-20, 3M EC-35, Childers CP-82, Childers CP-89, or approved equal. The final selection of this product for the specific application indicated is the responsibility of the insulation supplier. The insulation system must meet the specified application.
- 2.8 Fiber-Glas Mesh: 10x10 Mesh. Foster Mastafab or equal.

PART 3 - EXECUTION

- 3.1 <u>Insulate</u> all supply, return, and outdoor air ductwork exposed in mechanical rooms, mezzanines, fan lofts or in any finished spaces with 1-1/2" thick rigid fiberglass insulation with vapor barrier.
- 3.2 Installation of Rigid Insulation:

A. Clean and dry ductwork prior to insulating. Butt insulation firmly together to ensure complete and tight fit over surfaces to be covered. Install insulation materials with smooth and even surfaces. Maintain integrity of aluminum vapor barrier wherever possible. Extend insulation without interruption through walls, floors, and similar ductwork penetrations except where otherwise indicated.

- B. Adhere insulation to duct with 50 percent coverage using approved insulation adhesive applied in 6" wide swaths with 6" spaces between swaths. Additionally, secure insulation with perforated pins and Tuff-Bond or with welded pins. Space on 12" centers and 3" from all edges. Ducts up through 24" wide only require one row of pins. Ducts over 24" wide shall have pins spaced as described herein. Screwed pins are not acceptable.
- C. Apply open mesh glass fabric embedded in vapor barrier mastic. Then apply a second coat of general purpose mastic with aluminum grey color. This finish shall be complete over all rigid insulation.
- 3.3 Insulate all supply, return and outdoor air ductwork concealed above ceilings, in chases, or elsewhere, and the backs of all ceiling supply outlets with 2" thick fiberglass blanket insulation with vapor barrier.
- 3.4 Installation of Flexible Insulation:
 - A. Insulate round elbows and fittings with wrap such that thickness is equal to adjoining duct covering. Clean and dry ductwork prior to insulating.
 - B. Adhere insulation to duct with 50 percent coverage using approved insulation adhesive applied in 6" wide swaths with 6" spaces between swaths. Additionally, secure insulation with perforated pins and Tuff-Bond or by self-sticking pins with a 3/8" self-tapping screw. Space on 12" centers and 3" from all edges. Ducts up through 24" wide only require one row of pins. Ducts over 24" wide shall have pins spaced as described herein. Screwed pins are not acceptable.
 - C. Lap all joints 2" and seal joints with 4" wide strips of open mesh glass fabric embedded in two coats of general purpose mastic.
 - D. Seal all punctures and breaks in aluminum vapor barrier with open mesh glass fabric and vapor barrier sealant.

END OF SECTION 23 07 13

SECTION 23 08 05 - START-UP REQUIREMENTS FOR HVAC SYSTEMS

PART 1 - GENERAL

1.1 <u>Intent</u>: It is the intent of this section to require that the startup requirements and report noted herein be performed prior to starting TAB work on each system. Work can be phased with permission of the Engineer.

1.2 Coordination:

- A. The Contractor shall furnish to the TAB Contractor a complete set of plans, specification, addenda, shop drawings, equipment performance data sheets, change orders, etc. as requested by the TAB Contractor.
- B. The Contractor shall participate in a TAB coordination meeting to discuss interface requirements with the TAB Contractor and to establish a schedule for TAB work prior to start of TAB work.

1.3 Test Reports and Verification Submittals:

A. Submit Startup Report as described herein for each system. Attach Factory Startup Report for equipment as required by other Division-23 sections.

PART 2 - PRODUCTS: None

PART 3 - EXECUTION:

- 3.1 The TAB work shall not commence until the Engineer has received written notice from the Contractor that HVAC systems are 100% complete and are fully operational. Submit Startup Report as described herein.
- 3.2 The Contractor shall place all HVAC systems and equipment into complete operation during each working day of TAB work.
- 3.3 The Contractor shall provide access to HVAC systems and equipment by supplying ladders and/or scaffolding, and opening access panels and equipment room doors.
- 3.4 The TAB Contractor will provide to the Contractor TAB punch lists of non-complying HVAC work as they are discovered. The Contractor shall replace or repair non-complying work as soon as possible in order not to delay completion of TAB work.
- 3.5 <u>Airside Systems</u>: The Contractor shall provide the following information to the Engineer to substantiate proper start-up and preliminary adjustments of air handler units, belt driven fans, and duct systems.
 - A. Verify that air grilles (supply, return, exhaust, transfer, outdoor, etc.) are installed and connected to the duct system.
 - B. Verify that duct systems are clean of debris.
 - C. Verify that ducts attached with flexible connectors are aligned within 1/2" and have a uniform gap between ducts of 1"-1.5". Flexible connectors shall not leak and shall be insulated
 - D. Verify that filters are clean and filter spacers are installed.
 - E. Verify that balancing dampers at grilles and branch ducts are operational and are fully opened.
 - F. Verify that fan discharges are appropriate for the outlet ductwork with regards to the "system effect" per AMCA Publication 201. Inappropriate fan discharges will not be accepted.
 - G. Verify proper fan rotation.
 - H. Verify proper belt drive alignment.
 - I. Verify fan motor overload elements are correctly sized.

J. Adjust fan sheave until CFM is at or above design CFM. Provide additional sheaves and belts as required.

- K. Verify that motor is not overloaded.
- L. Verify that HVAC control systems are fully operational.
- 3.6 <u>Startup Report</u>: The Contractor shall submit the startup information required by this section to the Engineer in a typed report organized as outlined herein. The Startup Report is required to meet the written notice described herein prior to starting TAB work. TAB work will not start until the Startup Report has been submitted in a complete manner acceptable to the Owner and the Owner's agent.

END OF SECTION 23 08 05

SECTION 23 31 00 - METAL DUCTWORK

PART 1 - GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.
- 1.3 Extent of HVAC metal ductwork is indicated on drawings and in schedules, and by requirements of this section.
- 1.4 Refer to other Division-23 sections for exterior insulation of metal ductwork.
- 1.5 Refer to other Division-23 sections for ductwork accessories.
- 1.6 Codes and Standards:
 - A. SMACNA Standards: Comply with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" Latest Edition for fabrication and installation of metal ductwork, unless otherwise noted.
 - B. NFPA 90A Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.7 <u>Approval Submittals:</u>

- A. Product Data: Submit manufacturer's technical product data and installation instructions for the following.
 - 1. Factory-fabricated ductwork
 - 2. Sealants
 - 3. Side take-off fittings
- B. Shop Drawings: Submit scaled layout drawings of HVAC metal ductwork and fittings including, but not limited to, duct sizes, locations, elevations, and slopes of horizontal runs, wall and floor penetrations, and connections. Show interface and spatial relationship between ductwork and proximate equipment. Show modifications of indicated requirements, made to conform to local shop practice, and how those modifications ensure that free area, materials, and rigidity are not reduced.

PART 2 - PRODUCTS

2.1 Ductwork Materials:

- A. Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, stains and discolorations, and other imperfections, including those which would impair painting.
- B. Galvanized Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A653, lockforming quality; with G 90 zinc coating in accordance with ASTM A653; and mill phosphatized for exposed locations. Stamp gauge and manufacturer's identification on each sheet. Break sheets so that identification is exposed.

2.2 Miscellaneous Ductwork Materials:

A. General: Provide miscellaneous materials and products of types and sizes indicated and, where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.

B. Duct Sealant: Provide UL listed low VOC non-hardening, non-migrating mastic or liquid elastic sealant, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork. Sealant shall be NFPA 90A and 90B compliant.

- C. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim, and angles for support of ductwork.
- D. Fittings: Provide radius type fittings fabricated of multiple sections with maximum 15° change of direction per section. Unless specifically detailed otherwise, use 45° laterals and 45° elbows for branch takeoff connections. Where 90° branches are indicated, provide conical type tees.

2.3 <u>Fabrication</u>:

- A. Shop fabricate ductwork in 4, 8, 10, or 12-ft lengths, unless otherwise indicated or required to complete runs. Preassemble work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling. Match-mark sections for reassembly and coordinated installation.
- B. Shop fabricate ductwork of gauges and reinforcement complying with SMACNA "HVAC Duct Construction Standards", except provide sealant at all joints. Supply duct between AHU discharge and terminal units shall be minimum 4" pressure class.
- C. Fabricate duct fittings to match adjoining ducts, and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with centerline radius equal to 1-1/2 times associated duct width; and fabricate to include turning vanes in elbows where shorter radius is necessary. Limit angular tapers to 30° for contracting tapers and 20° for expanding tapers.
- D. Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division-23 section "Ductwork Accessories" for accessory requirements.

2.4 Factory-Fabricated High Pressure Ductwork (3" W.G. and Higher):

A. Round Ductwork: Construct of galvanized sheet steel complying with ASTM A 527 by the following methods and in minimum gauges listed.

| <u>Diameter</u> | Minimum Gauge | Method of Manufacture |
|-----------------|---------------|-----------------------|
| 3" to 14" | 26 | Spiral Lockseam |
| 15" to 26" | 24 | Spiral Lockseam |
| 27" to 36" | 22 | Spiral Lockseam |
| 37" to 50" | 20 | Spiral Lockseam |
| 51" to 60" | 18 | Spiral Lockseam |
| Over 60" | 16 | Longitudinal Seam |

- 1. Provide locked seams for spiral duct; fusion-welded butt seam for longitudinal seam duct.
- 2. <u>Fittings and Couplings</u>: Construct of minimum gauges listed. Provide continuous welds along seams.

| <u>Diameter</u> | <u>Minimum Gauge</u> |
|-----------------|----------------------|
| 3" to 36" | 20 |
| 38" to 50" | 18 |
| Over 50" | 16 |

B. <u>Flat-Oval Ductwork</u>: Construct of galvanized sheet steel complying with ASTM A 527, of spiral lockseam construction, in minimum gauges listed.

| Maximum Width | Minimum Gauge |
|---------------|---------------|
| Under 25" | 24 |
| 25" to 48" | 22 |
| 49" to 70" | 20 |
| Over 70" | 18 |

1. <u>Fittings and Couplings</u>: Construct of minimum gauges listed. Provide continuous weld along seams.

| _ | |
|---------------|---------------|
| Maximum Width | Minimum Gauge |
| Under 37" | 20 |
| 37" to 50" | 18 |
| Over 50" | 16 |

- C. <u>Optional Ducts and Fittings</u>: At Installer's option, provided that certified tests by Manufacturer show that rigidity and performance is equivalent to SMACNA standard gauge ductwork, provide ducts and fittings as follows:
 - 1. <u>Ducts</u>: Construct of Manufacturer's standard gauge, with spiral lock seam and intermediate standing rib.
 - 2. <u>Fittings</u>: Construct by fabricating with spot welding and bonding with neoprene-base cement in lieu of continuous weld seams.
 - 3. <u>Acceptable Manufacturers</u>: Subject to compliance with requirements, provide factory-fabricated ductwork Semco Mfg., Inc. or United Sheet Metal Div., United McGill Corp., or approved equal.

PART 3 - EXECUTION

- 3.1 <u>General</u>: Examine areas and conditions under which HVAC metal ductwork is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.
- 3.2 <u>Installation of Metal Ductwork:</u>
 - A. General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air-tight (5% leakage for systems rated 3" and under; 1% for systems rated over 3") and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately at connections, within 1/8" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers, and anchors of type which will hold ducts true-to-shape and to prevent buckling. Support vertical ducts at every floor.
 - B. Supports: Install concrete inserts for support of ductwork in coordination with formwork, as required to avoid delays in work. Install self-drilling screw anchors in prestressed concrete or existing work.
 - C. Field Fabrication: Complete fabrication of work at project as necessary to match shop-fabricated work and accommodate installation requirements. Seal joints in round or oval ductwork with hard cast or shrink bands, and sheet metal screws, or by welding.
 - D. Routing: Locate ductwork runs, except as otherwise indicated, vertically and horizontally. Avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details, and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct useable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other

structural and permanent enclosure elements of building. Limit clearance to 1/2" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. In finished and occupied spaces, conceal ductwork from view by locating in mechanical shafts, hollow wall construction or above suspended ceilings, unless specifically noted as "Exposed". Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

- E. Electrical Equipment Spaces: Do not route ductwork through transformer vaults or other electrical equipment spaces and enclosures.
- F. Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gauge as duct. Overlap opening on 4 sides by at least 1-1/2". Fasten to duct and substrate. Where ducts pass through firerated floors, walls, or partitions, provide firestopping between duct and substrate.
- G. Coordination: Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.
- H. Installation: Install metal ductwork in accordance with SMACNA HVAC Duct Construction Standards. Fan discharge outlet ducts shall be installed correctly with regard to "system effect" per AMCA Publication 201.
- 3.3 <u>Leakage Tests</u>: After each duct system is completed, test for duct leakage in accordance with Sections 3 and 5 of the SMACNA HVAC Air Duct Leakage Test Manual. Test pressure shall be equal to pressure class of duct, less 0.5" static pressure. Repair leaks and repeat tests until total leakage is less than 5% of system design air flow for low pressure systems and less than 1% for systems rated over 3".
- 3.4 <u>Equipment Connections</u>: Connect metal ductwork to equipment as indicated, provide flexible connection for each ductwork connection to equipment mounted on vibration isolators, and/or equipment containing rotating machinery. Provide access doors as indicated.
- 3.5 <u>Clean ductwork internally free of dust and debris.</u> Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration. Keep ducts closed with poly during construction to prevent contamination by construction dust and debris.
- 3.6 <u>Balancing</u>: Refer to Division-23 section "Testing, Adjusting, and Balancing" for air distribution balancing of metal ductwork; not work of this section. Seal any leaks in ductwork that become apparent in balancing process.
- 3.7 <u>System Adjustment</u>: Adjust the system to provide functional operation to the extent possible, and leave ready for Testing and Balancing work. It is not the intent of this section to provide final testing and balancing, but to leave the system operational with a minimum of noise.

END OF SECTION 23 31 00

SECTION 23 33 00 - DUCTWORK ACCESSORIES

PART 1 - GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.3 Extent of ductwork accessories work is indicated on drawings and in schedules, and by requirements of this section.
- 1.4 Refer to other Division-23 sections for testing, adjusting, and balancing of ductwork accessories; not work of this section.
- 1.5 Codes and Standards:
 - A. SMACNA Compliance: Comply with applicable portions of both SMACNA "HVAC Duct Construction Standards, Metal and Flexible" and "Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems".
 - B. UL Compliance: Construct, test, and label fire dampers in accordance with the latest UL Standard 555 "Fire Dampers and Ceiling Dampers". Construct, test, and label smoke dampers in accordance with UL Standard 555S "Leakage Rated Dampers for use in Smoke Control Systems".
 - C. NFPA Compliance: Comply with applicable provisions of NFPA 90A "Air Conditioning and Ventilating Systems" pertaining to installation of ductwork accessories.

1.6 Approval Submittals:

- A. Product Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction; and installation instructions as follows:
 - 1. Low pressure manual dampers
 - 2. Control dampers
 - 3. Duct access doors
 - 4. Flexible connections

PART 2 - PRODUCTS

2.1 Dampers:

- A. Low Pressure Manual Dampers: Provide 20 gauge dampers of single-blade type (12" maximum blade width) or provide 16 gauge dampers of multi-blade type. Damper blades to be gang-operated from a single shaft with acetal bearings on each end. Provide indexed locking quadrant. Parallel or opposed blade style is acceptable. Provide 2" standoff on locking quadrant for externally insulated duct.
- B. Control Dampers: Provide AMCA Standard 500-D certified dampers with parallel blades for 2-position control or opposed blades for modulating control. Construct blades of 16 gauge steel. Provide heavy-duty molded self-lubricating nylon bearings and 1/2" diameter steel axles spaced on 9" centers. Provide TPE blade seals. Construct frame of 2" x 1/2" x 1/8" steel channel for face areas 25 sq. ft. and under; 4" x 1-1/4" x 16 gauge channel for face areas over 25 sq. ft. Provide galvanized steel finish with aluminum touch-up. Actuators (motors) are provided by control contractor.
- C. Acceptable Manufacturers: Subject to compliance with requirements, provide dampers by Air Balance, American Warming & Ventilating, Arrow Louver and Damper, Greenheck, or Ruskin Mfg. Co.

D. Acceptable Manufacturers: Subject to compliance with requirements, provide fire and smoke dampers by Air Balance, Inc., American Warning & Ventilating, Arrow Louver and Damper, Greenheck or Ruskin Mfg. Co.

2.2 <u>Turning Vanes</u>: Provide manufactured or fabricated single wall turning vanes and vane runners, constructed in accordance with SMACNA "HVAC Duct Construction Standards".

2.3 Duct Access Doors:

- General: Provide duct access doors of size indicated, or as required for duty indicated.
- B. Construction: Construct of same or greater gauge as ductwork served. Provide insulated doors for insulated ductwork. Provide flush frames for uninsulated ductwork, extended frames for externally insulated duct. Provide one side hinged, other side with one handle-type latch for doors 12" high and smaller, 2 handle-type latches for larger doors.
- C. Acceptable Manufacturers: Subject to compliance with requirements, provide access doors by Air Balance, Inc., Duro Dyne Corp., Ruskin Mfg. Co., or Ventfabrics, Inc.

2.4 Flexible Connections:

- A. General: Provide flexible duct connections wherever ductwork connects to vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment.
- B. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following: Duro Dyne Corp., Flexaust (The) Co., or Ventfabrics, Inc.

PART 3 - EXECUTION

3.1 <u>Examine areas and conditions</u> under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Installation of Ductwork Accessories:

- A. Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.
- B. Install balancing dampers at all main ducts adjacent to units in return air, outside air and where indicated.
- C. Install control dampers in the outside air duct for each air handler. Damper Motor provided by control contractor.
- D. Install turning vanes in square or rectangular 90° elbows in supply and return air systems, and elsewhere as indicated.
- E. Install access doors to open against system air pressure, with latches operable from either side, except outside only where duct is too small for person to enter.
- F. Install flexible connections in ductwork such that the clear length of the connector is approximately two inches. Provide thrust restraints as required. Flexible material shall not be so slack as to take a definite concave or convex shape during fan operation.
- G. Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

3.3 Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories as required to obtain proper operation and leakproof performance.

- 3.4 Adjusting and Cleaning:
 - A. Adjusting: Adjust ductwork accessories for proper settings. Install fusible links in fire dampers and adjust for proper action.
 - B. Final positioning of manual dampers is specified in Division-23 section "Testing, Adjusting, and Balancing". However, the system shall be left functional with all dampers open or throttled.
 - C. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION 23 33 00

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SECTION 23 34 00 - FANS

PART 1 - GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.3 Extent of fan work required by this section as indicated on drawings and schedules, and by requirements of this section.
- 1.4 <u>Coordination</u>:
 - A. Refer to Division-7 sections for installation of prefabricated roof curbs; not work of this section. Furnishing prefabricated roof curbs is part of this section's work.
 - B. Refer to Division-23 section "Testing, Adjusting, and Balancing" for balancing of fans.
 - C. Refer to Division-26 sections for power supply wiring from power source to power connection on fans. Division-26 work will include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.

1.5 Codes and Standards:

- A. AMCA Compliance: Provide fans which have been tested and rated in accordance with AMCA standards, and bear AMCA Certified Ratings Seal.
- B. UL Compliance: Provide fans which are listed by UL and have UL label affixed.

1.6 Approval Submittals:

- A. Product Data: Submit manufacturer's technical data for fans, including specifications, capacity ratings, dimensions, weights, materials, accessories furnished, and installation instructions. Submit assembly-type drawings showing unit dimensions, construction details, methods of assembly of components, and field connection details.
 - 1. Fans
- 1.7 <u>O&M Data Submittals</u>: Submit maintenance data and parts list for each type of fan, accessory, and control. Include these data, a copy of approved submittals, and wiring diagrams in O&M Manual.

PART 2 - PRODUCTS

- 2.1 <u>General</u>: Except as otherwise indicated, provide standard prefabricated fans of type and size indicated, modified as necessary to comply with requirements, and as required for complete installation. Provide accessories as listed in the schedule on the drawings and as described herein. Motors shall be high efficiency per Division-23 section "Motors".
- 2.2 <u>Acceptable Manufacturers</u>: Subject to compliance with requirements provide fans manufactured by Acme, Greenheck, Loren Cook or approved equal unless otherwise noted herein.

2.3 <u>Centrifugal Ceiling Exhausters</u>:

A. Fan Assembly: Provide steel housing, plastic or aluminum grille, backdraft damper, statically and dynamically balanced fan wheel, permanently lubricated motor with internal thermal overloads, vibration isolation, and all required mounting hardware and brackets. Provide acoustically treated housing for all fans larger than 60 cfm. Mounting type shall be as indicated on the drawings or on the schedule.

B. Connectors: Provide adaptors, connectors, and eave elbows as required to connect fan discharges to outlets.

- C. Outlets: Provide where shown on the drawings (or required by the installation) wall caps, vent caps, or roof jacks, each with birdscreen, to match fans and surrounding construction.
- 2.4 <u>Fan Accessories and Features</u>: Where indicated on the schedule or drawings provide accessories and features listed herein.
 - 1. <u>Belt Drive</u>: Belt drives shall include cast iron, variable pitch sheaves, heavy duty belts, and 1750 rpm motors. The drive shall be adjustable to plus or minus 20% of scheduled flow. Provide fixed sheaves after balancing is complete.
 - 2. <u>Direct Drive</u>: Direct drives shall have multispeed motors or speed controllers to achieve scheduled flow.
 - 3. <u>Curbs</u>: Furnish 12-inch high, roofed over type, prefabricated aluminum curbs with treated wood nailer and 1-1/2" fire resistant fiberglass insulation sized to match the fans. For deck slopes of 1/4" per foot and more, fabricate curbs to form level top edge.
 - 4. <u>Bird Screens</u>: Provide bird screens of 1/2" mesh aluminum or galvanized steel hardware cloth.
 - 5. <u>Backdraft Dampers</u>: Provide where indicated aluminum louvered dampers with felt-edged blades and nylon bearings.
 - 6. <u>Disconnect Switches</u>: Provide factory installed local disconnecting means.
 - 7. Thermal Overloads: Provide internal thermal overloads.
 - 8. <u>Speed Controller</u>: Provide where indicated solid state speed controller for remote mounting.
 - 9. <u>Timeclock</u>: Provide where indicated a dedicated UL listed 120V astronomic programmable electronic time switch installed in accessible location above ceiling for maintenance use. Program to operate 7AM-7PM. Basis of design: Marktime 42E724A.

PART 3 - EXECUTION

- 3.1 <u>General</u>: Except as otherwise indicated or specified, install fans in accordance with manufacturer's installation instructions and recognized industry practices to ensure that fans serve their intended function.
- 3.2 Coordinate fan work with work of roofing, walls, and ceilings as necessary for proper interfacing. Framing of openings, caulking, and curb installation is not work of this section.
- 3.3 <u>Ductwork</u>: Refer to Division-23 section "Ductwork". Connect ducts to fans in accordance with manufacturer's installation instructions. Provide flexible connections in ductwork at fans.
- 3.4 <u>Electrical Wiring</u>: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to electrical Installer. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-26 sections. Verify proper rotation direction of fan wheels. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.
- 3.5 Remove shipping bolts and temporary supports within fans. Adjust dampers for free operation.
- 3.6 <u>Testing</u>: After installation of fans has been completed, test each fan to demonstrate proper operation of units at performance requirements specified. When possible, field

- correct malfunctioning units, then retest to demonstrate compliance. Replace units which cannot be satisfactorily corrected.
- 3.7 <u>Cleaning</u>: Clean factory-finished surfaces. Remove all tar and soil. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION 23 34 00

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SECTION 23 81 26 - SPLIT SYSTEM AIR CONDITIONERS

PART 1 - GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.3 Extent of fan work required by this section as indicated on drawings and schedules, and by requirements of this section.

1.4 <u>Coordination</u>:

- A. Refer to Division-23 section "Testing, Adjusting, and Balancing" for balancing of Split System Air Conditioning Systems.
- B. Refer to Division-23 HVAC control systems sections for control work required in conjunction with Split System Air Conditioning Systems.
- C. Refer to Division-26 sections for power supply wiring from power source to power connection on Split System Air Conditioning Systems. Division-26 work will include disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.

1.5 Codes and Standards:

- A. ARI 210/240 2005 Compliance: Provide split system air conditioning systems which have been tested and rated in accordance with ARI standards, and bear ARI 210/240 Certified Ratings Seal.
- B. ARI 270 2008/370-2001 Compliance: Provide split system air conditioning systems which have been tested and rated in accordance with ARI Sound Rating for Outdoor Unitary Equipment standards, and bear ARI 270/270 Certified Ratings Seal.
- C. UL Compliance: Provide split system air conditioning systems which are listed by UL and have UL label affixed.
- D. Energy Star® Compliance: Provide split system air conditioning systems which are Energy Star® compliant.

1.6 Approval Submittals:

- A. Product Data: Submit manufacturer's technical data for heat pumps and air handlers, including specifications, capacity ratings, dimensions, weights, materials, accessories furnished, and installation instructions. Submit assembly-type drawings showing unit dimensions, construction details, methods of assembly of components, and field connection details.
 - 1. Heat pump
 - 2. Air handling unit
 - Controls
 - 4. Refrigerant line connectors, electrical inlets, and service valves.
- 1.7 <u>O&M Data Submittals</u>: Submit maintenance data and parts list for each type of split system air conditioning system, accessory, and control. Include these data, a copy of approved submittals, and wiring diagrams in O&M Manual.

PART 2 - PRODUCTS

2.1 <u>General</u>: Except as otherwise indicated, provide standard prefabricated heat pump and air handling unit of type and size indicated. Provide accessories as listed in the schedule on the drawings and as described herein.

- 2.2 <u>Acceptable Manufacturers</u>: Subject to compliance with requirements, provide split system air conditioning systems manufactured by Lennox, Carrier, Trane.
 - A. Cabinet: Provide heavy-gauge steel construction cabinet with corrosion free prepainted cabinet finish.
 - 1. Provide large removable service access panels.
 - 2. Provide base drainage holes for moisture removal.
 - 3. Provide high density polyethylene unit support feet.
 - B. Refrigerant Line Connections and Service Valves:
 - 1. Provide fully serviceable brass service valves.
 - 2. Provide full shutoff vapor valve.
 - 3. Liquid valve shall be front seated to manage refrigerant charge while servicing system.
 - C. Provide the following Controls:
 - Defrost Control.
 - 2. Low Ambient Control (Down to 0°F).
 - 3. Compressor Low Ambient Cutoff.
 - 4. For heat pump equipped with supplemental electric heat provide control to prevent supplemental heat use when heat pump is providing rated heating capacity. When heat pump cannot provide rated heating capacity supplemental heat shall be allowed. Supplemental heat shall be allowed during defrost mode whenever heat pump operation is active.
 - D. Provide compressor with the following characteristics:
 - 1. Scroll compressor.
 - 2. Compressor shall be mounted on heavy duty rubber mounts to provide vibration isolation.
 - 3. Unit shall be equipped with internal excessive current safety and excessive temperature safety.
 - 4. Provide crankcase heater.
 - E. Refrigerant System shall be as follows:
 - Refrigerant type: R-410A.
 - 2. Units shall be factory pre-charged.
 - F. Provide outdoor coil fan with the following characteristics:
 - 1. Direct drive fan.
 - 2. Totally enclosed fan motor.
 - Removable and corrosion resistant steel fan guard.
 - G. Provide outdoor coil with the following characteristics:
 - 1. Provide copper tubes with flared shoulder connections and silver solder construction.
 - 2. Provide lanced, ripple-edged aluminum fins.
 - 3. Outdoor coil shall be factory leak tested.
 - H. Provide the following standard factory installed features:

- 1. High pressure switch.
- 2. Low pressure switch.
- 3. Hi-capacity liquid line drier.

2.3 <u>Air Handling Unit (Up-Flow/Horizontal)</u>:

- A. Cabinet: Provide pre-painted heavy-gauge galvanized steel construction cabinet, insulated with fiberglass insulation.
 - 1. Provide removable panel for complete maintenance access entirely from one side of the unit.
 - 2. Provide tool-less filter access panel. Provide 2" disposable pleated air filter.
 - 3. Provide dual position drain pan, with dual drain connections, suitable for up-flow and horizontal unit orientation. The drain pans shall have the following characteristics:
 - a. Provide drain pans from corrosion resistant plastic construction.
 - b. Provide drain pans with proper slope to remove all condensate.

B. Refrigerant System:

- 1. Refrigerant: R-410A
- The Air Handling unit shall have twin coils in an "A" configuration. The coils shall
 have copper tubes and lanced, ripple-edged aluminum fins. The copper tubing
 shall be seamless and rifled. Provide flared shoulder tubing joints and silver
 soldering.
- 3. Refrigerant line connections shall extend outside the cabinet, both vapor and liquid lines shall have sweat connection.
- 4. Provide check valve and wide range expansion valve. Provide Chatleff style fittings to allow valve removal.
- 5. Air Handling Unit refrigerant system shall be factory leak tested.

C. Direct Drive Blower:

- 1. Provide programmable multi-speed blower motor.
- 2. Blower shall be statically and dynamically balanced.
- 3. Blower shall be vibration isolated from the cabinet.
- 4. Blower motor shall be leadless and shall have selectable speeds.
- 5. Blower shall have a plug-in connection and slide out of the cabinet for easy servicing.
- D. Thermal Overloads, Transformer, and Blower Cooling Relay:
 - 1. Provide internal thermal overloads.
 - 2. Provide 24V transformer with in-line fuse and blower cooling relay.
 - 3. Provide terminal strip.

E. Electric Heater:

- Provide helix-wound nickel-chromium heating element factory or field mounted in air handling unit cabinet.
- 2. Provide single point power connection with factory mounted and wired electrical disconnect.
- 3. Provide limit safety control with fixed temperature shut-off setting and automatic reset.
- 4. Provide heating stage control relay(s) and heavy gauge galvanized steel control box with access cover.

F. Vibration Isolation: Mount air handling unit on vibration isolators in accordance with the requirements of Division-23 section "Vibration Isolation" and the following list:

- 1. Equipment Mountings: Type EM1, EM4.
- 2. Hangers: Type HA1, HA2, HA3.

G. Accessories:

- 1. 24-hour programmable thermostat with display and occupied/unoccupied override button. Provide selectable temperature set-points in Cooling/Heating modes with auto-changeover.
- 2. Motorized Damper: Provide where indicated aluminum louvered dampers with felt-edged blades and nylon bearings. Provide 120V or 24V actuator with limit switch to prevent fan from starting until damper is at least half open.
- 3. Provide 2" deep galvanized steel secondary drain pan to extend 3" past the air handling unit width and length.
- 4. Provide float switch in secondary drain pan and in cooling coil condensate drain piping p-trap. Provide a relay to shut off the air handling unit when float switch is activated.

PART 3 - EXECUTION

- 3.1 <u>General</u>: Except as otherwise indicated or specified, install split system air conditioning systems and air handlers in accordance with manufacturer's installation instructions and recognized industry practices to ensure that system serve their intended function.
- 3.2 <u>Storage</u>: Store equipment protected from exposure to harmful weather conditions. Ensure shipping covers remain in place until installation.
- 3.3 Coordinate work of this section with other trades to ensure split system air conditioning system installation properly interfaces with other systems.
- 3.4 <u>Outdoor Unit Installation</u>: Install the outdoor unit as shown on drawings on concrete pad or other support specified on drawings. Ensure the outdoor unit has sufficient clearance around it to ensure proper maintenance access and proper heat rejection area.
- 3.5 <u>Indoor Unit Installation</u>: Install indoor unit as shown on the drawings. Provide fabricated galvanized steel support stand or other mounting method as specified on the drawings. Ensure there is sufficient clearance to access the removable panel and perform maintenance on the unit components. Ensure there is enough clearance to change the air filters. Inform the engineer if there is a conflict between required clearances and building structure or other building systems.
- 3.6 <u>Electrical Wiring</u>: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to electrical Installer. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-26 sections. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.

3.7 Refrigeration Piping:

A. Route refrigerant piping between the outdoor and indoor unit in accordance with manufacturer requirements. Provide flexible piping connections at outdoor unit and air handling unit. Insulate refrigerant piping with 3/4" flexible unicellular insulation. Insulation shall be installed per manufacturer recommendation. Provide CPVC piping conduit for routing refrigerant piping underground. Seal piping conduit with water-proof sealant. Size the conduit to accommodate refrigerant piping and insulation.

- B. Copper Tubing 3/4" and Smaller: Type ACR, soft annealed temper; cast copper-alloy fittings for flared copper tubes; flared joints.
- C. Copper Tubing f" 4c": Type ACR, hard-drawn temper tubing; wrought-copper, solder-joint fitting; brazed joints.
- D. Silver Solder Material: Silver solder bearing at least 15% silver; Sil Fos.
- 3.8 <u>Ductwork</u>: Refer to Division-23 section "Ductwork". Connect ducts to air handling unit in accordance with manufacturer's installation instructions. Follow SMACNA guidelines if manufacturer instructions are ambiguous or lack detail. Provide flexible connections between air handling unit discharge and/or inlet and ductwork.
- 3.9 <u>Condensate Piping</u>: Route copper ACR or approved equal condensate piping to the nearest approved disposal point. Slope condensate drain pipe minimum of 1/8" per foot. Provide p-trap at unit connection. Size the p-trap depth per manufacturer instructions or per directions on drawings, ensure there is no standing water in the drain pan. Insulate condensate drain piping with1/2" thick flexible unicellular insulation.
- 3.10 <u>Identification</u>: Label the indoor and outdoor unit with their respective tags as called out on the drawings. The unit labels shall comply with the requirements of Division-23 section "HVAC Identification".
- 3.11 <u>Start Up and Testing</u>: After installation of entire systems has been completed, test each system to demonstrate proper operation of units at performance requirements specified. When possible, field correct malfunctioning units, then retest to demonstrate compliance. Replace units which cannot be satisfactorily corrected. Provide Start Up report to Engineer for review.
- 3.12 <u>Test and Balancing</u>: Test, adjust, and balance each system as specified in Division-23 section "Testing and Balancing of HVAC Systems". Adjust supply fan motor taps or speed controller to achieve scheduled airflow and static pressure. Provide punch list of all items not meeting contract documents. Include punch list items and system test and balance data in a report.
- 3.13 <u>Cleaning</u>: Clean factory-finished surfaces. Remove all dirt, tar, and soil. Repair any marred or scratched surfaces with manufacturer's touch-up paint. Ensure all condenser fins are straight, brush out fins as required following manufacturer recommendations.

END OF SECTION 23 81 26

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SECTION 26 00 00 - ELECTRICAL GENERAL

PART 1 - GENERAL

1.1 The work covered by this division consists of providing all labor, equipment, and materials and performing all operations necessary for the installation of the electrical work as herein called for and shown on the drawings.

1.2 Related Documents:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- B. This is a Basic Requirements Section. Provisions of this section apply to work of all Division 26 sections.
- C. Review all other contract documents to be aware of conditions affecting work herein.
- D. Definitions:
 - 1. Provide: Furnish and install, complete and ready for intended use.
 - 2. Furnish: Supply, deliver to project site, and store ready for installation.
 - 3. Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar requirements.
- 1.3 <u>Permits and Fees</u>: Contractor shall obtain all necessary permits and inspections required for his work pay all fees and charges incidental thereto.
- 1.4 <u>Verification of Owner's Data</u>: Prior to commencing any work the Contractor shall satisfy himself as to the accuracy of all data in these plans and specifications and as provided by the Owner. Should the Contractor discover any inaccuracies, errors, or omissions in the data, he shall immediately notify the Architect/Engineer such that responses and adjustments can be made in a timely fashion. Commencement by the Contractor of any work shall be held as an acceptance of the data by him after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions, or inaccuracies of the said data.
- 1.5 <u>Delivery and Storage of Materials</u>: Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. All material shall be stored to provide protection from the weather and accidental damage.
- 1.6 <u>Extent of Work</u>: Scope is indicated by the drawings, schedules, and the requirements of the specifications.
- 1.7 Field Measurements and Coordination:
 - A. The intent of the drawings and specifications is to obtain a complete and satisfactory installation. Separate divisional drawings and specifications shall not relieve the Contractor or subcontractors from full compliance of work of his trade indicated on any of the drawings or in any section of the specifications.
 - B. Verify all field dimensions and locations of equipment to ensure close, neat fit with other trades' work. Make use of all contract documents and approved shop drawings to verify exact dimension and locations.
 - C. Coordinate work in this division with all other trades in proper sequence to ensure that the total work is completed within contract-time schedule and with minimum cutting and patching.
 - D. Locate all apparatus symmetrical with architectural elements. Install to exact height and locations when shown on architectural drawings. When locations are shown only on electrical drawings, be guided by architectural details and conditions existing at job

- site and coordinate this work with that of others.
- E. Install work as required to fit structure, avoid obstructions, and retain clearance, headroom, openings, and passageways. <u>Cut no structural members without written approval</u>.
- F. Carefully examine any existing conditions, wiring, devices, and premises. Compare drawings with existing conditions. Report any observed discrepancies. It shall be the Contractor's responsibility to properly coordinate the work and to identify problems in a timely manner. Written instructions will be issued to resolve discrepancies.
- G. Because of the small scale of the drawings, it is not possible to indicate all precise locations for all devices and equipment. Drawings are essentially diagrammatic. Study carefully the sizes and locations of structural members, wall and partition locations, trusses, and room dimensions and take actual measurements on the job. Locate devices, equipment and accessories with sufficient space for installing and servicing. Contractor is responsible for accuracy of his measurements and for coordination with all trades. Contractor shall not order materials or perform work without such verification. No extra compensation will be allowed because field measurements vary from the dimensions on the drawings. If field measurements show that equipment or raceway cannot be fitted, the Architect/Engineer shall be consulted. Remove and relocate, without additional compensation, any item that is installed and is later found to encroach on space assigned to another use or to code required clearance.

1.8 <u>Guarantee</u>:

- A. The Contractor shall guarantee labor, materials, and equipment for a period of one (1) year from Substantial Completion, or from Owner's occupancy, whichever is earlier. Contractor shall make good any defects and shall include all necessary adjustments to and replacement of defective items without expense to the Owner.
- B. Owner reserves right to make emergency repairs as required to keep equipment in operation without voiding Contractor's Guarantee Bond nor relieving Contractor of his responsibilities during guarantee period.

1.9 Approval Submittals:

- A. When approved, the submittal control log and submittals shall be an addition to the specifications herewith, and shall be of equal force in that no deviation will be permitted except with the approval of the Architect/Engineer.
 - Shop drawings, product-data literature, and other approval submittals will only be reviewed if they are submitted in full accordance with the General and Supplementary Conditions and Division 1 Specification sections <u>and</u> the following.
 - a. Submittals shall be properly organized in accordance with the approved submittal control log.
 - b. Submittals shall not include items from more than one specification section in the same submittal package unless approved in the submittal control log.
 - c. Submittals shall be properly identified by a cover sheet showing the project name, Architect and Engineer names, submittal control number, specification section, a list of products or item names with model numbers in the order they appear in the package, and spaces for approval stamps. A sample cover sheet is included at the end of this section.
 - d. Submittals shall have been reviewed and approved by the General Contractor (or Prime Contractor). Evidence of this review and approval

- shall be an "Approved" stamp with a signature and date on the cover sheet.

 Submittals that include a series of fixtures or devices (such as lighting or panelboards) shall be organized by the device name or type and be marked accordingly. Each fixture must include all items associated with that fixture
- regardless of whether those items are used on other fixtures.

 Do not include pages in submittal which do not apply to the proje
- f. Do not include pages in submittal which do not apply to the project. If submittal includes products not intended for installation, clearly indicate all materials in the submittal which are intended for installation.
- g. The electrical design shown on the drawings supports the equipment basis of design specifications at the time of design. If equipment by any division is submitted with different electrical requirements, it is the responsibility of the submitting contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the proposed electrical configuration in the relevant submittal with a written statement that this change will be provided at no additional cost. Submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.
- B. If the shop drawings show variation from the requirements of contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variation in writing in his letter of transmittal and on the submittal cover sheet in order that, if acceptable, Contractor will not be relieved of the responsibility for executing the work in accordance with the contract.
- C. Engineer's review of shop drawings, product-data literature, catalog data, or schedules shall not relieve the Contractor from responsibility for deviations from contract drawings or specifications, unless he has in writing called to the attention of the Architect/Engineer each such deviation at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings, product literature, catalog data, or schedules. Any feature or function specified but not mentioned in the submittal shall be assumed to be included per the specification.
- D. Submit shop drawings as called for in other sections after award of the contract and before any material is ordered or fabricated. Shop drawings shall consist of plans, sections, elevations, details to scale not smaller than 1/4" with dimensions clearly showing the installation, and system calculations where applicable. Direct copies of small scale project drawings issued to the Contractor are not acceptable. Drawings shall take into account equipment furnished under other sections and shall show space allotted for it. Include construction details and materials.
- 1.10 <u>Test Reports and Verification Submittals</u>: Submit test reports, certifications, and verification letters as called for in other sections. Contractor shall coordinate the required testing and documentation of system performance such that sufficient time exists to prepare the reports, submit the reports, review the reports, and take corrective action within the scheduled contract time.
- 1.11 O&M Data Submittals: Submit Operation and Maintenance data as called for in other sections. When a copy of approval submittals is included in the O&M Manual, only the final "Approved" or "Approved as Noted" copy shall be used. Contractor shall organize these data in the O&M Manuals tabbed by specification number. Prepare O&M Manuals as required by Division 1 and as described herein. Submit manuals at the Substantial Completion inspection.

PART 2 - PRODUCTS

2.1 All materials shall be new or Owner-supplied reused as shown on the drawings, the best of their respective kinds, suitable for the conditions and duties imposed on them at the building and shall be of reputable manufacturers. The description, characteristics, and requirements of materials to be used shall be in accordance with qualifying conditions established in the following sections.

2.2 Equipment and Materials:

- A. All equipment and materials shall be new and the most suitable grade for the purpose intended. Equipment furnished under this division shall be the product of a manufacturer regularly engaged in the manufacture of such items for a period of three years. Where practical, all of the components shall be products of a single manufacturer in order to provide proper coordination and responsibility. Where required, Contractor shall furnish proof of installation of similar units or equipment.
- B. Each item of equipment shall bear a name plate showing the manufacturer's name, trade name, model number, serial number, ratings, and other information necessary to fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated, or painted.
- C. The label of the approving agency, such as UL, by which a standard has been established for the particular item, shall be in full view.
- D. The equipment shall be essentially the standard product of a manufacturer regularly engaged in the production of such equipment and shall be a product of the manufacturer's latest design.
- E. A service organization with personnel and spare parts shall be available within two hours for each type of equipment furnished.
- F. Install in accordance with manufacturer's recommendations. Place in service by a factory trained representative where required.
- G. Materials and equipment are specified herein by a single or by multiple manufacturers to indicate quality, material, and type of construction desired. Manufacturer's products shown on the drawings have been used as basis for design; it shall be the Contractor's responsibility to ascertain that alternate manufacturer's products, or the particular products of named manufacturers, meet the detailed specifications and that size and arrangement of equipment are suitable for installation.
- H. <u>Model Numbers</u>: Catalog numbers and model numbers indicated in the drawings and specifications are used as a guide in the selection of the equipment and are only listed for the contractor's convenience. The contractor shall determine the actual model numbers for ordering materials in accordance with the written description of each item and with the intent of the drawings and specifications.

2.3 Requests for Substitution:

- A. Where a particular system, product, or material is specified by name, consider it as standard basis for bidding, and base proposal on the particular system, product, or material specified.
- B. Requests by Contractor for substitution will be considered only when reasonable, timely, fully documented, and qualifying under one or more of the following circumstances.
 - 1. Required product cannot be supplied in time for compliance with Contract time requirements.
 - 2. Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by Contractor.
 - 3. Substantial cost advantage is offered to Owner after deducting offsetting

disadvantages including delays, additional compensation for redesign, investigation, evaluation, and other necessary services and similar considerations.

- C. All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design and the product proposed for substitution. Differences shall include but shall not be limited to data as follows for both the specified and substituted products:
 - 1. Principal of operation.
 - 2. Materials of construction or finishes.
 - 3. Thickness of gauge of materials.
 - 4. Weight of item.
 - 5. Deleted features or items.
 - Added features or items.
 - 7. Changes in other work caused by the substitution.
 - 8. Electrical ratings and properties.
 - 9. If the approved substitution contains differences or omissions not specifically called to the attention of the Architect/Engineer, the Owner reserves the right to require equal or similar features to be added to the substituted products (or to have the substituted products replaced) at the Contractor's expense.

PART 3 - EXECUTION

3.1 <u>Workmanship</u>: All materials and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any installation which is not orderly and reasonably neat, or does not allow adequate space for maintenance, shall be removed and replaced when so directed by the Architect/Engineer.

3.2 <u>Coordination</u>:

- A. The Contractor shall be responsible for complete coordination of the electrical systems with shop drawings of the building construction so the proper openings and sleeves or supports are provided for raceway or other appurtenances passing through slabs or walls.
- B. Any additional steel supports required for the installation of any electrical equipment, piping, or ductwork shall be furnished and installed under the section of the specifications requiring the additional supports.
- C. It shall be the Contractor's responsibility to see that all equipment such as terminal cabinets, fire alarm components, control panels, and such other apparatus or equipment that may require maintenance and operation are made easily accessible, regardless of the diagrammatic location shown on the drawings.
- D. All connections to fixtures and equipment shown on the drawings shall be considered diagrammatic unless otherwise indicated by detail. The actual connections shall be made to fully suit the requirements of each case and adequately provide for expansion and servicing.
- E. The contractor shall protect equipment, material, and fixtures at all times. He shall replace all equipment, material, and fixtures which are damaged as a result of inadequate protection.
- F. Prior to starting and during progress of work, examine work and materials installed by others as they apply to work in this division. Report conditions which will prevent satisfactory installation.

- G. Start of work will be construed as acceptance of suitability of work of others.
- 3.3 <u>Interruption of Service</u>: Before any equipment is shut down for disconnecting or tieins, arrangements shall be made with the Architect/Engineer and this work shall be
 done at the time best suited to the Owner. This will typically be on weekends and/or
 holidays and/or after normal working hours. Services shall be restored the same day
 unless prior arrangements are made. All overtime or premium costs associated with
 this work shall be included in the base bid.
- 3.4 <u>Phasing</u>: Provide all required temporary wiring, lighting, fire alarm, equipment, and devices as required. Maintain temporary services to areas as required. Remove all temporary material and equipment on completion of work unless Engineer concurs that such material and equipment would be beneficial to the Owner on a permanent basis.
- 3.5 <u>Cutting and Patching</u>: Notify General Contractor to do all cutting and patching of all holes, chases, sleeves, and other openings required for installation of equipment furnished and installed under this section. Utilize experienced trades for cutting and patching. Obtain permission from Architect/Engineer before cutting any structural items.
- 3.6 <u>Equipment Setting</u>: Bolt equipment directly to concrete pads or vibration isolators as required, using hot-dipped galvanized anchor bolts, nuts, and washers. Level equipment.
- 3.7 <u>Painting</u>: Touch-up factory finishes on equipment located inside and outside shall be done under Division 26. Obtain matched color coatings from the manufacturer and apply as directed. If corrosion is found during inspection on the surface of any equipment, clean, prime, and paint, as required.
- 3.8 <u>Clean-up</u>: Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials and remove all oil and grease spots. Repaint or touch up as required to look like new. During progress of work, contractor is to carefully clean up and leave premises and all portions of building free from debris and in a clean and safe condition.
- 3.9 <u>Start-up and Operational Test</u>: Start each item of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specification, start-up shall be done by a qualified representative of the manufacturer. Alignment, lubrication, safety, and operating control shall be included in start-up check.
- 3.10 Record Drawings:
 - A. During the progress of the work the Contractor shall record on their field set of drawings the exact location, as installed, of all switches, receptacles, devices, equipment, and other systems which are not installed exactly as shown on the contract drawings.
 - B. Upon completion of the work, record drawings shall be prepared as described in the General Conditions, Supplementary Conditions, and Division 1 sections.

3.11 <u>Acceptance</u>:

- A. Punch List: Submit written confirmation that all punch lists have been checked and the required work completed.
- B. Instructions: At completion of the work, provide a competent and experienced person who is thoroughly familiar with project, for one day to instruct permanent operating personnel in operation of equipment and control systems. This is in addition to any specific equipment operation and maintenance training.
- C. Operation and Maintenance Manuals: Provide O&M manual as dictated by Division 1. Manuals shall contain:

- 1. Detailed operating instructions and instructions for making minor adjustments.
- 2. Complete wiring, control, and single line diagrams.
- 3. Routine maintenance operations.
- 4. Manufacturer's catalog data, service instructions, and parts lists for each piece of operating equipment.
- 5. Copies of approved submittals.
- 6. Copies of all manufacturer's warranties.
- 7. Copies of test reports and verification submittals.
- D. Record Drawings: Submit record drawings.
- E. Acceptance will be granted on the basis of tests and inspections of job. A representative of firm that performed test and balance work shall be in attendance to assist. Contractor shall furnish necessary mechanics to operate system, make any necessary adjustments and assist with final inspection.
- F. Control Diagrams: Frame under clear plastic and mount on equipment room wall.
- G. Single Line Diagrams: Frame under clear plastic and mount on equipment room wall.

PROJECT NAME PROJECT NUMBER

ARCHITECT: Company Name

ENGINEER: Mitchell Gulledge Engineering

CONTRACTOR: Contractor Name

SUBCONTRACTOR: Sub Name

SUPPLIER: Supply Company

MANUFACTURER: Manufacturer

DATE: mm/dd/yyyy

SECTION: 26 XX XX/Section Name

1. Product 1: Manufacturer, Model 🔻

2. Product 2: Manufacturer, Model

3. Product 3: Manufacturer, Model

4. Product 4: Manufacturer, Model

5. Product 5: Manufacturer, Model

SAMPLE

Any standard heading is acceptable.

List each product individually. Include manufacturer name and model.

Include GC or CM
Approval stamp indicating review and acceptance by responsible contractor.

END OF SECTION 26 00 00

SECTION 26 05 01 - ELECTRICAL CODES AND STANDARDS

PART 1 - GENERAL

1.1 The work covered by this division consists of providing all labor, equipment, and materials and performing all operations necessary for the installation of the fire protection work as herein called for and shown on the drawings.

1.2 This is a Basic Electrical Requirements section. Provisions of this section apply to work of all Division 26 sections.

PART 2 - CODES

- 2.1 All work under Division 26 shall be constructed in accordance with the codes listed herein. The design has been based on the requirements of these codes; and while it is not the responsibility of the Contractor to verify that all work called for complies with these codes, he shall be responsible for calling to the Architect/Engineer's attention any drawings or specifications that are not in conformance with these or other codes prior to ordering equipment or installing work.
- 2.2 Comply with regulations and codes of utility suppliers.
- 2.3 Where no specific method or form of construction is called for in the contract documents, the Contractor shall comply with code requirements when carrying out such work.
- 2.4 Where code conflict exists, generally the most restrictive requirement applies. Comply with current code edition, unless noted.
- 2.5 Additional codes or standards applying to a specific part of the work may be included in that section.
- 2.6 The following codes and standards shall govern all work:
 - A. Florida Building Code Seventh Edition (2020)
 - B. Florida Building Code Seventh Edition (2020) Existing Building
 - C. Florida Building Code Seventh Edition (2020) Energy Conservation
 - D. Florida Building Code Seventh Edition (2020) Mechanical
 - E. Florida Building Code Seventh Edition (2020) Plumbing
 - F. Florida Building Code Seventh Edition (2020) Fuel Gas
 - G. Florida Building Code Seventh Edition (2020) Accessibility
 - H. Florida Fire Prevention Code Seventh Edition
 - 1. Fire Code (NFPA 1 2018 Edition)
 - 2. Life Safety Code (NFPA 101 2018 Edition)
 - I. National Electric Code (NFPA 70 2017)
 - J. Fire Alarm and Signaling Code (NFPA 72 2016)
 - K. University of Florida Design and Construction Standards (June 2021)

PART 3 - STANDARDS

All materials, installation and systems shall meet the requirements of the following standards, including the latest addenda and amendments, to the extent referenced:

- 3.1 Underwriters' Laboratories (UL)
- 3.2 American National Standards Institution (ANSI)
- 3.3 American Society of Testing Materials (ASTM)
- 3.4 National Fire Protection Association (NFPA)
- 3.5 National Electrical Manufacturers Association (NEMA)
- 3.6 Institute of Electrical and Electronics Engineers (IEEE)

- 3.8 American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
- 3.9 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
- 3.10 Illuminating Engineering Society of North America (IESNA)
- 3.11 Telecommunications Industry Association (TIA)
- 3.12 Electronics Industry Alliance (EIA)

END OF SECTION 26 05 01

SECTION 26 05 02 - ELECTRICAL RELATED WORK

PART 1 - DIVISION 1 - GENERAL REQUIREMENTS

- 1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- 1.2 This is a Basic Electrical Requirements section. Provisions of this section apply to work of all Division 26 sections.
- 1.3 Coordinate with the General Contractor for all cutting and patching. Contractors performing Division 26 work shall inform the General Contractor of all cutting and patching required prior to bidding and shall coordinate installation.

PART 2 - DIVISION 3 - CONCRETE

- 2.1 Refer to Division 3, Concrete for:
 - A. Rough grouting in and around electrical work.
 - B. Patching concrete cut to accommodate electrical work.
- 2.2 <u>The following is part of Division 26 work</u>, complying with the requirements of Division 3:
 - A. Curbs, foundations, and pads for electrical equipment.
 - B. Man holes, hand holes, and vaults of electrical work.
 - C. Underground structural concrete to accommodate electrical work.
 - D. Concrete encasement of electrical conduits and cables.

PART 3 - DIVISION 4 - MASONRY

- 3.1 Refer to Division 4. Masonry for:
 - A. Installation of access doors in walls.

PART 4 - DIVISION 5 - METALS

- 4.1 <u>Refer to Division 5, Metals for:</u>
 - A. Framing openings for electrical equipment.
- 4.2 The following is part of Division 26 work:
 - A. Supports for electrical work.

PART 5 - DIVISION 6 - WOOD AND PLASTIC

- 5.1 Refer to Division 6, Wood for:
 - A. Framing openings for electrical equipment

PART 6 - DIVISION 7 - THERMAL AND MOISTURE PROTECTION

- 6.1 Refer to Division 7, Thermal and Moisture Protection for:
 - A. Installation of all roof curbs and roof supports for electrical work.
 - B. Caulking and waterproofing of all wall and roof mounted electrical work.
 - C. Providing all roof curbs and all flashing for metal roofs.
- 6.2 <u>The following is part of Division 26 work</u>, complying with the requirements of Division 7.
 - A. Fire barrier penetration seals.

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PART 7 - DIVISION 9 - FINISHES

- 7.1 Refer to Division 9, Finishes for:
 - A. Painting piping, and equipment.
 - B. Painting structural metal and concrete for electrical work.
 - C. Painting access panels.
 - D. Painting color-coded electrical work indicated for continuous painting. See color schedule in Division 26 section, "Electrical Identification".
 - E. Installation of access doors in gypsum drywall.
- 7.2 Colors shall be selected by the Architect for all painting of exposed electrical work in occupied spaces, unless specified herein. Do not paint insulated or jacketed surfaces.
- 7.3 Perform the following as part of Division 26 work:
 - A. Touch up painting of factory finishes.
 - B. Painting of all hangers.

PART 8 - DIVISION 10 - SPECIALTIES

- 8.1 Refer to Division 10 Specialties for:
 - A. Fire extinguishers and fire extinguisher cabinets and accessories.

PART 9 - DIVISION 11 - EQUIPMENT

9.1 <u>Refer to Division 11 - Equipment</u> for all laboratory equipment including cabinets, casework, student stations, demonstration desks, fume hoods, snorkel exhausts, canopy hoods, safety stations, eyewashes, and all related fixtures, fittings, and trim.

PART 10 - DIVISION 22 - PLUMBING

- 10.1 Plumbing and Electrical Contractors shall coordinate the exact electrical requirements of all plumbing equipment being provided. Where approval submittals are required, this coordination shall be accomplished prior to making the submittals. The electrical design shown on the drawings supports the plumbing equipment basis of design. If plumbing equipment is submitted with different electrical requirements, it is the responsibility of the plumbing contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the plumbing submittal with a written statement that this design will be provided at no additional cost. Plumbing submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost to the Owner.
- 10.2 Electrical Contractor is expected to be familiar with the entirety of the plumbing scope. Review plumbing sheets, specifications, and other portions of the Contract Documents prior to bidding. Electrical Contractor is responsible for all line voltage (greater than 100V) work unless otherwise noted. Electrical Contractor shall coordinate with Plumbing Contractor, and shall make themselves available as necessary to support the plumbing scope.
- 10.3 Electrical contractor shall provide disconnect switches, starters, and contactors for plumbing equipment unless specifically noted as being furnished as part of plumbing equipment.
- 10.4 Electrical contractor shall provide all power wiring, raceway and devices, and make final electrical connections to all plumbing equipment, switches, starters, contactors, controllers, and similar equipment.

PART 11 - DIVISION 23 - HVAC

- 11.1 Mechanical and Electrical Contractors shall coordinate the exact electrical requirements of all mechanical equipment being provided. Where approval submittals are required, this coordination shall be accomplished prior to making the submittals. The electrical design shown on the drawings supports the mechanical equipment basis of design. If mechanical equipment is submitted with different electrical requirements, it is the responsibility of the mechanical contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the mechanical submittal with a written statement that this design will be provided at no additional cost. Mechanical submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost to the Owner.
- 11.2 Mechanical contractor shall provide all HVAC control wiring including the Energy Management Control system sensors, alarms, and input/output signals and all relays, interlocks, warning lights, and control devices, complying with the requirements of Division 26. The intent is for the mechanical contractor to be responsible for the entire HVAC control system, including point-to-point wiring, and associated raceway and boxes. Electrical contractor shall notify mechanical contractor upon discovery of any mechanical controls installation which does not meet Division 26 requirements.
- 11.3 Electrical Contractor is expected to be familiar with the entirety of the mechanical scope. Review mechanical sheets, specifications, and other portions of the Contract Documents prior to bidding. Electrical Contractor is responsible for all line voltage (greater than 100V) work unless otherwise noted. Electrical Contractor shall coordinate with Mechanical Contractor, and shall make themselves available as necessary to support the mechanical scope.
- 11.4 Electrical contractor shall provide disconnect switches, starters, and contactors for mechanical equipment unless specifically noted as being furnished as part of mechanical equipment.
- 11.5 Electrical contractor shall provide all power wiring, raceway and devices, and make final electrical connections to all mechanical equipment, switches, starters, contactors, controllers, and similar equipment.

PART 12 - DIVISION 27 - COMMUNICATIONS

- 12.1 Electrical and Communications Contractors shall coordinate the exact Communications requirements of all electrical equipment being provided. Where approval submittals are required, this coordination shall be accomplished prior to making the submittals. The Communications design shown on the drawings supports the electrical equipment basis of design. If electrical equipment is submitted with different Communications requirements, it is the responsibility of the electrical contractor to resolve all required Communications design changes (e.g. input/output voltage) and clearly show the new Communications design on the electrical submittal with a written statement that this design will be provided at no additional cost. Electrical submittals made with no written reference to the Communications design will be presumed to work with the Communications design. Any corrections required will be at no additional cost to the Owner.
- 12.2 Electrical Contractor is expected to be familiar with the entirety of the communications scope. Review communications sheets, specifications, and other portions of the Contract Documents prior to bidding. Electrical Contractor is responsible for all line voltage (greater than 100V) work unless otherwise noted. Electrical Contractor shall

- coordinate with Communications Contractor, and shall make themselves available as necessary to support the communications scope.
- 12.3 Unless otherwise instructed by Construction Manager or General Contractor, Division 26 shall be responsible for Division 27.

END OF SECTION 26 05 02

SECTION 26 05 26 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 Related Documents:

- A. Conform to Division 1 and other sections of this division.
- B. Division 26 Basic Materials and Methods sections apply to work of this Section.

1.2 <u>Summary</u>:

- A. The extent of electrical grounding and bonding work is indicated by drawings and schedules and as specified herein. Grounding and bonding work is defined to encompass systems, circuits, and equipment.
- B. The type of electrical grounding and bonding work specified in this Section includes the following:
 - Solidly grounded.
- C. Applications of electrical grounding and bonding work in this Section include the following:
 - 1. Electrical power systems.
 - 2. Raceways.
 - 3. Enclosures, pull boxes, junction boxes, etc.
 - 4. Equipment.
 - 5. Devices and Fixtures.
- D. Refer to other Division 26 sections for wires/cables, electrical raceways, boxes and fittings, and wiring devices which are required in conjunction with electrical grounding and bonding work.

1.3 Submittals:

- A. Submit in accordance with General, Supplementary, and Special Conditions.
- B. Product Data: Submit manufacturer's data on grounding and bonding products and associated accessories.

1.4 Codes and Standards:

- A. Codes and Standards:
 - Electrical Code Compliance: Comply with applicable local electrical code requirements of the authority having jurisdiction, and current NEC as applicable to electrical grounding and bonding, pertaining to systems, circuits, and equipment.
 - 2. UL Compliance: Comply with applicable requirements of UL Standards No.'s 467, "Electrical Grounding and Bonding Equipment", and 869, "Electrical Service Equipment", pertaining to grounding and bonding of systems, circuits, and equipment. In addition, comply with UL Std. 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors". Provide grounding and bonding products which are UL listed and labeled for their intended usage. Solder lugs are not acceptable.

PART 2 - PRODUCTS

2.1 Acceptable Manufacturers:

- A. All products shall be the produce of reputable and reliable manufacturers.
- B. The following manufacturers are recognized as being reputable and reliable:
 - 1. Burndy, Inc.
 - 2. Erico, Inc.
 - 3. Harger, Inc.
 - 4. Thermoweld, Inc.
- C. Additional manufacturers shall be considered reputable and reliable only if they verifiably satisfy the following requirements:
 - 1. History: Acceptable manufacturers shall have a history of producing similar products at least the past ten years. Such products shall have been sold in the state of Florida for at least the past five years.
 - 2. Volume: Acceptable manufacturers shall have produced and sold similar products in excess of one hundred (100) times annually the amount of product projected for used in this project. This requirement shall apply to each of the past ten years.
 - 3. Similar projects: Acceptable manufacturers shall have sold similar products which have been used in at least five similar projects in the past five years. Similar projects must be of a similar use, overall cost, and overall size.
- D. Documentation of the above manufacturer requirements shall be provided to Engineer upon request, but is otherwise unnecessary. If documentation is required, it shall consist of a signed statement from Manufacturer's representative on Manufacturer's letterhead (or the letterhead of Manufacturer's approved representative). Additional documentation may be required in rare cases.
- E. Any submittal by Contractor shall be considered indication by Contractor that Contractor stands behind for the suitability of a manufacturer, and that the manufacturer satisfies of the above requirements.
- F. Contact Engineer prior to bid with any questions regarding acceptable manufacturers.

2.2 <u>Grounding and Bonding:</u>

- A. Provide complete grounding and bonding assemblies, including, but not limited to,
 - 1. Cables/Wires,
 - 2. Connectors,
 - 3. Solderless Lug Terminals,
 - 4. Bonding Jumper Braid,
 - 5. Surge Arresters, and
 - 6. Additional accessories needed for a complete installation.
- B. Where more than one type component product meets indicated requirements, selection is Contractor's option.
- C. Where materials or components are not indicated, provide products which comply with NEC, UL, and applicable industry standards.
- D. Conductors:
 - Unless otherwise indicated, provide electrical grounding conductors for grounding system connections that match power supply wiring materials and are sized according to NEC.
- E. Bonding Plates, Connectors, Terminals, and Clamps:
 - 1. Provide electrical bonding plates, connectors, terminals, lugs, and clamps as recommended by bonding plate, connector, terminal, and clamp manufacturers

for indicated applications.

PART 3 - EXECUTION

3.1 <u>Examination</u>:

A. Examine areas and conditions under which electrical grounding and bonding connections are to be made and notify Engineer in writing of any condition detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer and Owner.

3.2 <u>Installation of Electrical Grounding and Bonding Systems</u>:

- A. General: Install electrical grounding and bonding systems as indicated, in accordance with manufacturer's instructions and applicable portions of current NEC, NECA's "Standard of Installation", and in accordance with recognized industry practices to ensure that products comply with requirements.
- B. Coordinate with other electrical work as necessary to interface installation of electrical grounding and bonding system work with other work.
- C. Provide all circuits with an insulated equipment grounding conductor. Under no circumstances shall raceways be the sole equipment grounding conductor.
- D. Terminate insulated equipment grounding conductors with grounding lug, bus, or bushing. Conductors shall not be looped under screw or bolt heads.
- E. Connect together service equipment enclosures, exposed noncurrent carrying metal parts of electrical equipment, metal raceway systems, boxes, grounding conductor in raceways and cables, device and fixture ground connectors.
 - 1. Provide minimum #12 AWG equipment grounding conductor in each conduit unless otherwise indicated. Equipment grounding conductor shall have continuous green insulation if #6 or smaller, green marking tape if #4 or larger.
 - 2. Equipment grounding conductor shall be connected to ground buses in equipment enclosures.
 - 3. Equipment grounding conductor bonded to all outlet, pull, and junction boxes by a lug or screw approved for the purpose before installation of the boxes. Ground pigtails and/or ground clips are not acceptable.
- F. Grounding type bushings shall be installed on all feeder and subfeeder conduits entering panelboards, pull boxes and transformers and all conduit entering oversized, concentric, and eccentric knock-outs.
- G. Tighten grounding and bonding connectors and terminal, including screws and bolts, in accordance with manufacturer's published torque tightening values for connectors and bolts. Where manufacturer's torqueing requirements are not indicated, tighten connections to comply with tightening torque values specified in UL 486A to assure permanent and effective grounding.
- H. Install clamp-on connectors on clean metal contact surfaces, to ensure electrical conductivity and circuit integrity. All ground clamps and lugs shall be listed for application and shall be made completely of bronze or brass.

END OF SECTION 26 05 26

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SECTION 26 05 31 - WIRES AND CABLES

PART 1 - GENERAL

1.1 Related Documents:

- A. Conform to Division 1 and other sections of this division.
- B. This Section is a general Division 26 materials and methods section, and applies to all other Division 26 sections involving materials and methods specified herein.

1.2 Description of Work:

- A. Extent of electrical wire and cable work is indicated by drawings and schedules.
- B. Types of electrical wire, cable, and connectors specified in this Section include the following:
 - 1. Copper conductors.
 - 2. Fixture wires.
 - 3. Wire connectors.
- C. Applications of electrical wire, cable, and connectors required for project are as follows:
 - 1. For power distribution circuits.
 - 2. For lighting circuits.
 - 3. For appliance and equipment circuits.
 - 4. For motor branch circuits.
 - 5. For control circuits.

1.3 Codes and Standards:

- A. NEC Compliance: Comply with NEC requirements as applicable to construction, installation, and color coding of electrical wires and cables.
- B. IEEE Compliance: Comply with applicable requirements of IEEE Stds. 82, "Test Procedures for Impulse Voltage Tests on Insulated Conductors", and Std. 241, "IEEE Recommended Practice for Electric Power Systems in Commercial Buildings" pertaining to wiring systems.
- C. ASTM Compliance: Comply with applicable requirements of ASTM B1, 2, 3, 8, and D 753.

1.4 Submittals:

- A. Submit in accordance with General, Supplementary, and Special Conditions.
- B. Product Data: Submit manufacturer's data.

PART 2 - PRODUCTS

2.1 General Wiring Products:

A. Unless otherwise noted, all wiring shall be copper, with conductivity of not less than 98% at 20°C (68°F).

2.2 Acceptable Manufacturers:

- A. All products shall be the produce of reputable and reliable manufacturers.
- B. The following manufacturers are recognized as being reputable and reliable:
 - 1. Cerro Wire
 - 2. Encore Wire Corporation

- 3. General Cable
- 4. Southwire Company
- C. Additional manufacturers shall be considered reputable and reliable only if they satisfy the following requirements:
 - 1. History: Acceptable manufacturers shall have a history of producing similar products at least the past ten years. Such products shall have been sold in the state of Florida for at least the past five years.
 - 2. Volume: Acceptable manufacturers shall have produced and sold similar products in excess of one hundred (100) times annually the amount of product projected for used in this project. This requirement shall apply to each of the past ten years.
 - 3. Similar projects: Acceptable manufacturers shall have sold similar products which have been used in at least five similar projects in the past five years. Similar projects must be of a similar use, overall cost, and overall size.
- D. Documentation of the above manufacturer requirements shall be provided to Engineer upon request, but is otherwise unnecessary. If documentation is required, it shall consist of a signed statement from Manufacturer's representative on Manufacturer's letterhead (or the letterhead of Manufacturer's approved representative). Additional documentation may be required in rare cases.
- E. Any submittal by Contractor shall be considered indication by Contractor that Contractor stands behind for the suitability of a manufacturer, and that the manufacturer satisfies of the above requirements.
- F. Contact Engineer prior to bid with any questions regarding acceptable manufacturers.
- 2.3 <u>Building Wires</u>: Provide factory fabricated wires of sizes, ampacity ratings, and materials for applications and services indicated.
 - A. Dual-listed THHN/THWN-2: For dry, damp, and wet locations.
 - B. All wiring for conventional devices shall be stranded wire with the exceptions as noted on the electrical drawings.
- 2.4 <u>Color Coding</u>: The following systems of color coding shall be strictly adhered to. There shall be no color change for switch legs. Switch legs shall be marked at all junctions with colored tape on each wire with tape of contrasting color. Three way travelers shall be purple. In cases where more than one set of travelers are in the same conduit, travelers shall be marked with circuit number and colored tape. Colored tape shall be same color as corresponding switch leg marking.
 - A. Note: Verify that the following corresponds to existing wiring prior to proceeding.
 - B. All wiring shall be the indicated color. Tape is not an acceptable method of indicating phase legs.
 - C. 208Y/120V:
 - 1. Phase A: Black
 - 2. Phase B: Red
 - 3. Phase C: Blue
 - 4. Neutral: White
 - 5. EGC (Ground): Green
 - D. The color code assigned to each phase wire shall be consistently followed throughout.
 - E. Control and alarm wiring shall be identified by tags at every enclosure.

PART 3 - EXECUTION

3.1 <u>Delivery, Storage, and Handling:</u>

- A. Deliver wire and cable properly packaged in factory fabricated type containers, or wound on NEMA specified type wire and cable reels.
- B. Store wire and cable in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris, and traffic.
- C. Handle wire and cable carefully to avoid abrading, puncturing, and tearing wire and cable insulation and sheathing. Ensure that dielectric resistance integrity of wires/cables is maintained.

3.2 Installation of Wires and Cables:

- A. General: Install electrical cables, wires, and wiring connectors in compliance with applicable requirements of NEC, NEMA, UL, and NECA's "Standard of Installation" and in accordance with recognized industry practices.
- B. Unless otherwise noted, all branch circuit conductors shall be 12 AWG minimum.
- C. Install all line voltage wiring in conduit, unless otherwise indicated in writing by Engineer.
- D. Pull conductors simultaneously where more than one is being installed in same raceway.
- E. Use lubricant for pulling conductors. Use only products indicated for the purpose by the manufacturer.
- F. Use pulling means including, fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceway.
- G. Minimize conductor splices.
- H. Install splices and taps which possess equivalent or better mechanical strength and insulation ratings than conductors being spliced. Use splice and tap connectors which are compatible with conductor material.
- I. Provide a 6" loop in each conductor in all joint boxes and pull boxes.
- J. Conductors of systems of different voltages or types shall not enter the same conduit or junction box. The number of current carrying conductors and total number of conductors to be installed in conduits shall be as noted below.
 - 1. Single phase 120V circuits: Limit three per raceway.
 - 2. All other circuits: Dedicated raceway.
 - 3. Deviation of installation as identified above requires prior written approval from Engineer.
- K. Circuits shall be installed such that the continuity of the ground, neutral, and hot circuits shall not be interrupted by the removal of any device or fixture.
- L. For the purposes of thermal derating calculations, neutrals shall be considered current carrying except for balanced three-phase linear loads.
- M. Multiwire branch circuits are prohibited. All 120V circuits shall be provided a dedicated neutral conductor.
- N. All Branch circuit conductors (Hot & Neutral) shall be identified as a pair from the Panel thru all junction boxes to the device box before it ties into any device.
 - 1. All conductors shall be numbered to identify the pairs.

3.3 Field Quality Control:

A. Prior to energization of circuitry, check installed feeder wires and cables with megohmmeter to determine insulation resistance levels to ensure requirements are fulfilled. A list of feeders tested shall be submitted to the Engineer indicating the insulation resistance level for each cable. Owner shall be given the option to witness

- all tests.
- B. Prior to energization, test wires and cables for electrical continuity and for short circuits.
- C. Subsequent to wire and cable hook ups, energize circuitry and demonstrate functioning in accordance with requirements. Where necessary, correct malfunctioning units, and then retest to demonstrate compliance.

END OF SECTION 26 05 31

SECTION 26 05 33 - RACEWAYS

PART 1 - GENERAL

1.1 Related Documents:

- A. Conform to Division 1 and other sections of this division.
- B. This Section is a general Division 26 materials and methods section, and applies to all other Division 26 sections involving materials and methods specified herein.

1.2 Description of Work:

- A. Extent of raceway work is indicated by drawings and schedules.
- B. Types of raceways specified in this section include the following:
 - 1. Electrical metallic tubing (EMT)
 - 2. Rigid metal conduit, galvanized (RMC)
 - 3. Rigid nonmetallic conduit (RNC)
 - 4. Liquid tight flexible metal conduit (LFMC)
 - 5. Flexible metal conduit, steel only (FMC)

1.3 Submittals:

- A. Submit in accordance with General, Supplementary, and Special Conditions.
- B. Product Data: Submit manufacturer's data.

PART 2 - PRODUCTS

2.1 <u>Acceptable Manufacturers</u>:

- A. All products shall be the produce of reputable and reliable manufacturers.
- B. The following manufacturers are recognized as being reputable and reliable:
 - 1. Allied Tube & Conduit
 - 2. Carlon
 - 3. Cantex
 - 4. Wiremold
 - 5. Wheatland Tube
- C. Additional manufacturers shall be considered reputable and reliable only if they verifiably satisfy the following requirements:
 - 1. History: Acceptable manufacturers shall have a history of producing similar products at least the past ten years. Such products shall have been sold in the state of Florida for at least the past five years.
 - 2. Volume: Acceptable manufacturers shall have produced and sold similar products in excess of one hundred (100) times annually the amount of product projected for used in this project. This requirement shall apply to each of the past ten years.
 - 3. Similar projects: Acceptable manufacturers shall have sold similar products which have been used in at least five similar projects in the past five years. Similar projects must be of a similar use, overall cost, and overall size.
- D. Documentation of the above manufacturer requirements shall be provided to Engineer upon request, but is otherwise unnecessary. If documentation is required, it shall consist of a signed statement from Manufacturer's representative on Manufacturer's letterhead (or the letterhead of Manufacturer's approved representative). Additional

- documentation may be required in rare cases.
- E. Any submittal by Contractor shall be considered indication by Contractor that Contractor stands behind for the suitability of a manufacturer, and that the manufacturer satisfies of the above requirements.
- F. Contact Engineer prior to bid with any questions regarding acceptable manufacturers.

2.2 <u>UL Listed Materials</u>:

- A. Provide raceway products and components which have been UL listed and labeled for the intended use.
- B. Comply with applicable requirements of UL safety standards pertaining to electrical raceway systems.

2.3 <u>Products – Metal Conduit and Tubing:</u>

- A. General: Provide metal conduit, tubing, and fittings of types, grades, sizes, and weights (wall thicknesses) for each indicated use.
- B. Where types and grades are not indicated, provide proper selection determined by Contractor to fulfill wiring requirements, and comply with applicable portions of NEC for raceways.
- C. Minimum size conduit shall be 3/4" for all systems.
- D. Minimum size flexible conduit shall be 3/4" for all systems (3/8" for pre-assembled light fixture whips). Maximum length shall be 6 feet. Minimum length shall be 4 feet.
- E. Cast zinc conduit fittings are prohibited. Any cast zinc fitting installed by this project shall be replaced at Contractor's expense.
- F. All fittings shall be provided with insulated throats or plastic bushings prior to pulling wires or cables.
- G. Electrical Metallic Tubing (EMT):
 - 1. Conduit: Shall be mild steel, electrically welded, galvanized, and produced to ANSI Specification C80.3 and Federal Specification WW-C-563, latest revisions and shall be labeled with the Underwriter's Laboratories marking.
 - 2. Fittings: Couplings and connectors for conduit shall be set screw type, steel, or malleable iron.

H. Rigid Steel Conduit (RMC):

- Conduit: Shall be mild steel, manufactured, hot-dipped galvanized, and produced to ANSI specifications C80.1 and Federal Specification WW-C 581, latest revisions, and shall be labeled with the Underwriters' Laboratories marking.
- 2. Fittings: Cast malleable iron, galvanized, or cadmium plated.
 - a. Use Type 1 fittings for rain-tight connections.
 - b. Use Type 2 fittings for concrete tight connections.

I. Flexible Metal Conduit (FMC):

- 1. Conduit: UL 1. Formed from continuous length of spirally wound, interlocked zinc coated strip steel.
- 2. Fittings: Flexible Metal Conduit Fittings: Provide conduit fittings for use with flexible steel conduit of threadless hinged clamp type. Inside type fittings are not allowed.
 - a. Straight Terminal Connectors: One piece body, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provided with locknut.
 - b. 45° or 90° Terminal Angle Connectors: Two piece body construction with

removable upper section, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provided with locknut.

- J. Liquid Tight Flexible Metal Conduit (LFMC):
 - 1. Conduit: Provide liquid tight flexible metal conduit; construct of single strip, flexible, continuous, interlocked, and double wrapped steel; galvanized inside and outside; coat with liquid tight jacket of flexible polyvinyl chloride (PVC).
 - 2. Fittings: Provide cadmium plated, malleable iron fittings with compression type steel ferrule and neoprene gasket sealing rings, with insulated, or noninsulated throat.
- K. No ENT, corrugated flexible conduit, or MT cable shall be installed or reused.
- L. No intermediate metal conduit (IMC) shall be installed.
- M. Conduit Bodies: Provide galvanized cast-metal conduit bodies of types, shapes, and sizes as required to fulfill job requirements and NEC requirements. Construct conduit bodies with threaded conduit-entrance ends, removable covers, either cast or of galvanized steel, and corrosion-resistant screws. SLB type are not permitted.

2.4 <u>Products – Nonmetallic Conduit and Ducts:</u>

- A. General: Provide nonmetallic conduit, ducts, and fittings of types, sizes, and weights for each indicated use. Where types and grades are not indicated, provide proper selection determined by Contractor to fulfill wiring requirements which comply with provisions of NEC and Specifications for raceways.
- B. 90°C, UL rated, constructed of polyvinyl chloride. For direct burial, UL listed and in conformity with NEC Article 352.
- C. Conduit and Tubing Accessories: Provide conduit, tubing, and accessories of types, sizes, and materials, complying with manufacturer's published product information, which mate and match conduit and tubing.
- D. Data conduit shall comply with "Pathways for Telecom Cables" paragraph, below.

2.5 Pathways for Telecom Cables:

A. General:

- 1. Any pathway that is not accessible or does not provide a clear and workable pathway will be rejected.
- 2. All components of pathway systems in contact with telecom cables shall be listed and indicated for the use. This includes Category 6 ratings, etc.

B. Conduits for Telecom Cables:

- 1. Conduit intended for telecom cables shall be a minimum 1" trade size unless otherwise indicated.
- Conduits terminating not into a box shall be capped with a bushing.
- 3. Conduits terminating at cable trays shall be bonded to the cable tray with a bonding jumper or a clip listed for the purpose.

PART 3 - EXECUTION

- 3.1 Examine areas and conditions under which raceways are to be installed, and substrate which will support raceways. Notify Owner and Engineer in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in acceptable manner.
- 3.2 <u>Provide raceways for each installation location as follows:</u>
 - A. Below grade: PVC

- B. Within concrete: PVC
- C. Exterior above-grade locations: rigid galvanized steel
- D. Damp and wet locations: rigid galvanized steel
- E. Interior locations subject to physical abuse: rigid galvanized steel
- F. Interior locations not subject to physical abuse: EMT
- G. Whips to light fixtures: 48" to 72" FMC or prefabricated whip.
- H. Connections to any vibrating or mechanically active equipment: FMC
 - 1. Exception: Utilize LFMC in exterior locations, or where subject to moist or humid atmosphere, or where subject to water, oil, or grease exposure.
- I. Connection to any equipment subject to movement: FMC
 - 1. Exception: Utilize LFMC in exterior locations, or where subject to moist or humid atmosphere, or where subject to water, oil, or grease exposure.
- J. FMC, LFMC, and LFNC shall not be used for any other applications without written consent from Engineer.

3.3 Raceway Size:

- A. Sizes of raceways shall be not less than NEC requirements using THHN/THWN2 for sizing and shall not in any case be less than indicated on the drawings.
- B. Larger size raceways and/or pull boxes shall be installed if there is excessive length of unbroken run or excessive number of bends.

3.4 <u>General Requirements</u>:

- A. Install conduits without damaging or penetrating structural members.
- B. Conduits shall not be installed below equipment.
- C. Metallic conduit in contact with concrete, grout, mortar, or other cementitious products such as grouted cells, headers, lintels, etc. shall be provided a bituminous coating before installation.
- D. All conduit installed in walls and above ceilings shall be 100% complete and approved by inspectors before covering is installed. Such coverings include drywall, insulation, ceiling tiles, and any other material which obscures the installation.
- E. Conduit installed above accessible ceilings shall be supported from the building structure and shall not be supported from or attached to the suspended ceiling suspension system.
- F. Where feasible, avoid conduit runs within partitions and walls.
- G. Mechanically assemble metal enclosures, and raceways for conductors to form a continuous conductive system.
- H. Connect to electrical boxes, fittings, and cabinets to provide effective electrical continuity and rigid mechanical assembly.
- I. Avoid use of dissimilar metals throughout system to eliminate possibility of electrolysis. Where dissimilar metals are in contact, coat all surfaces with corrosion inhibiting compound before assembling.
- Install expansion fittings in all raceways wherever structural expansion joints are crossed.
- K. Raceway penetrations of fire rated walls and/or floors shall be sealed to maintain the rating(s). All relevant materials and methods shall be per a UL detail satisfying NFPA rating requirements.
- L. Fire rating of construction assemblies are specified under architectural section of the Contract Documents. Any ratings indicate within other portions of the Contract Documents is purely intended for the Contractor's convenience, and is not meant to

- replace a careful review of architectural life safety plans.
- M. Submit complete data on fire stopping materials and construction methods for review by Architect prior to proceeding with work.
- N. Coordinate with other work including wires/cables, boxes, and panel work, as necessary to interface installation of electrical raceways and components with other work.
- O. Use Manufacturer-provided dimensions to lay out all equipment electrical connections. Set conduit and boxes for connection to units only after receiving review of dimensions and coordinating with other trades.
- P. Provide nylon pull cord in empty conduits.
- Q. Cut conduits straight, properly ream, and cut threads for heavy wall conduit deep and clean.
- R. Field bend conduit with benders designed for the purpose.
- S. Any conduit with kinks, tears, or other material damage shall be replaced at Contractor's expense.
- T. Conduits are not to cross utility shafts or duct openings.
- U. Keep conduits a minimum distance of six inches (6") from parallel runs of flues, hot water pipes, or other sources of heat. Wherever possible, install horizontal raceway runs above water and steam piping.
- V. Support riser conduit at each floor level with clamp hangers.
- W. Use of running threads at conduit joints and terminations is prohibited.
- X. Complete installation of electrical raceways before starting installation of cables/wires within raceways.
- Y. Under no circumstances shall PVC or PVC-coated conduit be utilized within an air plenum. In particular, Contractor is to avoid LFMC within air handler plenums, etc.

3.5 Flexible Conduit:

- A. Flexible conduit shall not pass through walls or ceilings. Provide a junction box at the point of transition.
- B. Flexible conduit shall not be used within walls, except where written permission is given by Engineer and Owner.

3.6 Conduits Installed in Exterior, Wet, or Damp Locations:

- A. Metallic raceways exterior, wet, or damp locations shall have conduit threads painted with cold galvanizing paint. Remove oil and clean prior to painting. Draw up coupling and conduit sufficiently tight to ensure water tightness.
- B. All wall penetrations entering wet locations shall be sloped downward at least 1/2".

3.7 Special EMT Requirements:

- A. EMT shall not be installed below 8" AFF.
- B. EMT shall not be installed exposed below 72" AFF.
- C. EMT shall be installed in dry and indoor locations only.

3.8 <u>Conduits Installed Below Grade</u>:

A. All underground wiring and ductbanks shall have metalized warning tape installed above conduit, ductbank, or electrical line that identifies the specific system buried below. Tape shall consist of a minimum 3.5 mil solid foil core encased in a protective plastic jacket (total thickness 5.5 mils) and be 6" wide with black lettering imprinted on a color coded background that conforms to APWA color code specifications. Tape shall be installed from 18" to 30" above a conduit, ductbank, or electrical line, and in no case less than 6" below grade. No additional tracer wire is required.

- B. All rigid metal conduit below grade shall be provided a bituminous coating.
- C. Metallic raceways installed below grade shall have conduit threads painted with cold galvanizing paint. Remove oil and clean prior to painting. Draw up coupling and conduit sufficiently tight to ensure water tightness.
- D. Install all underground conduits a minimum of 42" below finished grade (to top of conduit), except where below building foundation. Underground conduit shall be inspected and approved prior to backfilling. Primary raceway shall be buried 48" to top of conduit.
- E. Conduit below concrete slabs and footers under or inside building foundations shall be minimum of 6" below bottom of concrete and/or at an adequate depth to conceal radius of bends.

3.9 Conduits within Concrete Slabs or Encased in Concrete:

- A. No conduit shall be installed within slabs without prior written approval from Structural Engineer. Provide Structural Engineer with whatever description and drawings of the proposed installation which Structural Engineer may require.
- B. All of the following are subject to the alteration by Structural Engineer:
 - 1. Place conduits between bottom reinforcing steel and top reinforcing steel. Place conduits either parallel, or at 90 degrees, to main reinforcing steel.
 - 2. Separate conduits by not less than diameter of largest conduit to ensure proper concrete bond.
 - 3. Conduits crossing in slab must be reviewed for proper cover by Engineer, Architect, and Owner.
 - 4. Embedded conduit diameter is not to exceed one-third (1/3) of slab thickness.

3.10 Coatings:

- A. Apply any coatings in accordance with manufacturer's instructions and recommendations.
- B. Reapply bituminous coating locally after making threaded connections.
- C. Any conduit requiring bituminous coating shall be coated without holidays. Inspect coating prior to burial or pouring, and touch up as needed.
- D. In lieu of bituminous coatings, raceways with factory-applied polyethylene or PVC protective coatings may be utilized. Install per manufacturer's instructions and recommendations. Seal all joints.

3.11 Conduits Above Grade:

- A. Install exposed conduits and all conduit above grade and extensions from concealed conduit systems neatly, parallel with, or at right angles to walls and building structure.
- B. Install exposed conduit work as not to interfere with ceiling inserts, lights, or ventilation ducts or outlets.
- C. Securing and Supporting:
 - 1. Secure conduits within three feet of fittings, boxes, etc., and on spacing not to exceed ten feet.
 - a. Conduits may be supported in lieu of securing, where permitted by Code.
 - 2. Support conduits by use of hangers, clamps, or clips.
 - 3. Conduit shall not be supported from suspended ceiling supports or grid systems.
- D. Limit penetrations of vapor- and water-barriers. Utilize curbs, etc. wherever possible. Seal any penetrations of vapor- and water-barriers with approved methods.
- E. Conduit shall not be installed on roof tops or walkway covers.

- F. Conduit penetrating concrete floors not within 12" of walls shall have couplings installed flush with top slab.
- G. Flexible metal conduit shall not be installed in damp or wet locations, through walls, or used as a raceway in concealed or inaccessible areas. It shall be supported within 12" of connectors and at least once every 54".

3.12 PVC Conduits:

- A. PVC subject to physical damage shall be Schedule 80. All other PVC shall be heavy wall type (Schedule 40) conduit.
- B. PVC conduit shall be installed with rigid steel elbows and risers. (Exception: low voltage with inner ducts may be PVC.)
- C. Make solvent cemented joints in accordance with recommendations of manufacturer.
- D. Install PVC conduits in accordance with NEC and in compliance with local utility practices.
- E. Conduit and elbows shall be installed on the secondary side at power company's transformers. Wire and cable installation shall be such that wire pulling rope or cable will not damage elbows.
- F. Conduit, elbows, and risers shall be installed for all primary services per Utility and Owner requirements.
- G. All elbows shall be RMC, except where required otherwise by Utility.
- H. All risers shall be RMC, except where required otherwise by Utility.

3.13 General Conduit Fitting Requirements:

- A. Grounding type bushings shall be installed on all feeder and subfeeder conduits entering panelboards, pull boxes, and transformers and all conduit entering oversized, concentric, and eccentric knock-outs.
- B. Miscellaneous fittings such as reducers, chase nipples, 3 piece unions, split couplings, and plugs shall be designed and listed for the specific use.
- C. Provide either plastic bushings or plastic insulating throats for all fittings prior to pulling wire.
- D. Install insulated-type bushings for terminating conduits 1" and larger. Bushings are to have flared bottom and ribbed sides. Upper edge shall have phenolic insulating ring molded into bushing. Bushings shall be installed during rough-in and before installing conductors.
- E. Snap-on bushings are prohibited.

3.14 Threaded Conduit Fitting Requirements:

- A. Provided locknuts for securing conduit to metal enclosure with sharp edge for digging into metal, and ridged outside circumference for proper fastening.
- B. Bushings for threaded conduits smaller than 1" shall have flared bottom and ribbed sides, with smooth upper edges to prevent injury to cable insulation. Bushings shall be installed during rough-in and before pulling wire.
- C. Bushing of standard or insulated type shall have screw type grounding terminal. Bushings shall be installed on all threaded conduit.

3.15 <u>Identification</u>:

- A. Conduits shall be factory painted as follows:
 - 1. Telecom: Blue
 - 2. All others: unpainted, with color coded boxes and couplings per other sections.
- B. See also Boxes for coupling identifications.

- C. Conduit couplers further than 2 sticks (20 feet) of conduit from a junction box will have
 - 1. a label with voltage, and power source if needed (e power) or with the service in the junction box (fire alarm, access control, telecom/data, HVAC/BAS, etc.).
 - 2. or the pre colored coupler shall be wrapped with painters tape and after painting has occurred, painters tape shall be removed to expose coupler cover.
- D. If conduit comes from or goes to a space where the conduit is accessible and not painted (i.e. with drop ceiling) paint the conduit as it come through the wall (small paint, ~6" is fine) on the drop ceiling side and begin colored conduit (above drop ceiling) after the next coupler.
- E. If conduit comes from or goes to a space with hard ceiling or will not be visible, then add label to the conduit at the wall penetration using the labeling system above.
- F. Labels shall be self-adhesive type, with 1/2" tall black letters on a white or clear background.

3.16 Pathways for Telecom Cables:

- A. Low voltage wiring shall be contained in EMT.
- B. Conduits for Telecom Cables:
 - 1. Conduits intended for telecom cables shall not exceed the following:
 - a. Two 90° bends, turns, sweeps, etc. between pull boxes,
 - b. A total of 270° of bends, turns, sweeps, offsets, etc. between pull boxes,
 - c. 100' length between pull boxes, or
 - d. 200' total length.
 - 2. Changes in direction shall be made with sweeps, elbows, etc. Changes in direction shall not be made in pull boxes.
 - 3. Conduit bodies are not acceptable for telecom conduits, regardless of whether they may be used elsewhere in the project. This is not intended to indicate that conduit bodies are acceptable for other purposes.
 - 4. Ream and bush all conduits intended for telecom cables.
 - 5. Provide a 200lb nylon pull cord in each conduit intended for telecom cables.
 - 6. Provide a minimum of one dedicated 1" conduit from each work area outlet (telecom outlet box), including floor boxes and poke throughs, to the nearest cable tray. Where no cable tray is within 30 feet, route conduit to nearest telecom room.

C. Penetrations of Partitions:

- 1. Coordinate route of telecommunications pathways to ensure pathways are provided through partitions as needed to support the telecommunications scope.
- 2. Maintain ratings of any partitions penetrated by telecommunications cabling.
 - a. Provide EZ-Path 44 in quantities sufficient to match capacity of associated pathway (cable tray, j-hooks, etc.). Where multiple EZ-Path devices are provided at the same location, gang devices with manufacturer's gang faceplate.

END OF SECTION 26 05 33

SECTION 26 05 34 - BOXES AND FITTINGS

PART 1 - GENERAL

1.1 Related Documents:

- A. Conform to Division 1 and other sections of this division.
- B. This Section is a general Division 26 materials and methods section, and applies to all other Division 26 sections involving materials and methods specified herein.

1.2 Description of Work:

- A. Extent of electrical box and associated fitting work is indicated by drawings and schedules.
- B. Types of electrical boxes and fittings specified in this Section include the following:
 - Outlet boxes.
 - 2. Junction boxes.
 - 3. Pull boxes.
 - 4. Floor boxes.

1.3 <u>Codes and Standards</u>:

- A. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical wiring boxes and fittings.
- B. UL Compliance: Comply with applicable requirements of UL 50, UL 514 Series, and UL 886 pertaining to electrical boxes and fittings. Provide electrical boxes and fittings which are UL listed and labeled.

1.4 <u>Submittals</u>:

- A. Submit in accordance with General, Supplementary, and Special Conditions.
- B. Product Data: Submit manufacturer's data.

PART 2 - PRODUCTS

2.1 Acceptable Manufacturers:

- A. All products shall be the produce of reputable and reliable manufacturers.
- B. The following manufacturers are recognized as being reputable and reliable:
 - 1. Republic Steel
 - 2. Square D
 - 3. Thomas & Betts
 - 4. Quazite
 - 5. Wiremold
 - 6. Legrand
- C. Additional manufacturers shall be considered reputable and reliable only if they verifiably satisfy the following requirements:
 - 1. History: Acceptable manufacturers shall have a history of producing similar products at least the past ten years. Such products shall have been sold in the state of Florida for at least the past five years.
 - 2. Volume: Acceptable manufacturers shall have produced and sold similar products in excess of one hundred (100) times annually the amount of product projected for used in this project. This requirement shall apply to each of the past ten years.

- 3. Similar projects: Acceptable manufacturers shall have sold similar products which have been used in at least five similar projects in the past five years. Similar projects must be of a similar use, overall cost, and overall size.
- D. Documentation of the above manufacturer requirements shall be provided to Engineer upon request, but is otherwise unnecessary. If documentation is required, it shall consist of a signed statement from Manufacturer's representative on Manufacturer's letterhead (or the letterhead of Manufacturer's approved representative). Additional documentation may be required in rare cases.
- E. Any submittal by Contractor shall be considered indication by Contractor that Contractor stands behind for the suitability of a manufacturer, and that the manufacturer satisfies of the above requirements.
- F. Contact Engineer prior to bid with any questions regarding acceptable manufacturers.

2.2 <u>Products – Fabricated Materials:</u>

A. Outlet Boxes:

- 1. Outlet wiring boxes shall be galvanized coated flat rolled sheet steel, of shapes, volumes, and dimensions as indicated, suitable for installation at respective locations. Exception: Exterior boxes shall be weatherproof cast box.
- 2. Outlet boxes shall be constructed with mounting holes, and with cable and conduit size knockout openings in bottom and sides.
- 3. Minimum dimensions for device boxes, junction boxes, pull boxes, and other boxes in walls shall be 2-Gang square. Depth shall be
 - a. two and one-eight inches (2-1/8") deep for IT (telecom, AV, access controls, etc.),
 - b. two and one-eight inches (2-1/8") deep for exposed work or furred ceiling work, and
 - c. one and one-half inches (1-1/2") for other locations.
- 4. Dimensions of ceiling boxes shall be a minimum 2-Gang square or octagonal. Depth shall be
 - a. three inches (3") for flush-in-concrete work.
 - b. two and one-eight inches (2-1/8") deep for IT (telecom, AV, access controls, etc.),
 - c. two and one-eight inches (2-1/8") deep for exposed work or furred ceiling work, and
 - d. one and one-half inches (1-1/2") for other locations.
- 5. Plaster rings and/or fixture studs shall be provided where required. Plater rings shall be 1-Gang unless a devices like a quad receptacle requires 2-Gang plaster ring.
- 6. Boxes shall be placed so that extension rings shall not be needed. Any box proposed extensions need to be approved by facility services.
- 7. Outlet boxes for exposed wall mounting shall be weatherproof cast metal type "FS" or "FD" boxes with suitable cast weatherproof aluminum covers.
- 8. Outlet boxes shall be sound attenuated in back to back installations within framing studs.
- 9. Exterior boxes:
 - a. All exterior boxes shall be appropriately listed or indicated for the use.
 - b. Device boxes for exterior receptacles shall be provided with in-use

- weatherproof receptacle covers. Such covers shall have spring hinged lids.
- c. Weatherproof covers shall meet code requirements for covers intended for use with attachment plugs.
- 10. Sectional or gangable boxes shall not be installed.
- 11. Through-wall boxes shall not be installed.
- 12. Box extensions or "goof rings" shall not be installed.
- 13. "Handy" boxes, etc. shall not be permitted.
- B. All pull boxes used outside and underground shall be pre-cast concrete polymer, with concrete polymer cover. Such boxes shall be of sufficient size to make all entrances and exits from box in one horizontal plane.
- C. Junction and Pull Boxes: Provide galvanized code gauge sheet steel junction and pull boxes, with screw on covers; of types, shapes and sizes, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws, and washers.
- D. Floor Boxes: Provide raintight adjustable floor boxes as indicated, with threaded conduit entrance ends, and vertical adjusting rings, gaskets, brass floor plates with flush screw on covers with ground flange and stainless steel cover screws. Carpet and tile plates to be brass.
- E. Cover Plates:
 - 1. All cover plates shall be abuse resistant nylon or stainless steel.

PART 3 - EXECUTION

3.1 General:

- A. Install all electrical boxes and fittings as indicated, in accordance with manufacturer's instructions, applicable code, and recognized industry practices, to fulfill project requirements.
- B. The location of any pull box shall be approved by Architect and Owner before installation, unless said pull box is installed in an accessible above-ceiling space, or a dedicated mechanical or electrical room.
- C. Coordinate installation of electrical boxes and fittings with wire/cable, wiring devices, and raceway installation work.
- D. Provide weatherproof outlets for interior and exterior locations exposed to weather or moisture.
- E. Provide knockout closures to cap unused knockout holes where blanks have been removed.
- F. All outlet and device boxes shall be independently supported from structure.
- G. Install electrical boxes only in accessible locations.
- H. Orient all boxes for ease of accessibility. Install overhead boxes cover-down unless otherwise directed.
- I. Coordinate all boxes with other trades.
 - 1. Any box without a minimum 6" front clearance will be adjusted or reinstalled at Contractor's expense.
 - 2. Any box installed such that access is effectively blocked by other trades shall be adjusted or reinstalled at Contractor's expense.
- J. Secure electrical boxes firmly and rigidly to structure, or solidly embed electrical boxes in concrete or masonry.
- K. Protect installed boxes from construction debris and damage.
- L. All outside, above grade pull boxes shall be galvanized.

M. All flush mounted boxes, regardless of system or voltage, shall be installed flush within 1/8" of wall finish or finished face of tackboards, sound boards, cabinets, etc. Box extension or goof rings shall not be installed.

- N. Boxes shall not be installed back-to-back.
- O. Boxes within the same stud cavity shall be separated by a minimum of 12".
- P. Boxes for flush mounting in concrete block:
 - 1. Boxes for flush mounting in concrete block shall be provided covers with square corners on the raised portion of the cover.
 - 2. Such covers shall be of sufficient depth to be flush with the face of the block.
 - 3. The bottom side of the covers or boxes shall be installed at the masonry course nearest to the dimension specified or noted, but not more than applicable code.
 - 4. Boxes installed in block walls shall be secured in place with mortar.
 - 5. Boxes shall be flush with any combustible surface including black splash, tack board or sound board.

Q. Exterior Boxes:

- 1. Unless otherwise noted, exterior boxes on walls shall be installed flush with wall. Coordinate with masonry as required.
- 2. Provide suitable installation for each application, including face plate gaskets and corrosion resistant plugs and fasteners.

3.2 Boxes in Rated Partitions:

- A. Maintain all fire and heat ratings by installing boxes in rated partitions according to a UL detail for an acceptable product. No UL rating detail shall be used prior to approval by Architect.
- B. All boxes installed in rated walls shall be rigidly secured to structure.
- C. All voids between boxes and surrounding wall surfaces shall be completely filled with an approved material.

3.3 Outlet Boxes:

- A. Position recessed outlet boxes accurately to allow for surface finish thickness.
- B. Set floor boxes level and flush with finish flooring material.
- C. Outlet Box Accessories: Provide compatible outlet box accessories as required for installation, including:
 - 1. box supports,
 - 2. bonding accessories,
 - 3. mounting ears and brackets,
 - 4. wallboard hangers,
 - 5. box extension rings,
 - 6. fixture studs.
 - 7. cable clamps, and
 - 8. metal straps for supporting outlet boxes.
- D. Rigidly support all outlet boxes from both sides, or from back, such that box cannot move or deflect into the wall when devices are installed or modified.

3.4 Identification:

- A. Box lids and conduit couplings shall be color coded as follows:
 - 1. 208Y/120V: Black, marked using a printed label, stencil or be handwritten (3/4" minimum height for labels, hand writing must be legible).

a. Exception: For exposed ceiling areas all junction boxes get a printed label on them with Voltage, power source if needed (e power), Panel number (or feeding and load panel numbers), circuit (s) number or with the service in the junction box (fire alarm, access control, telecom/data, HVAC/BAS, etc.).

- 1. Above information shall be written with permanent marker on the inside of the junction box cover as well.
- 2. Telecom: Blue
- 3. All others: Paint a unique color.
- 4. Exception: Coordinate color coding requirements with Architect and Owner where boxes are visible in public spaces.
- B. Covers of all junction boxes, pull boxes, etc. shall be marked by circuit number using indelible ink, 3/4" minimum height. Locate marker so it can be readily identified without removal of the cover plate.
 - 1. Exception: Where box covers are visible in public spaces, marker label shall be on the inside of the box cover.

END OF SECTION 26 05 34

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SECTION 26 24 20 - PANELBOARDS

PART 1 - GENERAL

1.1 <u>Summary</u>:

- A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for panelboards as required for the complete performance of the work, and as shown on the Drawings and as herein specified.
- B. Section Includes: The work specified in this Section includes, but shall not be limited to, the following:
 - 1. Provide lighting and appliance panelboards as specified herein and where shown and scheduled on the Drawings.

1.2 Submittals:

- A. General: See submittal procedures in Division 1.
- B. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications. Clearly indicate all variations and options proposed for installation.
- C. Configuration: Submit panelboard configuration information, including the physical locations and connections of all active and conductive components.
- D. Shop Drawings: Submit scaled shop drawings depicting the intended installation location for each panelboard, relevant clearance requirements, and all other equipment intended for installation nearby. Indicate all relevant dimensions, and document that installation is feasible as proposed.
- E. Include panelboards in dimensioned electrical room shop drawings.

1.3 Operation and Maintenance:

A. Operation and Maintenance Data: Prior to substantial completion, submit operation and maintenance data for panelboards. Submit as indicated in Section 26 00 00 and Division 1.

1.4 Quality Assurance:

A. Qualifications:

- 1. Manufacturer Qualifications: Manufacturer shall be a firm engaged in the manufacture of panelboards of types and sizes required, and whose products have been in satisfactory use in similar service for a minimum of five years.
- 2. Installer Qualifications: Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing panelboards similar in type and scope to that required for this Project and shall be approved by the manufacturer.
- 3. Documentation of qualifications, examples of past projects, and references, shall be provided to Owner and/or Engineer upon request, but are not required as part of the standard submittal procedure.
- B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

1. Without limiting the generality of other requirements of this Section, all work specified herein shall conform to or exceed the applicable requirements of the following standards; provided, that wherever the provisions of said publications are in conflict with the requirements specified herein, the more stringent requirements shall apply:

- a. FS W-C-375.
- b. FS W-P-115 (Type I, Class 1).
- c. NEMA AB 1.
- d. NEMA PB 1.
- e. NEMA PB 1.1.
- f. NEC.
- g. UL 50.
- h. UL 67.
- i. UL 489.
- j. UL 924 (for emergency panels).
- C. Pre-Installation Conference: Prior to commencing the installation, meet at the Project site to review the material selections, installation procedures, and coordination with other trades. Pre-installation conference shall include, but shall not be limited to, the Contractor, the Installer, manufacturer's representatives, and any trade that requires coordination with the work. Date and time of the pre-installation conference shall be acceptable to the Owner and the Architect.
- D. Single Source Responsibility: Obtain panelboards and required accessories from a single source with resources to produce products of consistent quality in appearance and physical properties without delaying the work. Any materials which are not produced by the manufacturer shall be acceptable to and approved by the manufacturer.

1.5 Delivery, Storage, and Handling:

- A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.
- B. Store materials in their original, undamaged packages and containers, inside a well ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.6 Warranty:

- A. General: See closeout procedures in Division 1.
- B. Special Warranty: Submit a written warranty executed by the manufacturer, the Installer, and the Contractor, agreeing to repair or replace panelboards that fail in materials or workmanship within the specified warranty period.
 - 1. Warranty Period: Warranty period shall be one year from the date of substantial completion.

PART 2 - PRODUCTS

2.1 Manufacturers:

- A. Approved Manufacturers: All panelboard products shall be the produce of one of the following:
 - 1. Square D (Schneider Electric)
 - 2. ABB Panelboards (General Electric)

- 3. Cutler Hammer (Eaton)
- 4. Siemens

B. Basis of Design:

- 1. Items specified are to establish a standard of quality for design, function, materials, and appearance.
- 2. Equivalent products by other manufacturers are acceptable.
- 3. The Design Professional will be the sole judge of the basis of what is equivalent.
- 4. Any adjustments required to meet equivalency requirements shall be at Contractor's expense.
- 5. See Drawings for schedules indicating additional Basis of Design information.

2.2 Materials and Components:

A. General:

- 1. Minimum voltage rating shall be for the voltage indicated and scheduled on the Drawings.
- 2. Minimum per-phase continuous current ratings shall be as indicated and scheduled on the Drawings.
- 3. Minimum neutral continuous current ratings shall be as indicated and scheduled on the Drawings.
- 4. Minimum short circuit current rating shall be as indicated and scheduled on the Drawings, in RMS symmetrical amperes at the AC voltage indicated for the panelboard.
- 5. Enclosure NEMA rating shall be as indicated and scheduled on the Drawings.
- 6. Panelboards shall be suitable for use as service equipment when application requirements comply with UL 67 and NEC Article 230.

B. Feeder Connection(s):

- 1. Interiors shall be field convertible for top or bottom incoming feed.
- 2. Main circuit breakers shall be vertically mounted.
- 3. Sub-feed circuit breakers shall be vertically mounted.
- 4. Main lug interiors up to 400 amperes shall be field convertible to main circuit breaker.

C. Buses:

- 1. Provide one continuous bus bar per phase.
- 2. Each bus bar shall have sequentially phased branch circuit connectors suitable for plug-on or bolt-on branch circuit breakers.
- 3. The busing shall be fully rated.
- 4. Busing shall be plated copper.
- 5. Bus bar plating shall run the entire length of the bus bar.
- 6. Solid neutral(s) shall be plated and located in the mains compartment up to 225 amperes so incoming neutral cable may be of the same length.
- 7. Interior phase bus shall be pre-drilled to accommodate field installable options (i.e., sub-feed lugs, sub-feed circuit breakers, thru-feed lugs, etc.).

D. Circuit Breakers:

- 1. Circuit breakers shall be UL-listed with amperage ratings, interrupting ratings, and number of poles as indicated and scheduled on the Drawings.
- 2. Two-pole and three-pole circuit breakers shall have common tripping of all poles. Circuit breaker frame sizes above 100 amperes shall have a single magnetic trip

- adjustment located on the front of the circuit breaker that shall allow the user to simultaneously select the desired trip level of all poles. Circuit breakers shall have a push-to-trip button for maintenance and testing purposes.
- 3. Circuit breakers shall have an overcenter, trip-free, toggle mechanism which shall provide quick-make, quick-break contact action.
- 4. Circuit breakers shall have a permanent trip unit with thermal and magnetic trip elements in each pole.
- 5. Main circuit breaker thermal elements shall be true rms sensing and shall be factory calibrated to operate in a 40°C ambient environment.
- 6. Circuit breaker handle and faceplate shall indicate rated ampacity.
- 7. Standard construction circuit breakers shall be UL-listed for reverse connection without restrictive line or load markings.
- 8. Circuit breaker escutcheon shall have international I/O markings, in addition to standard on/off markings.
- 9. Circuit breaker handle accessories shall provide provisions for locking handle in the on or off position.
- 10. Circuit breakers shall be UL-listed for use with the following accessories, and shall be provided such accessories as indicated and scheduled on the Drawings:
 - a. Shunt trip.
 - b. Under voltage trip.
 - c. Ground fault shunt trip.
 - d. Auxiliary switch.
 - e. Alarm switch.
 - f. Compression lug kits.
- 11. The exposed faceplates of branch circuit breakers shall be flush with one another.
- 12. Molded case branch circuit breakers shall have bolt-on type bus connectors.
- 13. Breaker shall be UL Listed with the following ratings: (15-125A) Heating, Air Conditioning, and Refrigeration (HACR), (15-30A) High Intensity Discharge (HID), (15-20A) Switch Duty (SWD), (15-50A) Equipment Protection Device (EPD) (480Y/277Vac maximum).

E. Enclosures:

1. Type 1 Boxes:

- a. Boxes shall be hot-dip zinc galvanized steel constructed in accordance with UL 50 requirements. Unpainted galvannealed steel is not acceptable.
- b. Boxes shall have removable endwalls with knockouts located on one end. Boxes shall have welded interior mounting studs. Interior mounting brackets are not required.
- c. Boxes in fire and/or temperature rated walls shall be provided with a listed mat or wrap installed per an applicable UL detail. 3M Interam Endothermic Mat or equal.

2. Type 1 Fronts:

- Front shall meet strength and rigidity requirements per UL 50 standards.
- b. Front shall have grey enamel electrodeposited over cleaned phosphatized steel.
- c. Fronts shall be hinged one-piece with door, or door-in-door.

- d. Mounting shall be flush or surface as indicated and scheduled on the Drawings.
- e. Panelboards shall have mono-flat fronts with concealed door hinges and mounted with trim screws.
- f. Front shall not be removable with the door locked.
- g. Doors on front shall have rounded corners and edges shall be free of burrs.
- h. Front shall have cylindrical tumbler type lock with catch and spring-loaded stainless steel door pull.
- i. Lock assemblies shall be keyed alike.
- j. One key shall be provided with each lock.
- k. A clear plastic directory cardholder shall be mounted on the inside of door.

F. Grounding:

1. A solidly bonded copper equipment ground bar shall be provided.

G. Identification:

- Nameplates shall contain system information and catalog number or factory order number. Interior wiring diagram, neutral wiring diagram, UL-listed label, and short circuit current rating shall be displayed on the interior or in a booklet format.
- 2. Floors Marking: Areas that pertain to section 110-26 of NEC shall have yellow striping installed diagonally with stripes being three inches wide and three inches apart. The center of the area shall have the words "Safety Zone" installed with letters at least four inches high.

H. Safety:

- 1. Current carrying parts shall be insulated from ground and phase-to-phase by high dielectric strength thermoplastic.
- 2. Interior trim shall be of deadfront construction to shield user from energized parts. Deadfront trim shall have filler plates covering unused mounting spaces.

I. Miscellaneous:

- 1. Interior leveling provisions shall be provided for flush-mounted applications.
- 2. The entire panelboard shall be listed as a system, including all breakers, buses, enclosure, cover, etc.
- 3. Lugs shall be UL-listed to accept solid or stranded copper conductors.
- 4. Lugs shall be suitable for 90°C rated wire, sized according to the 75°C temperature rating per NEC Table 310-15(B)(16). Branch circuit breakers rated 30 amperes and below may be UL-listed to accept 60°C rated wire.
- 5. Lug body shall be bolted in place. Snap-in designs are not acceptable.

2.3 Arc Energy Protection:

- A. All circuit breakers set, or capable of being set, to 1200A or higher continuous trip rating shall be provided with arc energy reduction and documentation in accordance with NEC 240.87.
- B. Provide documentation to relevant parties with location of all such circuit breakers.
- C. Each such circuit breaker shall be LSIG-type unless specifically indicated otherwise.
- D. Provide one of the following for each such circuit breaker:
 - 1. Zone-selective interlocking,
 - 2. Differential relaying,
 - 3. Energy-reducing maintenance switching with local status indicated,

- 4. Energy-reducing active arc flash mitigation system,
- 5. An approved equivalent means, approved in writing by Engineer, Owner, and AHJ.

PART 3 - EXECUTION

3.1 Examination:

- A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
 - 1. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 <u>Installation</u>:

- A. General: Install panelboards and accessories in accordance with reviewed product data, final shop drawings, manufacturer's written instructions and recommendations, and as indicated on the Drawings.
 - 1. Install panelboards in accordance with manufacturer's written instructions, NEMA PB 1.1, and NEC standards.
 - 2. Install and configure software in accordance with manufacturer's written instructions.

B. Labeling:

- 1. Provide accurate, printed panelboard directories prior to substantial completion. Directory shall account for all addenda, field orders, and field modifications.
- 2. Provide engraved laminated melamine label for equipment, in accordance with specification section 26 05 53 Electrical Identification.
- 3. Permanently label all adjustable trip circuit breakers with the designed trip ratings. Provide engraved laminated melamine label with this information, in accordance with specification section 26 05 53 Electrical Identification.

3.3 Field Quality Control:

- A. Inspect complete installation for physical damage, proper alignment, anchorage, and grounding.
- B. Measure steady state load currents at each panelboard feeder. Rearrange circuits in the panelboard to balance the phase loads within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.
- C. Check tightness of bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written specifications.

3.4 Demonstration:

- A. Provide the services of a factory-authorized service representative of the manufacturer to provide start-up service and to demonstrate and train the Owner's personnel.
 - 1. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
 - 2. Train the Owner's maintenance personnel on procedures and schedules related to start-up and shutdown, troubleshooting, servicing, and preventive maintenance.

- 3. Review data in operation and maintenance manuals with the Owner's personnel.
- 4. Schedule training with the Owner, through the Architect, with at least seven days' advanced notice.
- 5. Provide at least two hours of training for equipment covered by this section.

3.5 <u>Protection</u>:

A. Provide final protection and maintain conditions in a manner acceptable to the Installer, that shall ensure that the panelboards shall be without damage at time of Substantial Completion.

END OF SECTION 26 24 20

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SECTION 26 27 26 - GENERAL WIRING DEVICES

PART 1 - GENERAL

1.1 Related Documents:

- A. Conform to Division 1 and other sections of this division.
- B. This Section is a general Division 26 materials and methods section, and applies to all other Division 26 sections involving materials and methods specified herein.

1.2 <u>Description of Work:</u>

- A. The extent of wiring device work is indicated by drawings and schedules. Wiring devices are defined as single discrete units of electrical distribution systems which are intended to carry but not utilize electric energy.
- B. Types of electrical wiring devices in this Section include the following:
 - 1. Receptacles
 - 2. Ground Fault Circuit Interrupters
 - 3. Switches
 - 4. Wall Plates

1.3 Codes and Standards:

- A. NEC Compliance: Comply with NEC as applicable to installation and wiring of electrical wiring devices.
- B. UL Compliance: Comply with applicable requirements of UL 20, 486A, 498, and 943 pertaining to installation of wiring devices. Provide wiring devices which are UL listed and UL-labeled.

1.4 Submittals:

- A. Submit in accordance with General, Supplementary, and Special Conditions.
- B. Product Data: Submit manufacturer's data on electrical wiring devices.

PART 2 - PRODUCTS

2.1 Acceptable Manufacturers:

- A. Manufacturers: Subject to compliance with requirements, manufacturers providing wiring devices which may be incorporated in the work include, but are not limited to, the following (for each type and rating of wiring device):
 - 1. Hubbell, Inc.
 - 2. Leviton Manufacturing Co., Inc.
 - 3. Pass and Seymour, Inc.
 - 4. Eaton, Inc.
 - 5. Intermatic
 - 6 Tork

2.2 Fabricated Wiring Devices:

- A. General: Provide factory fabricated wiring devices, in types, colors, and electrical ratings for applications indicated and which comply with NEMA Stds. Pub/No. WD.
 - 1. Normal Power: Provide white color devices except as otherwise indicated.
 - a. Duplex receptacle: shall be commercial specification grade, with back-fed wiring connections. Basis of design: Leviton 5362. Provide additional

features based on device subscripts below.

- G: All receptacles marked 'G' on plans shall be GFCI type, factory marked weather resistant WR, tamper resistant, self testing, conforming to current UL requirements. Basis of design: Leviton G5362-WTW.
- DAMP: All receptacles marked 'DAMP' on plans shall be weather resistant GFCI-type wiring device with flat metallic weatherproof cover. Basis of design: Leviton G5362-WTW with Leviton WM1V-GY series
- 3. WET: All receptacles marked 'WET' on plans shall be weather resistant GFCI-type wiring device with recessed extra duty while-in-use weatherproof cover. Basis of design: Leviton G5362-WTW with Leviton IUM1V series while-in-use cover.
- 4. EWC: See Duplex receptacle above.

B. Switches:

1. Snap: Provide toggle switches, rated 20 amps minimum, quiet type, UL I without derating for tungsten lamp loads or inductive loads. The following catalog numbers are Leviton. "Slim" series (e.g. 1221S) are forbidden.

| Туре | Catalog No. |
|-----------------------|-------------|
| Single Pole, 120-277V | 1221 |
| Two Pole | MS302 |

2.3 Wiring Device Accessories:

A. Wall Plates:

- 1. Unless otherwise indicated, wall plate material shall be as follows:
 - a. Interior finished spaces: High abuse resistant nylon.
 - b. Interior unfished spaces: Stainless Steel.
 - c. Exterior: Cover as part of weatherproof assembly.
- 2. Provide commercial specification grade wall plates for single and combination wiring devices, of types, sizes, and with ganging and cutouts as indicated. Select plates which mate and match wiring devices. Construct with metal screws for securing plates to devices: screw heads to match finish of plates.

PART 3 - EXECUTION

3.1 Installation of Wiring Devices:

- A. Install wiring devices as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices to fulfill project requirements.
- B. Install wiring devices only in electrical boxes which are clean; free from excess building materials, dirt, and debris.
- C. Install wiring devices after wiring work is completed and inspected.
- D. Install wall plates after painting work is completed.
- E. Rear wire all wiring device connections. Side terminations are forbidden.
- F. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torqueing requirements are not indicated, tighten connectors

and terminals to comply with tightening torques specified in UL Stds 486A and B. Use properly scaled torque indicating hand tool.

- G. Orient all receptacles with the ground pin up, except:
 - 1. Where receptacle serves equipment which may have a 90° plug, orient receptacle ground pin down.
 - 2. Orient horizontally installed receptacles (e.g. receptacles in surface raceway) with the neutral pin up.
- H. Wiring devices shall have pig-tail connection. Feed-thru wiring is not allowed.
- I. Push-in spring type connections are not to be used.
- J. When using stranded wire, connections are to be made to the back clamps of the specifications grade device. All wire strands must be under the ground screw. Other methods are the use of a fork or solid wire.

3.2 Protection of Wallplates and Receptacles:

A. At time of substantial completion, replace any wall plates and/or receptacles which have been damaged during construction, including those burned and scored by faulty plugs.

3.3 Grounding:

A. Provide equipment grounding connections for all wiring devices, unless otherwise indicated. Tighten connections to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounds. Grounding conductor shall be bonded to all boxes with a separate screw. Screws used to support boxes are not to be used for grounding. Bonding screws shall be installed in box during rough-in installation. Bonding screws shall be green hexagonal type.

3.4 Identification:

- A. Switches: Each light switch shall be marked by circuit number using a numbered vinyl cloth adhesive marker, 1/4" minimum height. Locate marker behind cover plate so it can be readily identified by removal of the cover plate. Thomas and Betts E-Z Code Markers are acceptable.
- B. Receptacles: Each receptacle shall be marked by circuit number using a numbered vinyl cloth adhesive marker, 1/4" minimum height. Locate marker behind cover plate so it can be readily identified by removal of the cover plate. Thomas and Betts E-Z Code Markers are acceptable.

3.5 Testing:

A. Prior to energizing circuitry, test wiring for electrical continuity, and for short circuits. Ensure proper polarity of connections is maintained. Subsequent to energization, test wiring devices to demonstrate compliance with requirements.

END OF SECTION 26 27 26

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SECTION 26 28 16 - DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 <u>Summary</u>:

- A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for safety switches as required for the complete performance of the work, and as shown on the drawings and as herein specified.
- B. Section Includes: the work specified in this section includes, but shall not be limited to, the following:
 - 1. Switches shall be furnished and installed at locations as shown on the drawings. Switches shall be of the type approved, indicated, and specified herein.

1.2 Submittals:

- A. General: See submittal procedures in Division 1.
- B. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the drawings and specifications. Clearly indicate all variations and options proposed for installation.
- C. Shop Drawings: Submit scaled shop drawings depicting the intended installation location for each safety switch, relevant clearance requirements, and all other equipment intended for installation nearby. Indicate all relevant dimensions, and document that installation is feasible as proposed.
- D. Include safety switches in dimensioned electrical room shop drawings.

1.3 Operation and Maintenance:

A. Operation and Maintenance Data: Prior to substantial completion, submit operation and maintenance data for safety switches. Submit as indicated in Section 26 00 00 and Division 1.

1.4 Quality Assurance:

A. Qualifications:

- 1. Manufacturer qualifications: Manufacturer shall be a firm engaged in the manufacture of safety switches of types and sizes required, and whose products have been in satisfactory use in similar service for a minimum of five years.
- 2. Installer qualifications: Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing safety switches similar in type and scope to that required for this project and shall be approved by the manufacturer.
- 3. Documentation of qualifications, examples of past projects, and references, shall be provided to owner and/or engineer upon request, but are not required as part of the standard submittal procedure.
- B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of federal, state, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.
 - 1. Without limiting the generality of other requirements of this section, all work specified herein shall conform to or exceed the applicable requirements of the following standards; provided, that wherever the provisions of said publications

are in conflict with the requirements specified herein, the more stringent requirements shall apply:

- a. Switches shall be manufactured in accordance with the following standards:
 - 1. UL 98 enclosed and dead front switches
 - 2. NEMA KS 1 enclosed switches
 - 3. NEMA 250 enclosures for electrical equipment

1.5 Delivery, Storage, and Handling:

- A. Deliver materials to the project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.
- B. Store materials in their original, undamaged packages and containers, inside a well ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.6 Warranty:

- A. General: See closeout procedures in Division 1.
- B. Special Warranty: Submit a written warranty executed by the manufacturer, the installer, and the contractor, agreeing to repair or replace safety switches that fail in materials or workmanship within the specified warranty period.
 - 1. Warranty period: Warranty period shall be one year from the date of substantial completion.

1.7 Operation and Maintenance:

A. Operation and Maintenance Data: Prior to substantial completion, submit operation and maintenance data for light fixtures. Submit as indicated in Section 26 00 00 and Division 1.

PART 2 - PRODUCTS

2.1 Manufacturers:

- A. Approved Manufacturers: All safety switch products shall be the produce of one of the following:
 - 1. Square D (Schneider Electric)
 - 2. Bussmann (Eaton)
 - 3. General Electric
 - 4. Siemens

B. Basis of Design:

- 1. Items specified are to establish a standard of quality for design, function, materials, and appearance.
- 2. Equivalent products by other manufacturers are acceptable.
- 3. The design professional will be the sole judge of the basis of what is equivalent.
- 4. Any adjustments required to meet equivalency requirements shall be at contractor's expense.
- 5. See drawings for additional basis of design information.

2.2 Materials and Components:

A. General:

1. Minimum voltage rating shall be for the voltage indicated and scheduled on the drawings.

- 2. Minimum horsepower ratings shall be as indicated and scheduled on the drawings.
- 3. Minimum per-phase continuous current ratings shall be as indicated and scheduled on the drawings.
- 4. Fuses shall be provided as indicated on the drawings. Fuse clip current rating shall match equipment rating. Fuse current ratings shall be as indicated and scheduled on the drawings.
- 5. Provide 10% spare fuses, with a minimum of 3 spare sets. Spare fusing shall be provided within weatherproof containers for long-term storage (such as in ammo cans). Spray paint container with the wording "Spare Fuses" on the side.
- 6. Minimum neutral continuous current ratings shall be as indicated and scheduled on the drawings.
- 7. Minimum short circuit current rating shall be as indicated and scheduled on the drawings, in RMS symmetrical amperes at the AC voltage indicated for the safety switch.
- 8. Enclosure NEMA rating shall be as indicated and scheduled on the drawings.
- 9. Safety switches shall be suitable for use as service equipment when application requirements comply with UL 67 and NEC articles 230.

B. Switch Interior:

- 1. All switches shall have switch blades which are visible when the switch is off and the cover is open.
- 2. Lugs shall be front removable and UL listed for 75°C conductors.
- 3. All current carrying parts shall be plated to resist corrosion.
- 4. Switches shall have removable arc suppressors to facilitate easy access to line side lugs.
- 5. Switches shall have provisions for a field installable electrical interlock.

C. Grounding:

A solidly bonded copper equipment ground bar shall be provided.

D. Identification:

 Nameplates shall contain product information and catalog number or factory order number. UL-listed label, and short circuit current rating shall be displayed on the interior.

E. Switch Mechanism:

- 1. Switch operating mechanism shall be quick-make, quick-break such that, during normal operation of the switch, the operation of the contacts shall not be capable of being restrained by the operating handle after the closing or opening action of the contacts has started.
- 2. The operating handle shall be an integral part of the box, not the cover.
- 3. Provisions for padlocking the switch in the off position with a padlock shall be provided.
- 4. The handle position shall travel at least 90° between off and on positions to clearly distinguish and indicate handle position.
- 5. All switches shall have a dual cover interlock mechanism to prevent unintentional opening of the switch cover when the switch is on and prevent turning the switch on when the cover is open. The cover interlock mechanism shall have an

externally operated override but the override shall not permanently disable the interlock mechanism. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

F. Switch Enclosure:

General:

- a. All switches shall have provisions to accept up to three 3/8 in hasp padlocks to lock the operating handle in the off position.
- b. The enclosure shall have on and off markings stamped into the cover.
- c. The operating handle shall be provided with a dual colored, red/black position indication.

2. Type 3R:

- a. NEMA 3R switch covers shall be top hinged, attached with removable screws and securable in the open position (type 3R).
- b. Type 3R enclosures shall be finished with grey baked enamel paint which is electrodeposited on cleaned, phosphate pre-treated galvannealed steel.
- c. Type 3R enclosures for switches rated 30-200A shall be provided with tangential knockouts to facilitate ease of conduit entry.
- d. Type 3R enclosures through 200 ampere shall have provisions for interchangeable bolt-on hubs in the top endwall.

PART 3 - EXECUTION

3.1 <u>Examination</u>:

- A. Verification of Conditions: examine areas and conditions under which the work is to be installed, and notify the contractor in writing, with a copy to the owner and the architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
 - 1. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the installer.

3.2 Installation:

- A. General: install safety switches and accessories in accordance with reviewed product data, final shop drawings, manufacturer's written instructions and recommendations, and as indicated on the drawings.
 - 1. Install safety switches in accordance with manufacturer's written instructions, NEMA PB 1.1, and NEC standards.
 - 2. Install and configure software in accordance with manufacturer's written instructions.

3.3 Field Quality Control:

- A. Inspect complete installation for physical damage, proper alignment, anchorage, and grounding.
- B. Check tightness of bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written specifications.

3.4 Demonstration:

- A. Provide start-up service and train the owner's personnel.
 - 1. Train the owner's maintenance personnel on procedures and schedules related

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- to start-up and shutdown, troubleshooting, servicing, and preventive maintenance.
- 2. Review data in operation and maintenance manuals with the owner's personnel.
- 3. Schedule training with the owner, through the architect, with at least seven days' advanced notice.
- 4. Provide at least one hour of training for equipment covered by this section.

3.5 <u>Protection</u>:

A. Provide final protection and maintain conditions in a manner acceptable to the installer, that shall ensure that the safety switches shall be without damage at time of substantial completion.

END OF SECTION 26 28 16

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SECTION 26 51 00 - BUILDING LIGHTING

PART 1 - GENERAL

1.1 <u>Summary</u>:

- A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for interior lighting as required for the complete performance of the work, and as shown on the Drawings and as herein specified.
- B. Section Includes: The work specified in this Section includes, but shall not be limited to, the following:
 - 1. Provide interior lighting fixtures as specified herein and where shown and scheduled on the Drawings.
 - 2. Provide all necessary accessories and appurtenances as required for a functional installation of the interior lighting system.

1.2 Submittals:

- A. General: See submittal procedures in Division 1.
- B. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications. Clearly indicate all variations and options proposed for installation.

1.3 Operation and Maintenance:

A. Operation and Maintenance Data: Prior to substantial completion, submit operation and maintenance data for light fixtures. Submit as indicated in Section 26 00 00 and Division 1.

1.4 Quality Control:

A. Qualifications:

- Manufacturer Qualifications: Manufacturer shall be a firm engaged in the manufacture of light fixtures of types, sizes, and performance required, and whose products have been in satisfactory use in similar service for a minimum of five years.
- 2. Installer Qualifications: Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing light fixtures similar in type and scope to that required for this Project and shall be approved by the manufacturer.
- 3. Documentation of qualifications, examples of past projects, and references, shall be provided to Owner and/or Engineer upon request, but are not required as part of the standard submittal procedure.
- B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.
 - 1. Without limiting the generality of other requirements of this Section, all work specified herein shall conform to or exceed the applicable requirements of the following standards; provided, that wherever the provisions of said publications are in conflict with the requirements specified herein, the more stringent requirements shall apply:

- a. NFPA 70, National Electrical Code
- b. ANSI/UL 1598-08 NMX-J-307/1-ANCE/C22.2 NO.250.0-08, Luminaires
- c. ANSI/UL 8750-2015 Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products
- d. UL 924 10th Edition Standard for Emergency Lighting and Power Equipment
- C. Pre-Installation Conference: Prior to commencing the installation, meet at the Project site to review the material selections, installation procedures, and coordination with other trades. Pre-installation conference shall include, but shall not be limited to, the Contractor, the Installer, manufacturer's representatives, and any trade that requires coordination with the work. Date and time of the pre-installation conference shall be acceptable to the Owner and the Architect.
- D. Single Source Responsibility: Obtain each type of light fixture and required accessories from a single source with resources to produce products of consistent quality in appearance and physical properties without delaying the work. Any materials which are not produced by the manufacturer shall be acceptable to and approved by the manufacturer. This is not meant as a requirement that all light fixtures come from a single source. All parts and accessories for each individual light fixture shall meet this requirement.

1.5 <u>Delivery, Storage, and Handling:</u>

- A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.
- B. Store materials in their original, undamaged packages and containers, inside a well ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.6 Warranty:

- A. General: See closeout procedures in Division 1.
- B. Special Warranty: Submit a written warranty executed by the manufacturer, the Installer, and the Contractor, agreeing to repair or replace light fixtures that fail in materials or workmanship within the specified warranty period.
 - 1. Warranty Period: Warranty period shall be one year from the date of substantial completion.
- C. Provide additional Manufacturer's warranty information, as applicable.

PART 2 - PRODUCTS

2.1 Manufacturers:

A. Basis of Design:

- 1. Items specified are to establish a standard of quality for design, function, materials, and appearance.
- 2. Unless specifically noted otherwise, all Basis of Design light fixtures are open to submission of equivalent products.
- 3. The Design Professional will be the sole judge of the basis of what is equivalent.
- 4. Equivalency will be decided on quality, performance, aesthetics, and maintainability.
- 5. Owner will be given the opportunity to reject specific manufacturers of equivalent materials based on negative past experience.

- 6. Any adjustments required to meet equivalency requirements shall be at Contractor's expense.
- 7. See Drawings for schedules indicating additional Basis of Design information.

2.2 <u>Materials and Components</u>:

A. General:

- 1. Color temperature shall be as indicated on the Light Fixture Schedule.
- 2. Luminous output shall be as indicated on the Light Fixture Schedule. Alternate fixtures within 5% do not require justification.
- 3. Fixture or lamp life rating in hours shall be per the Basis of Design. Life rating for LED fixtures shall be to 70% or 90% intensity per the Basis of Design.
- 4. CRI shall be per the Basis of Design.
- 5. Where not specified elsewhere, Color Rendering Index (CRI) [Ra] ≥ 80.
- 6. R9 value shall be per the Basis of Design. (Note: R9 is a color rendering criterion providing additional information beyond CRI.)
- 7. Where not specified elsewhere, R9 value shall be positive.
- 8. TM-30 data shall be comparable to the Basis of Design, as determined by the Design Professional. (Note: TM-30 are color rendering criteria providing additional information beyond CRI.)
- 9. Where not specified elsewhere, TM-30 ratings: 'Rf≥75, Rg≥95, and Rcs,h1≥-8%.
- 10. Minimum rated life shall be comparable to Basis of Design, as determined by the Design Professional.
- 11. Where not specified elsewhere, minimum rated life shall be 68,000 hours at L70.
- 12. Materials (steel, aluminum, acrylic, polycarbonate, etc.) shall be per the basis of design.
- 13. Environmental ratings shall be per the Basis of Design.
- 14. Additional considerations shall be per notes on the Light Fixture Schedule and on the Drawings.
- 15. Confirm all finishes with Owner and Architect prior to ordering.

B. Environmental Considerations:

- 1. All exterior fixtures shall be indicated for use in wet locations, even where installed in damp or dry locations.
- 2. Interior fixtures subject to high humidity or moisture shall be suitable for use in wet locations. This includes light fixtures for showers.

C. Construction/Finish:

1. No visible welding, no plane-protruding screws, latches, springs, hooks, rivets or plastic supports viewed from the occupied (room) side are allowed.

D. Maintainability:

1. Power supplies/drivers/ballasts, LED arrays, boards or light engines shall be easily field replaceable using common hand tools (e.g., screwdrivers, pliers, etc.) and without uninstalling the luminaire.

E. Maintenance Materials:

- 1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - a. Fixtures: One for every thirty of each type and rating installed. Furnish at least one spare fixture for any type of fixture with at least ten units being

- installed by this project.
- b. Lamps: One for every ten of each type and rating installed, rounded up. Furnish at least one of each type.
- c. Track Heads: One for every ten of each type and rating installed, rounded up. Furnish at least one spare head for any type of head with at least ten units being installed by this project.
- d. Diffusers and Lenses: One for every twenty of each type and rating installed, rounded up. Furnish at least one of each type.
- e. Globes and Guards: One for every thirty of each type and rating installed, rounded up. Furnish at least one of each type.

PART 3 - EXECUTION

3.1 <u>Examination</u>:

- A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 <u>Temporary Lighting</u>:

- A. If approved by the Architect, use selected permanent luminaires for temporary lighting.
- B. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.
- C. Contractor is responsible for replacing any light fixtures damaged over the course of construction.

3.3 Installation:

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Provide 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 vertical force of 400 percent of luminaire weight.
 - 5. Fixtures larger than 24"x24" shall be supported by all four corners.
 - 6. Fixtures 24"x24" and smaller shall be supported by two corners.

E. Flush-Mounted Luminaire Support:

- 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.
- 4. Do not use ceiling system as support for pendant luminaires.

F. Wall-Mounted Luminaire Support:

- 1. Attached to structural members in walls.
- 2. Utilize back plates and/or other support methods were recommended by the manufacturer.
- 3. Do not attach luminaires directly to gypsum board.

G. Ceiling-Mounted Luminaire Support:

- 1. Do not support fixture from gypsum board.
- 2. Support fixture from structure, as required by the assembly.
- 3. Install per manufacturer's recommendations.

H. Suspended Luminaire Support:

- 1. Provide architectural finish items (escutcheons, etc.) at all ceiling penetrations. Coordinate finish with Architect.
- 2. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
- 3. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
- 4. Continuous Rows of Luminaires: Coordinate method of suspension with Architect.
- 5. Do not use ceiling system as support for suspended luminaires. Connect support wires or rods to building structure.

I. 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.

3.4 <u>Identification</u>:

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "Electrical Identification".

3.5 Field Quality Control:

- A. Perform the following tests and inspections:
 - 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 Adjusting:

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to

suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.

- 1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
- 2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
- 3. Adjust the aim of luminaires in the presence of the Architect.

3.7 Protection:

A. Provide final protection and maintain conditions in a manner acceptable to the Installer, that shall ensure that the light fixtures shall be without damage at time of Substantial Completion.

3.8 <u>Cleaning</u>:

A. Clean fixture surfaces of dirt, cement, plaster, and debris. Utilize cleansers compatible with fixture finishes and materials.

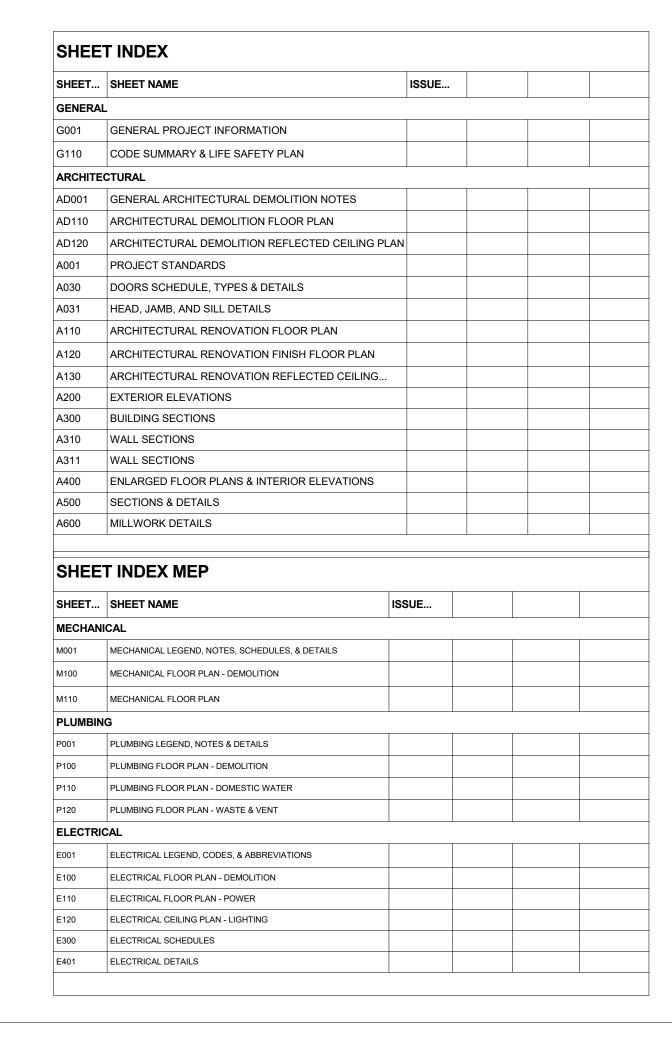
3.9 <u>Training</u>:

- A. Provide up to four hours of training from a factory authorized-representative, up to two sessions.
- B. Schedule training with Owner.
- C. Provide DVD recording of all training sessions. Ensure that audio is clear and intelligible.

END OF SECTION 26 51 00

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BLDG B8003 3925 FL-71 GREENWOOD, FL 32443



COVER



PROJECT TEAM:

Owner:

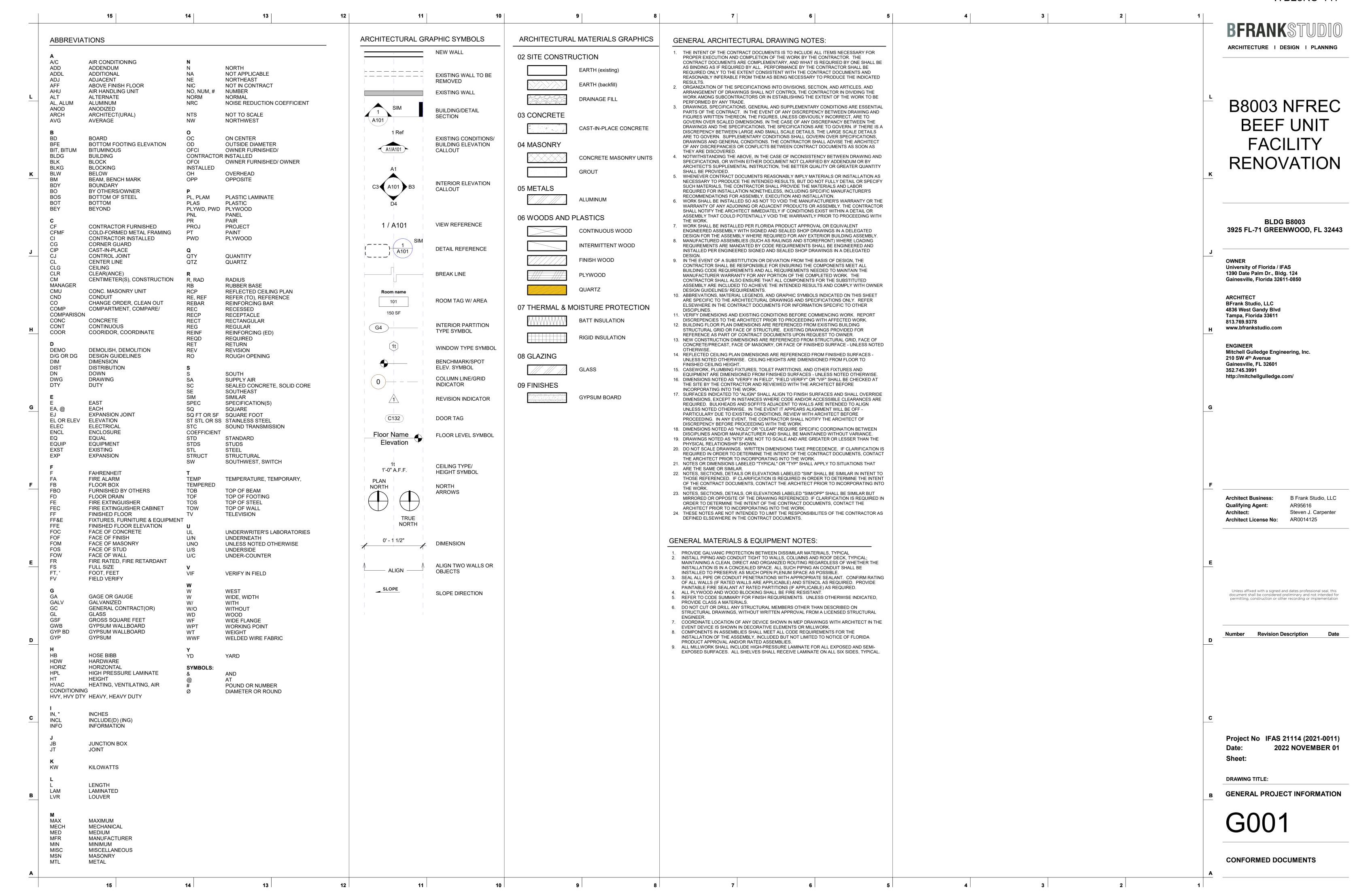
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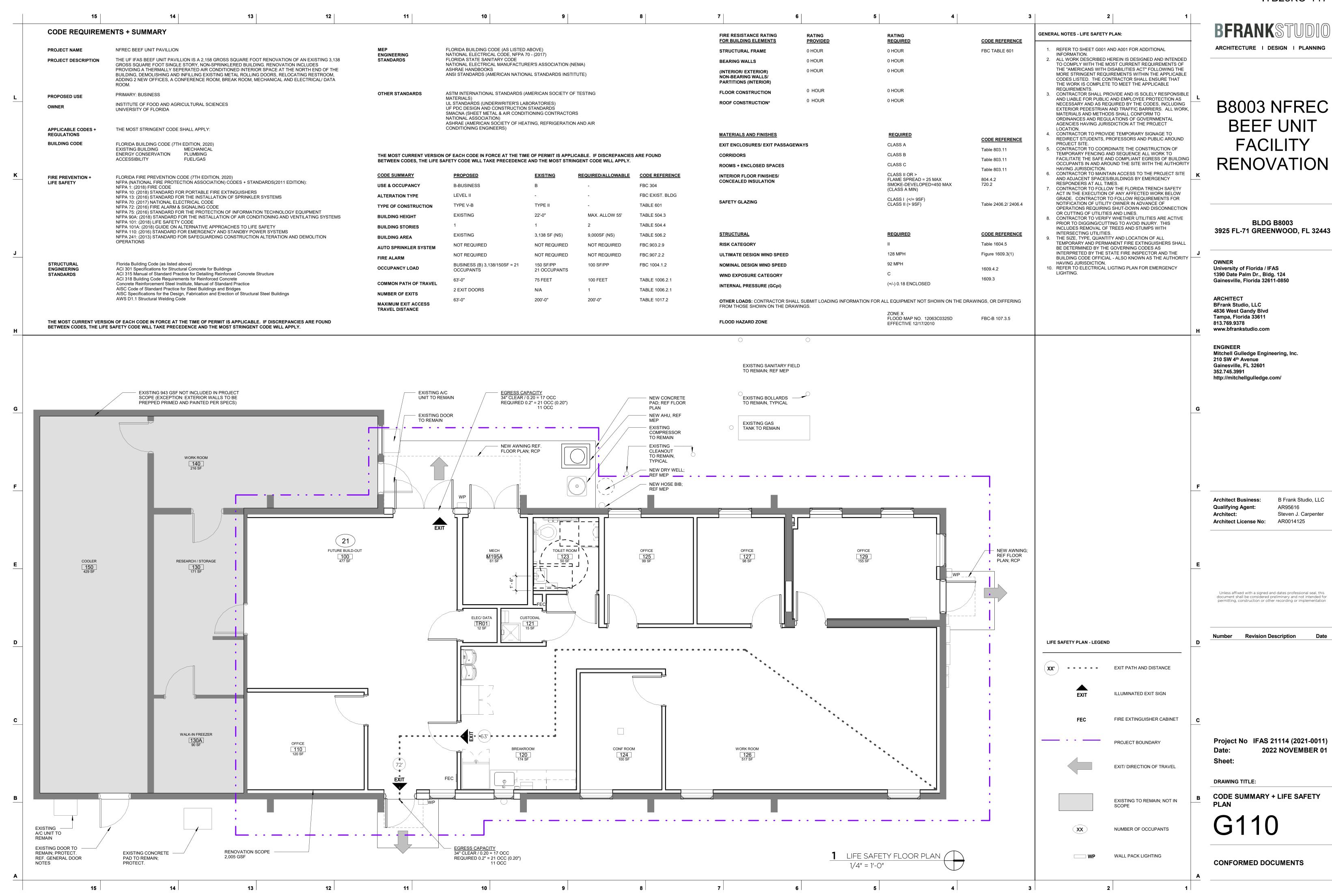
B Frank Studio, LLC 4836 West Gandy Boulevard Tampa, FL 33611 813.769.9378 www.bfrankstudio.com Mechanical, Electrical Engineer:

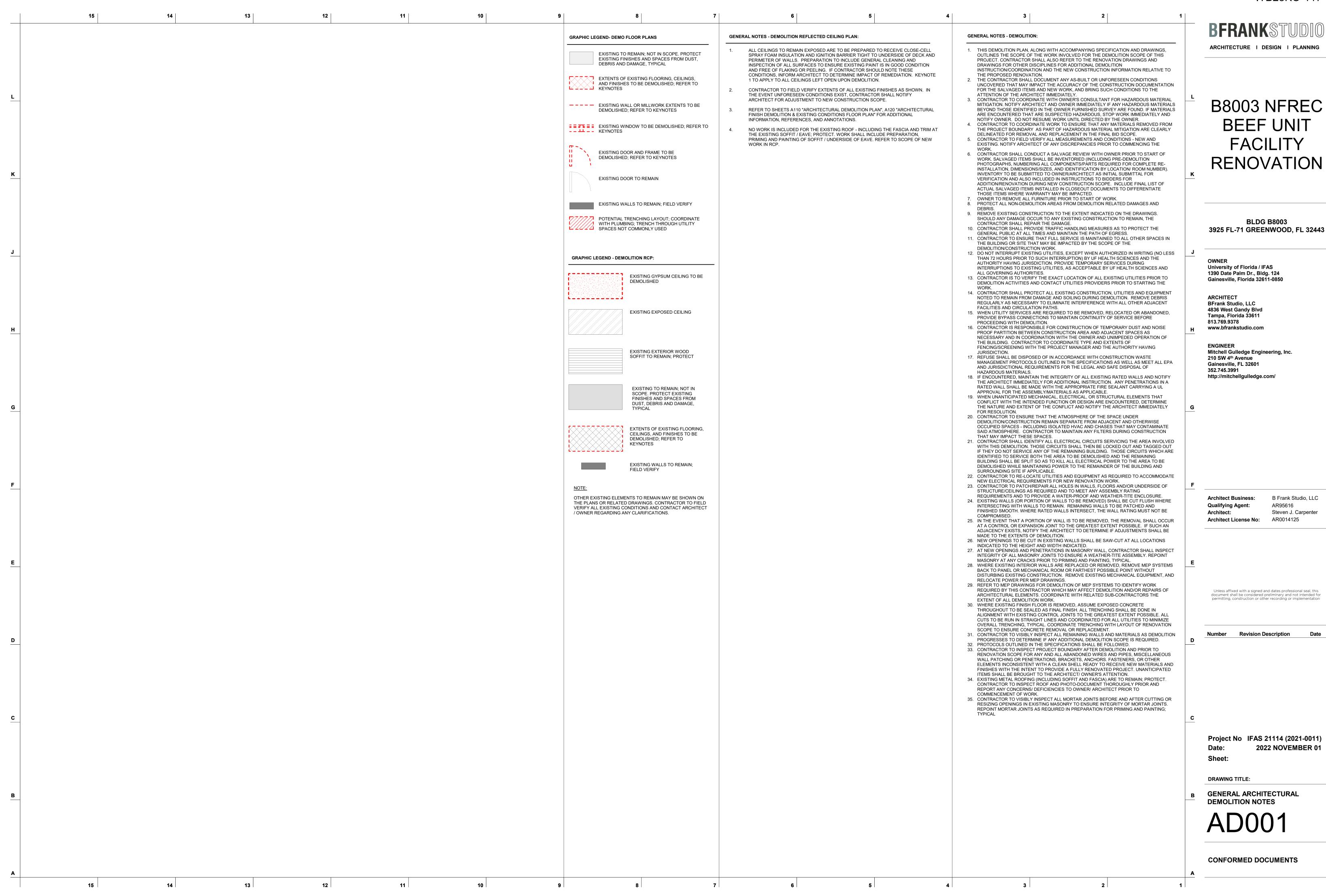
Mitchell Gulledge Engineering, Inc. 210 SW 4th Avenue Gainesville, FL 32601 352.745.3991 http://mitchellgulledge.com/ 2022 NOVEMBER 01
CONFORMED DOCUMENTS

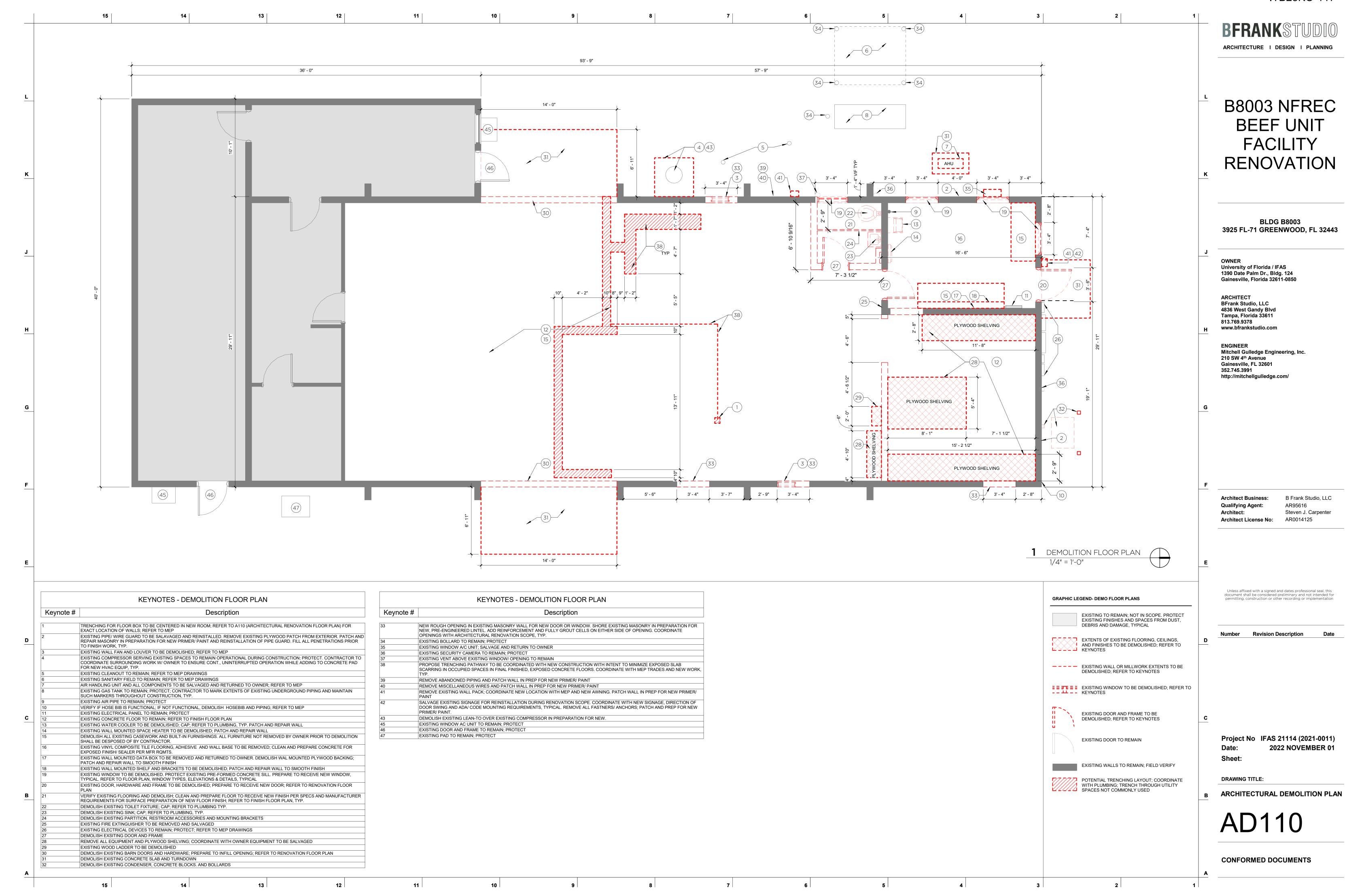
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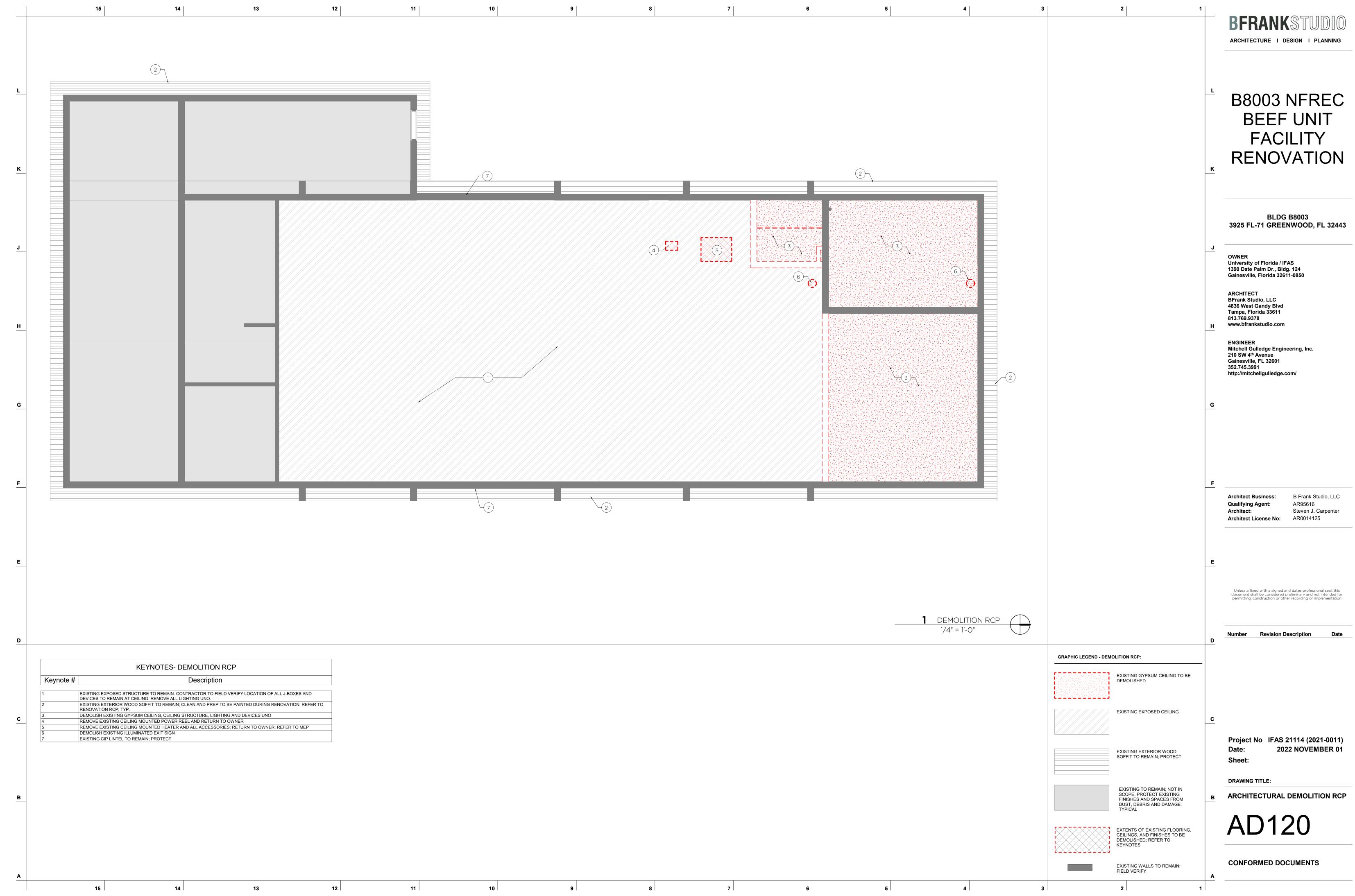


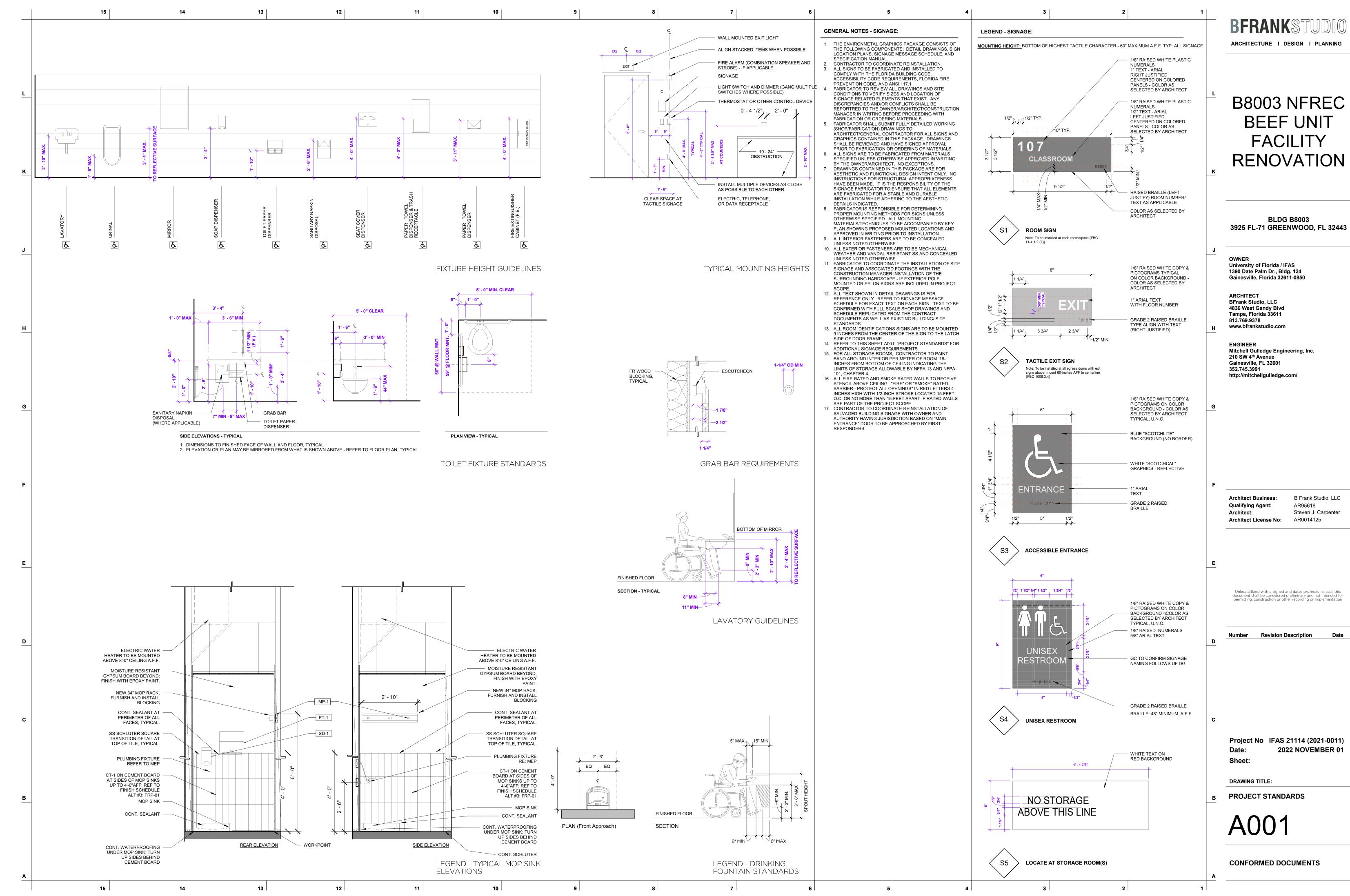




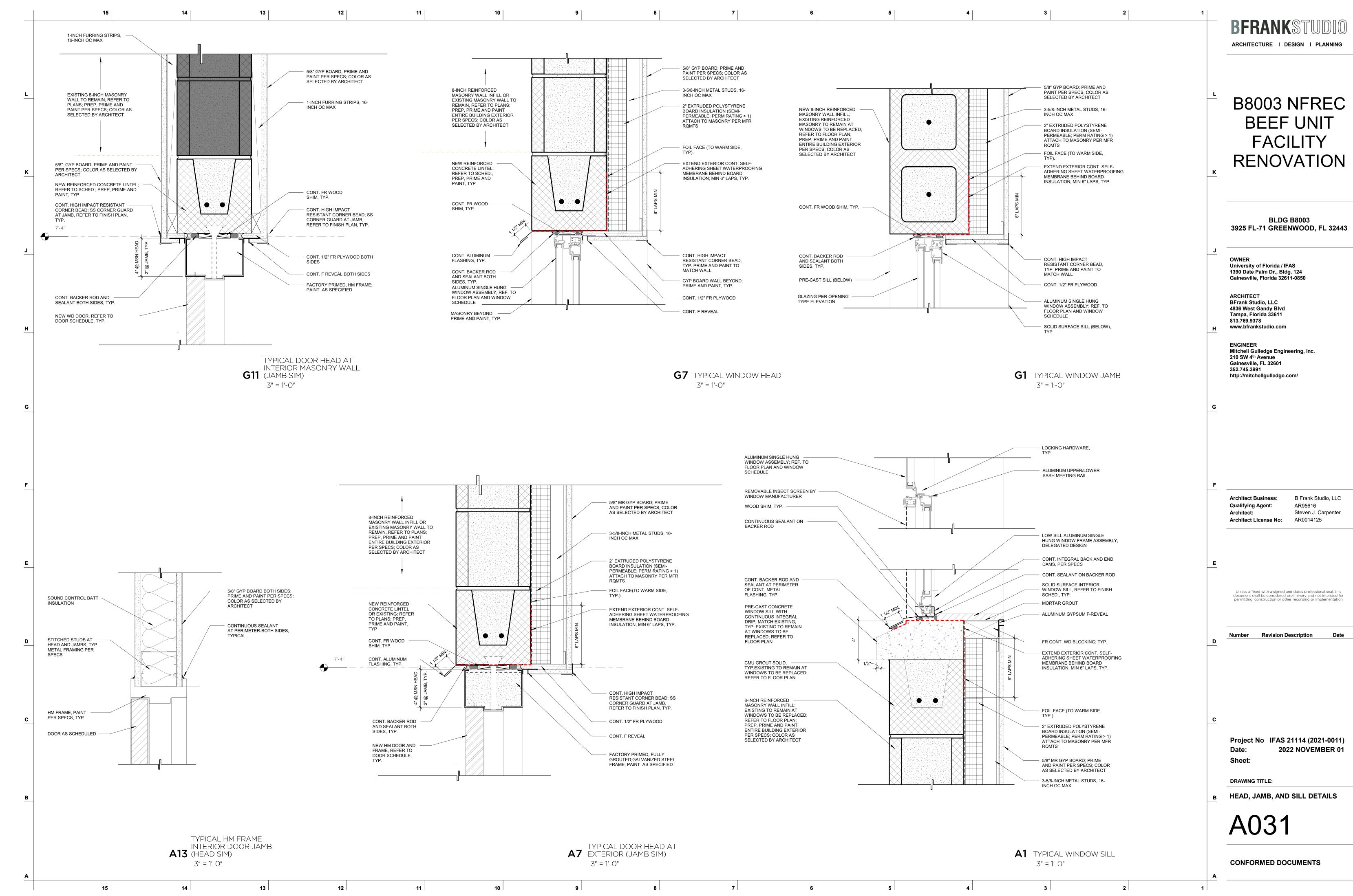


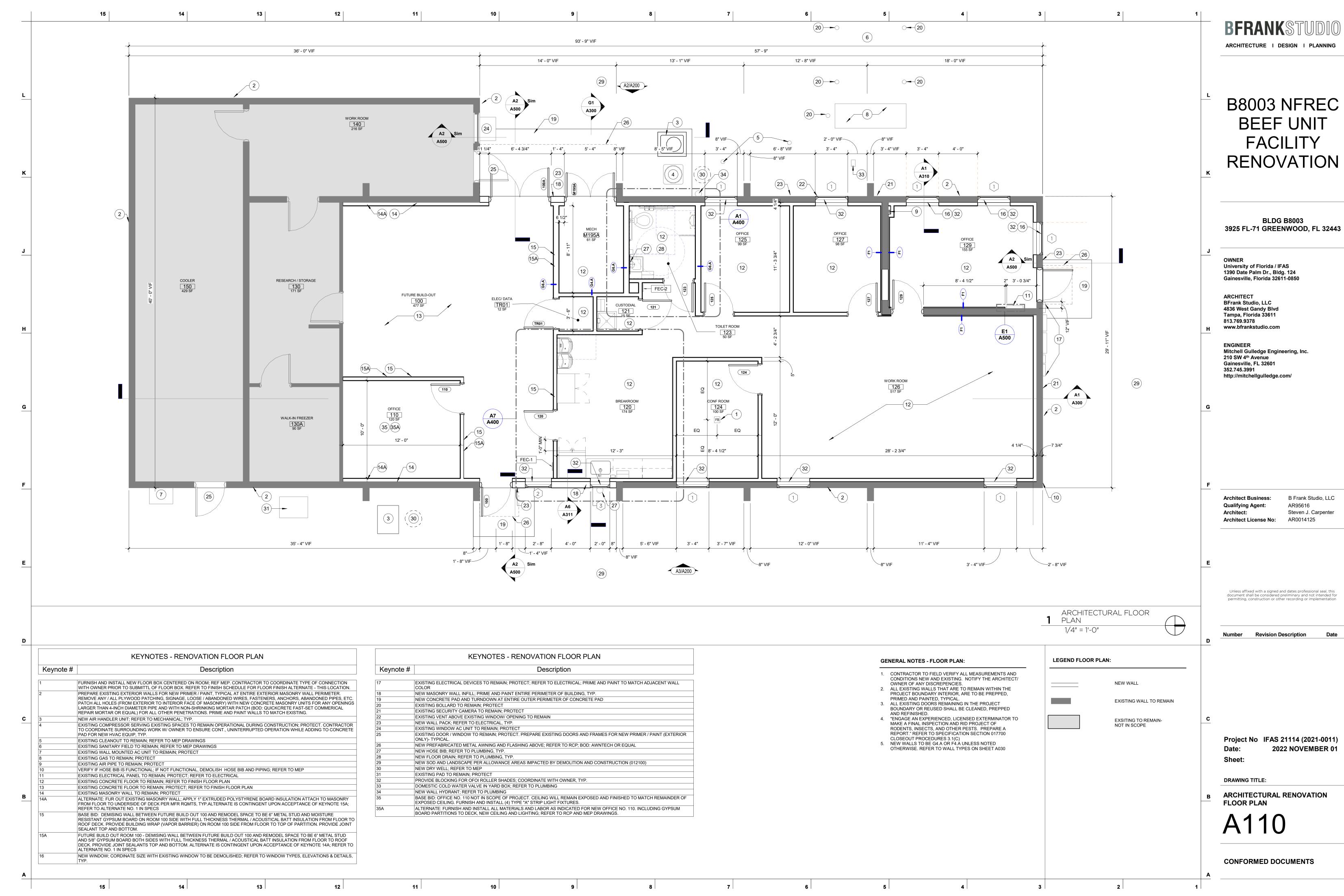


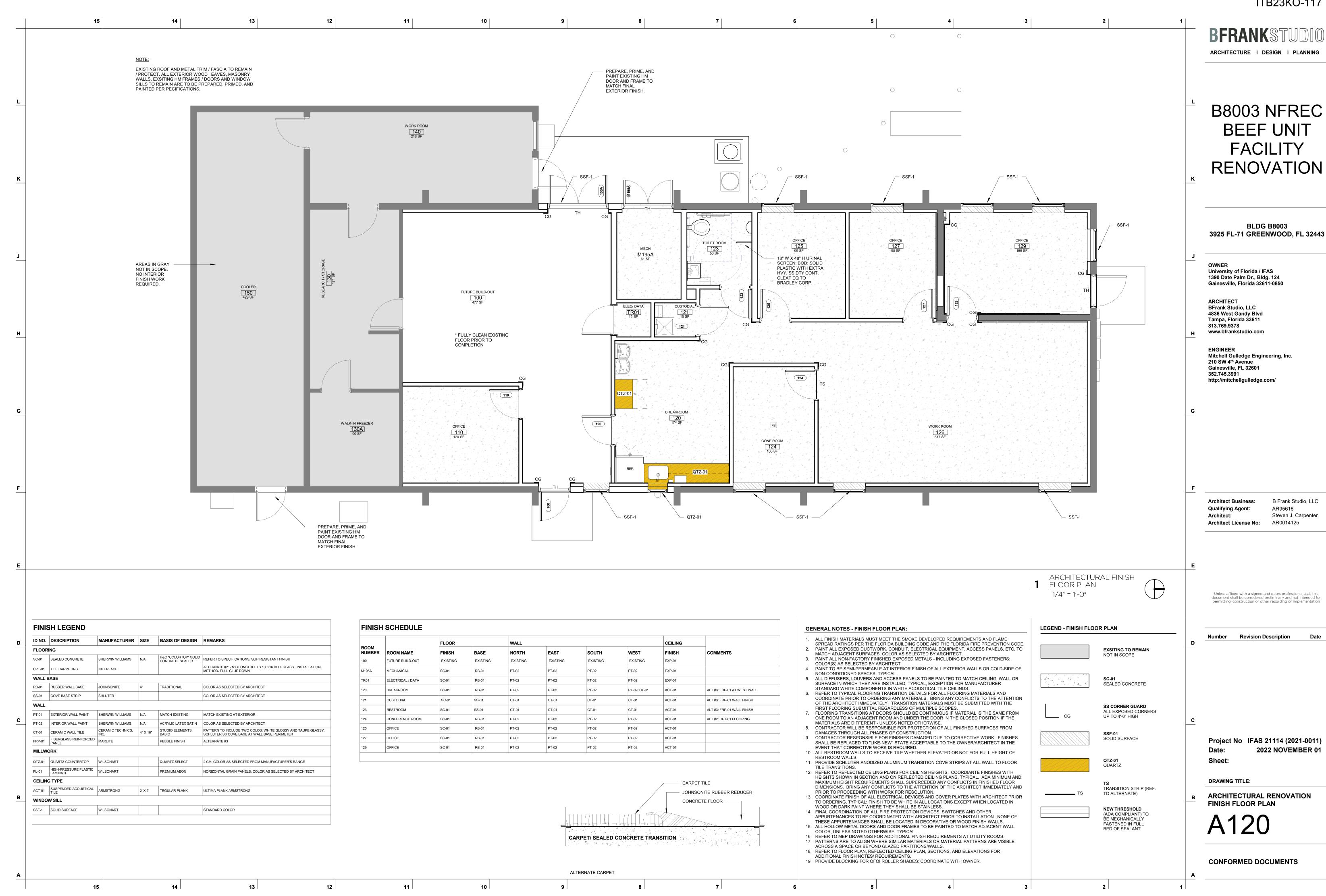


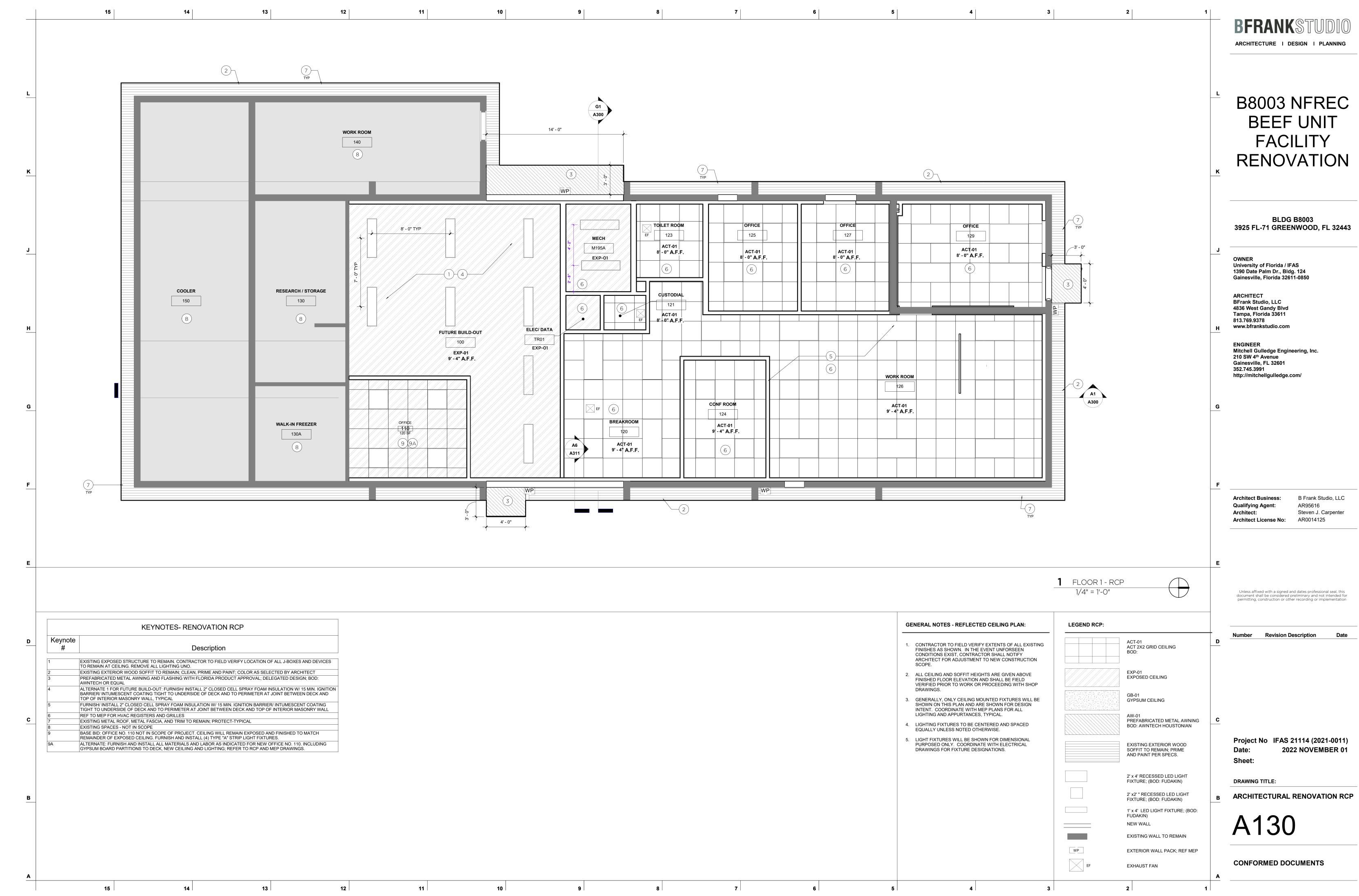


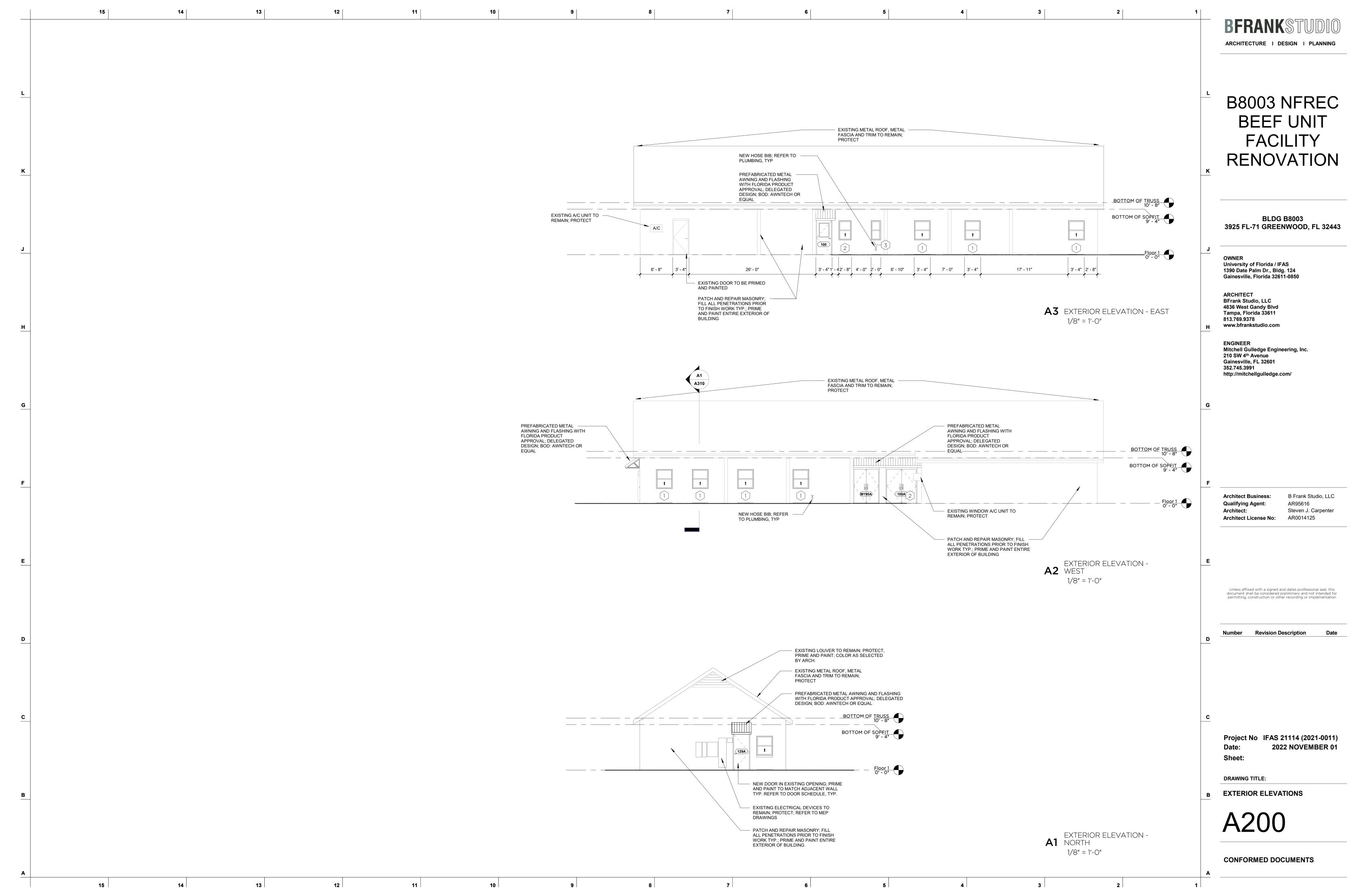


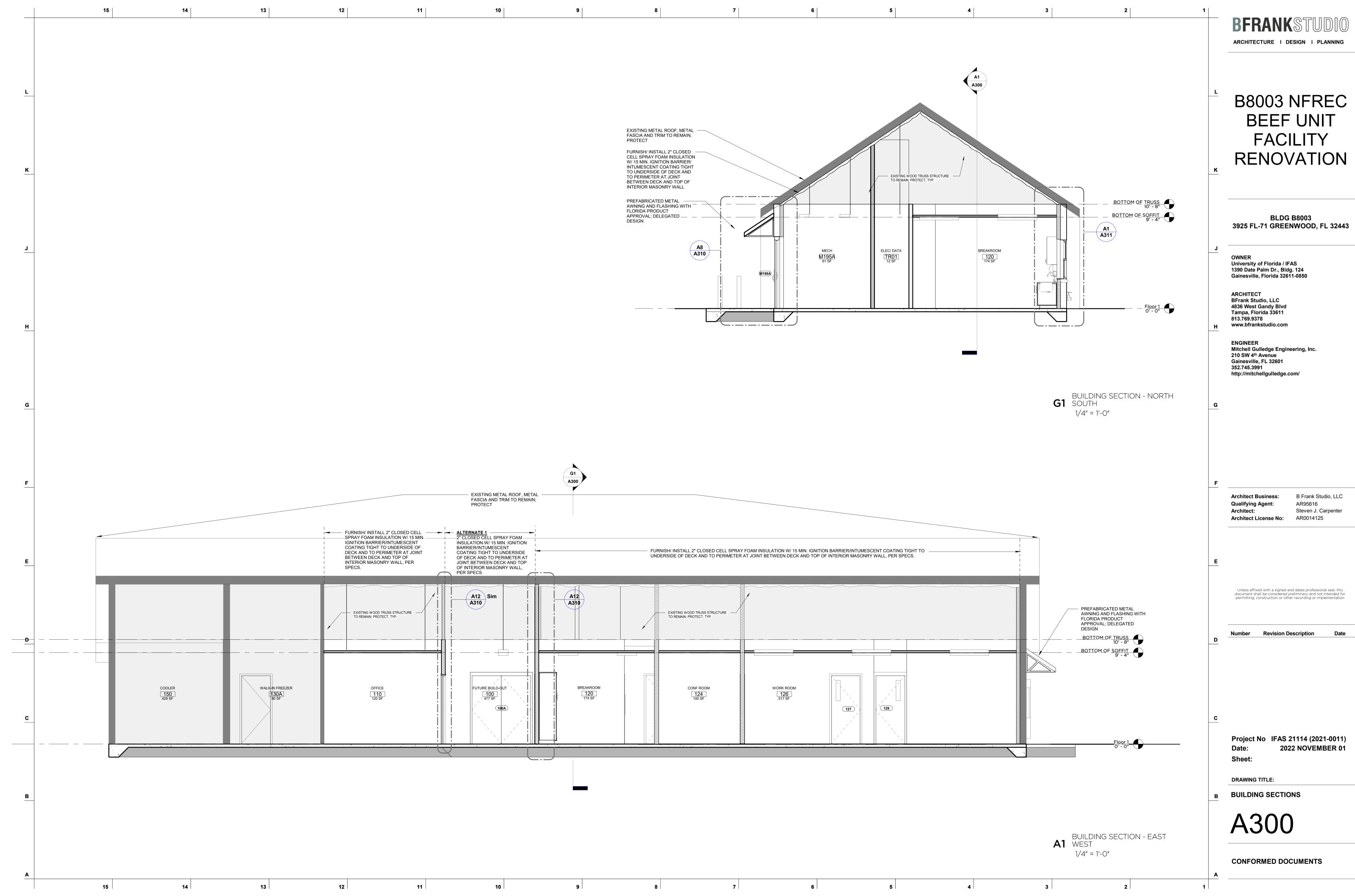


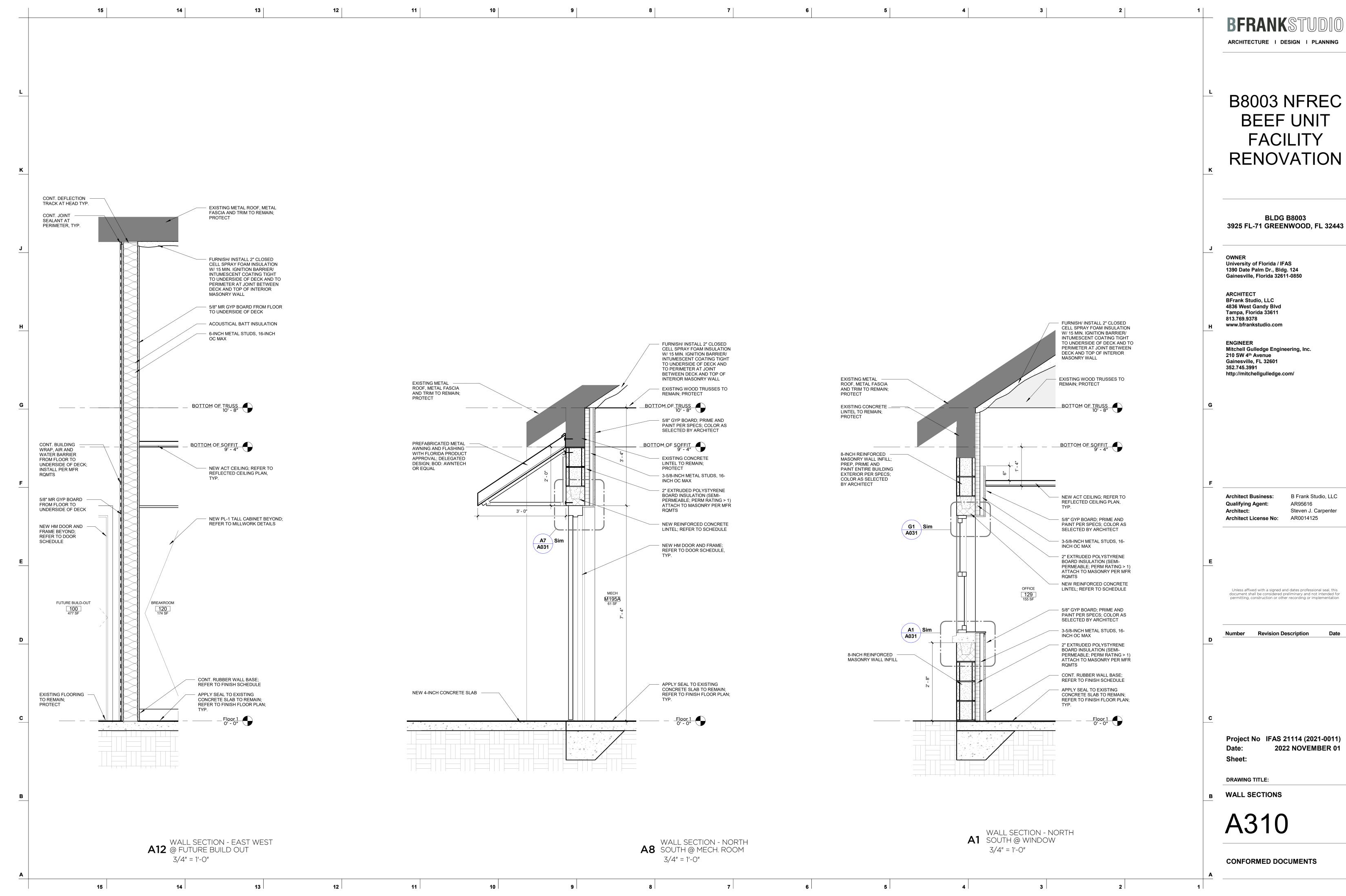


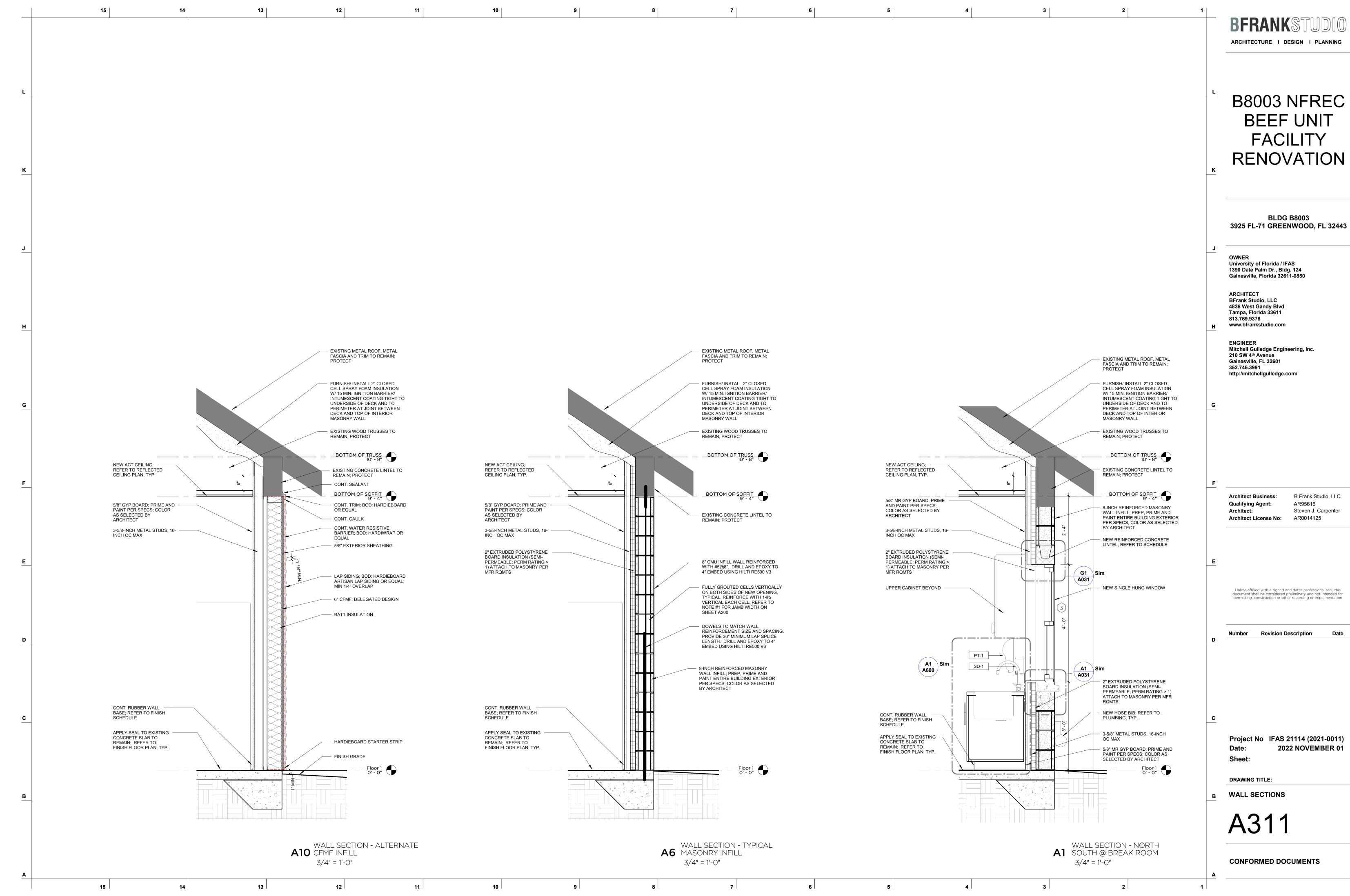


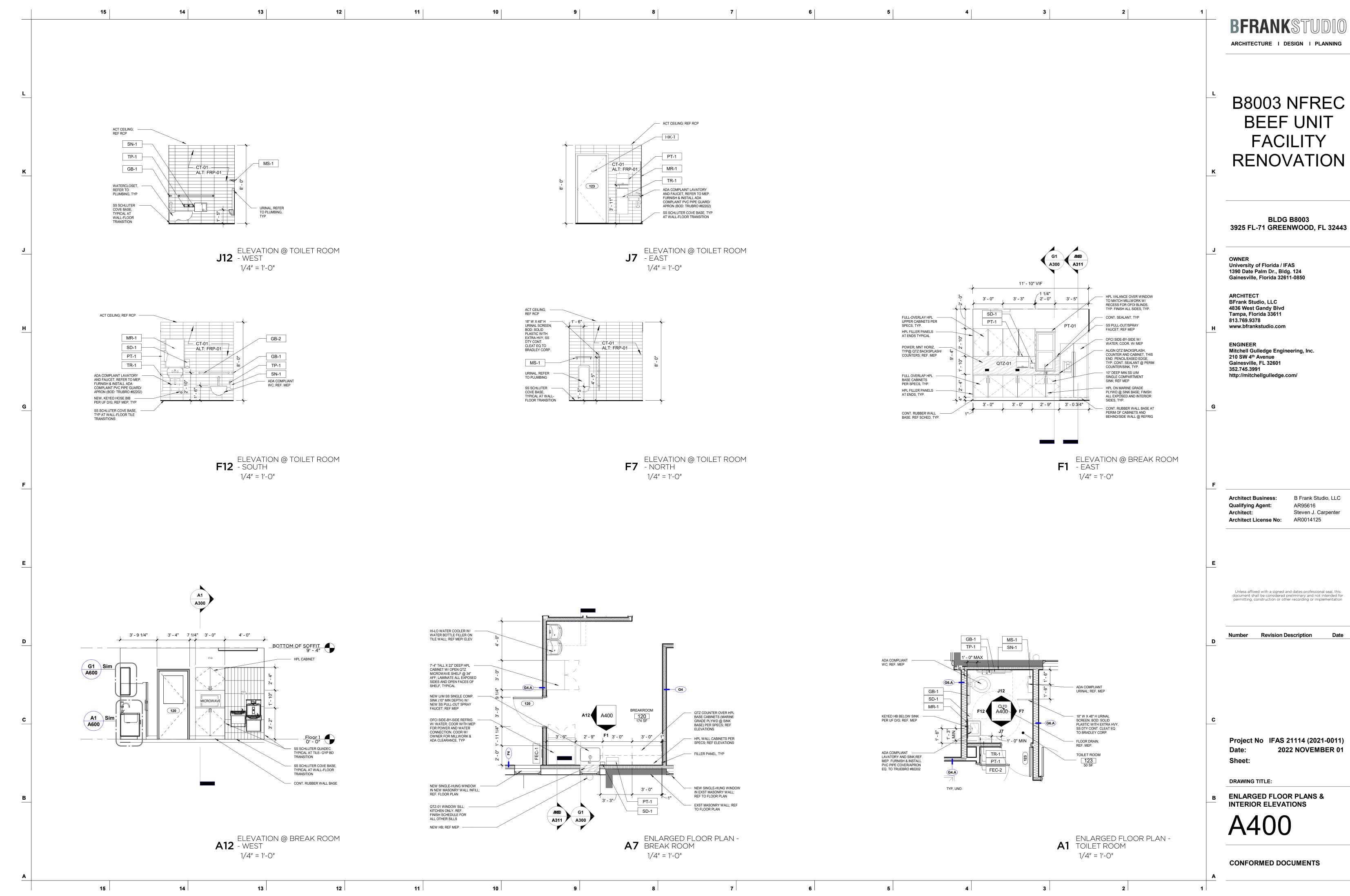


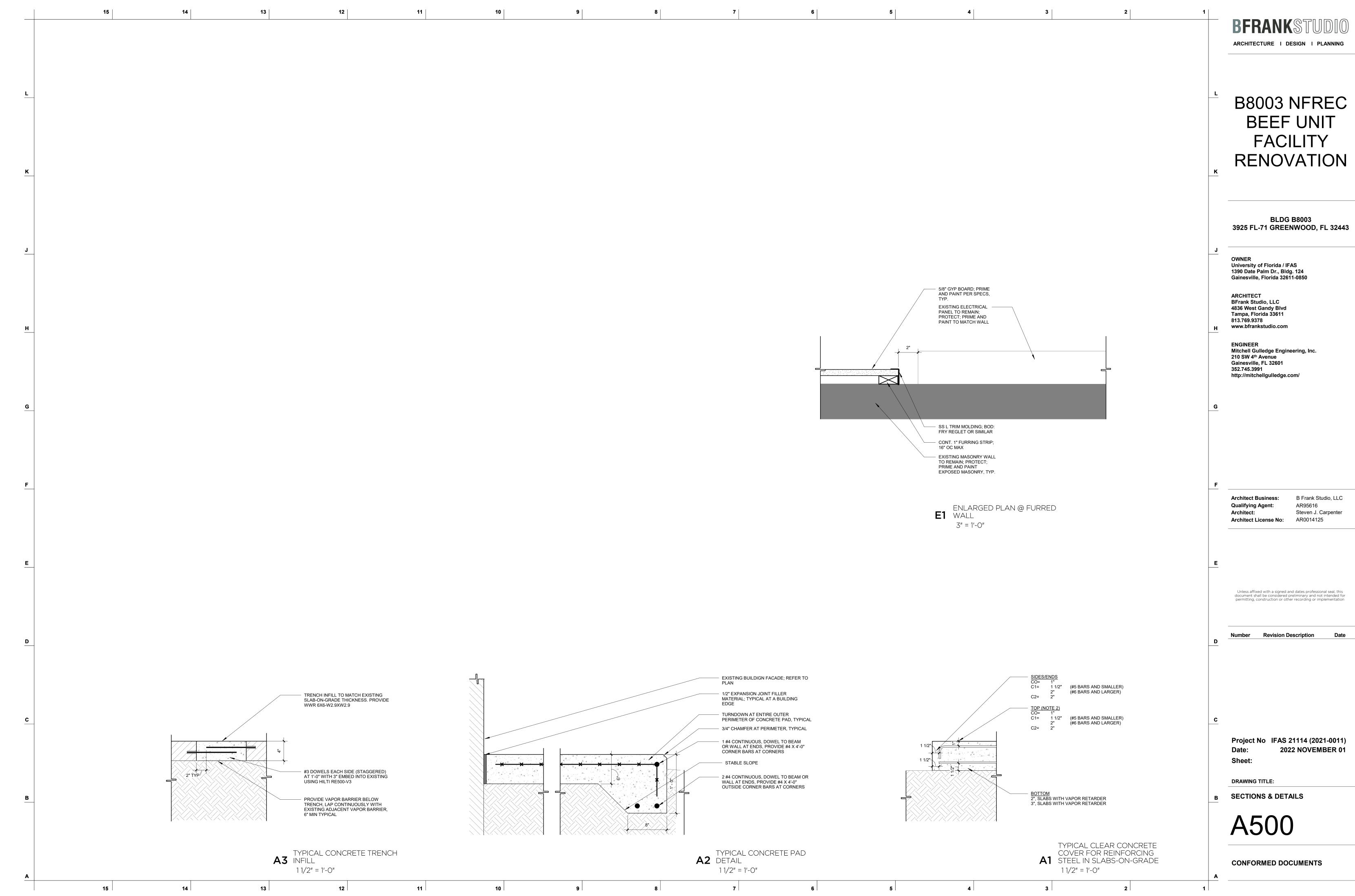


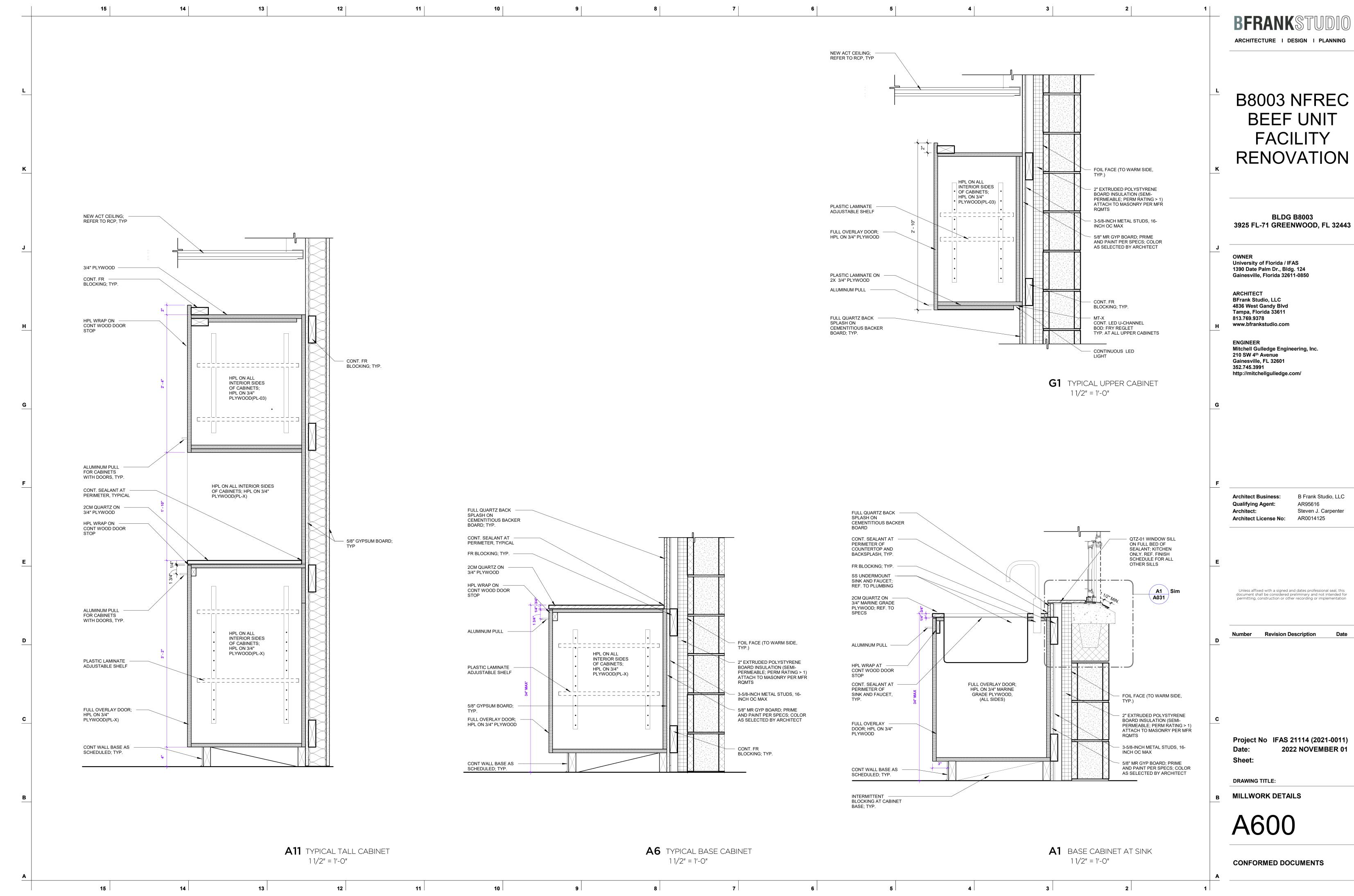












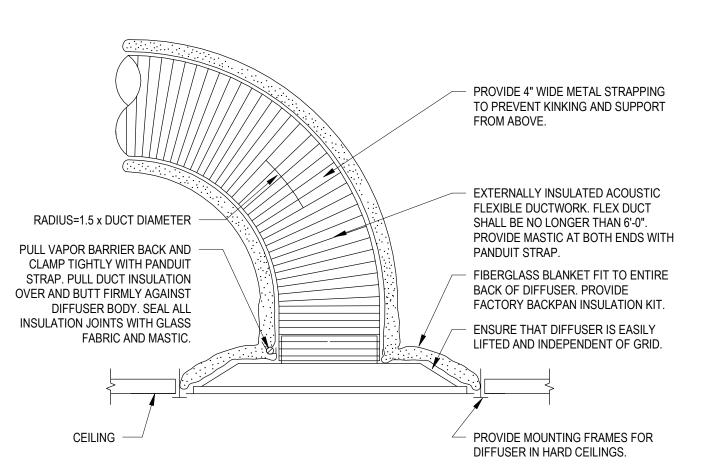
5 SPLIT SYSTEM - VERTICAL AHU

12

11

13

| MANUFACTURER | GREENHECK | GREENHECK | GREENHECK |
|--------------------------------|------------|------------|------------|
| MODEL | SP-B110 | SP-B80 | SP-B150 |
| UNIT TYPE | CEILING | CEILING | CEILING |
| FAN MARK | EF-1 | EF-2 | EF-3 |
| DRIVE | DIRECT | DIRECT | DIRECT |
| AIRFLOW (CFM) | 50 | 25 | 100 |
| EXTERNAL STATIC PRESSURE (CFM) | 0.5 | 0.5 | 0.5 |
| FAN SPEED (RPM) | 709 | 893 | 815 |
| FAN POWER (WATTS) | 80 | 17 | 128 |
| MOTOR SIZE (HP) | FRACTIONAL | FRACTIONAL | FRACTIONAL |
| VOLTS-PHASE | 120-1 | 120-1 | 120-1 |
| SOUND DATA | | | |
| FIRST OCTIVE BAND (dB) | 61 | 51 | 60 |
| SECOND OCTIVE BAND (dB) | 50 | 49 | 52 |
| THIRD OCTIVE BAND (dB) | 49 | 52 | 51 |
| SCHEDULE NOTES | (1)(2)(3) | (1)(2)(3) | (1)(2)(3) |



CEILING DIFFUSER

SPLIT SYSTEM SCHEDULE MANUFACTURER **UNIT TYPE OUTDOOR CONDENSER MARK** CONDENSER MODEL # AIR HANDLER MARK AIR HANDLER MODEL# NOMINAL TONNAGE TOTAL GROSS CAPACITY (BTUH) GROSS SENSIBLE CAPACITY (BTUH) EFFICIENCY COOLING (SEER) HEATING CAPACITY @ 47F (BTUH) EFFICIENCY HEATING (HSPF) DESIGN CONDITIONS SUMMER OUTDOOR TEMP DB/WB (DEG F) SUMMER INDOOR DB/WB (DEG F WINTER OUTDOOR TEMP (DEG F) WINTER INDOOR (DEG F)

OUTDOOR AIR (CFM) TOTAL AIR (CFM) ENTERING AIR (DB/WB) MIXED LEAVING AIR (DB/WB) INDOOR UNIT FAN MOTOR (HP) FAN TOTAL STATIC PRESSURE (IN WG) FAN EXTERNAL STATIC PRESSURE (IN WG) FILTER MERV RATING FILTER INITIAL PRESSURE DROP (IN WG) FILTER FINAL PRESSURE DROP (IN WG) FILTER SIZE (L - W - THICKNESS) (INCH) AIR HANDLER ELECTRICAL CHARACTERISTICS (V-Ø) MINIMUM CURRENT AMPS (MCA) FULL LOAD AMPS (FLA) MAXIMUM OVERCURRENT PROTECTION WEIGHT (LBS) **ELECTRIC HEAT (KW-STAGES)** ELECTRIC HEAT TEMPERATURE RISE (DEG F) **OUTDOOR UNIT** COOLING STAGES ELECTRICAL CHARACTERISTICS (V-Ø) MINIMUM CIRCUIT AMPS MAXIMUM OVERCURRENT PROTECTION (MOCP)

REFRIGERANT SUCTION PIPE SIZE (INCH)

REFRIGERANT LIQUID PIPE SIZE (INCH)

SCHEDULE NOTES 1) PROVIDE AHU AND ELECTRIC HEAT WITH SINGLE POINT POWER CONNECTION AND DISCONNECT. 2) PROVIDE LOW AMBIENT CONTROL - FIELD WIRED. 3) PROVIDE 7-DAY PROGRAMMABLE THERMOSTAT.

4) PROVIDE DRAIN SENSOR IN PTRAP TO SHUT DOWN AHU 5) PROVIDE SECONDARY DRAIN PAN AND DRAIN PAN ALARM

COOLING COIL CONDENSATE DRAIN PIPE SIZE (INCH)

RECTANGULAR DUCT. SPIN-IN FITTING DUCT SIZE IS THE SAME AS DIFFUSER/GRILLE NECK SIZE, UNLESS OTHERWISE NOTES. PANDUIT STRAP AND MASTIC -PRE-INSULATED FLEX DUCT. MANUAL VOLUME DAMPER. EXTENSION ON DAMPER ROD FOR INSULATED DUCT INSULATION AS SPECIFIED.

FLEXIBLE DUCT TAKEOFF

CODES AND STANDARDS ALL PROJECT WORK SHALL BE GOVERNED BY AND ADHERE TO THE FOLLOWING CODES AND

FLORIDA BUILDING CODE - SEVENTH EDITION (2020) FLORIDA BUILDING CODE - SEVENTH EDITION (2020) - MECHANICAL FLORIDA BUILDING CODE - SEVENTH EDITION (2020) - EXISTING BUILDING FLORIDA BUILDING CODE - SEVENTH EDITION (2020) - ENERGY CONSERVATION FLORIDA FIRE PREVENTION CODE SEVENTH EDITION (2020) FIRE CODE (NFPA 1 - 2018 FLORIDA EDITION) LIFE SAFETY CODE (NFPA 101 - 2018 FLORIDA EDITION) NATIONAL ELECTRIC CODE (NFPA 70 - 2017)

FIRE ALARM AND SIGNALING CODE (NFPA 72 - 2016) UNDERWRITERS' LABORATORIES (UL) AMERICAN NATIONAL STANDARDS INSTITUTION (ANSI) AMERICAN SOCIETY OF TESTING MATERIALS (ASTM) SHEET METAL & AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA) AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR-CONDITIONING ENGINEERS

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL (AMCA) NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB) ASSOCIATED AIR BALANCE COUNCIL (AABC)

| DUCTLESS MINISPLIT SC | CHEDULE | | | |
|---|------------------|--|--|--|
| MANUFACTURER | LG | | | |
| UNIT TYPE | MINISPLIT | | | |
| | HEAT PUMP | | | |
| CONDENSING UNIT | HP-2 | | | |
| CONDENSING UNIT MODEL | LSU243HLV3 | | | |
| AIR HANDLER MARK | AH-2 | | | |
| AIR HANDLER MODEL | LSN243HLV3 | | | |
| AIR HANDLER UNIT TYPE | CEILING CASSETTE | | | |
| | | | | |
| DESIGN CONDITIONS | | | | |
| SUMMER OUTDOOR TEMP DB/WB (DEG F) | 95/77 | | | |
| SUMMER INDOOR DB/WB (DEG F) | 75/63 | | | |
| WINTER OUTDOOR TEMP (DEG F) | 30 | | | |
| WINTER INDOOR (DEG F) | 70 | | | |
| TOTAL AIR (CFM) | 300 | | | |
| TOTAL COOLING CAPACITY (BTUH) | 9,000 | | | |
| AIR ENTERING COOLING COIL DB/WB (DEG F) | 75/63 | | | |
| TOTAL HEATING CAPACITY (BTUH) | 11,000 | | | |
| INDOOR UNIT | | | | |
| VOLTS-PHASE | 208-1 | | | |
| SYSTEM AMPACITY (MCA) | 11.9 | | | |
| SYSTEM MOCP | 15 | | | |
| SCHEDULE NOTES (1)(2) | | | | |
| 1) PROVIDE WIRED WALL MOUNTED REMOTE CONTROLLER. | | | | |
| 0 N I D 0 0 D I N I T I O D 0 N I E D E D N I O I I T D 0 0 D I N I I T | = | | | |

LENNOX

HEAT PUMP

HP-1

16HPX-036

AHU-1

CBA38MV-042

36,200

27.500

35,600

8.5

96/77

75/64

1,210

78/65.5

53.9/53.9

0.4

0.12

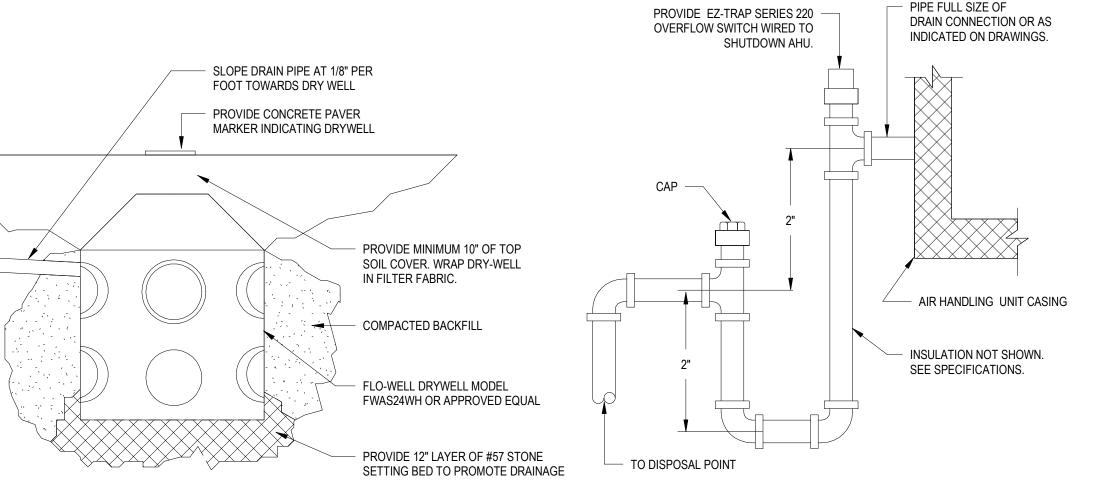
0.4

20-25-5

208-1

208-1

2) INDOOR UNIT IS POWERED BY OUTDOOR UNIT



CONDENSATE DRY-WELL

EQUIPMENT CONDENSATE TRAP

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www.mitchellgulledge.com MG #21064

BFRANKS ARCHITECTURE I DESIGN I PLANNING

B8003 NFREC **BEEF UNIT FACILITY** RENOVATION

BLDG B8003 3925 FL-71 GREENWOOD, FL 32443

University of Florida / IFAS 1390 Date Palm Dr., Bldg. 124 Gainesville, Florida 32611-0850

ARCHITECT **BFrank Studio, LLC** 4836 West Gandy Blvd Tampa, Florida 33611 813.769.9378 www.bfrankstudio.com

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R. Craig Gulledge II

Revision Description Number

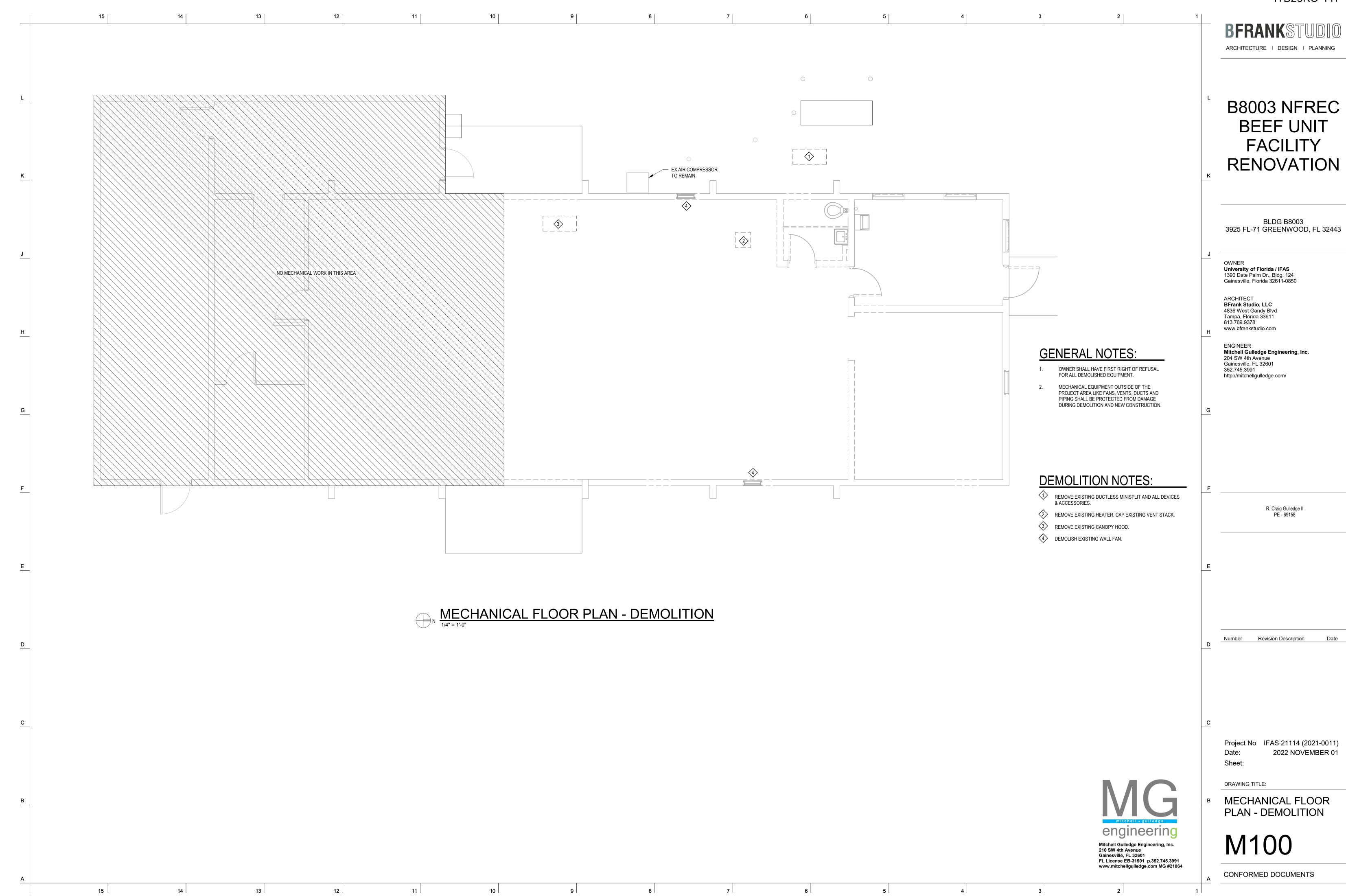
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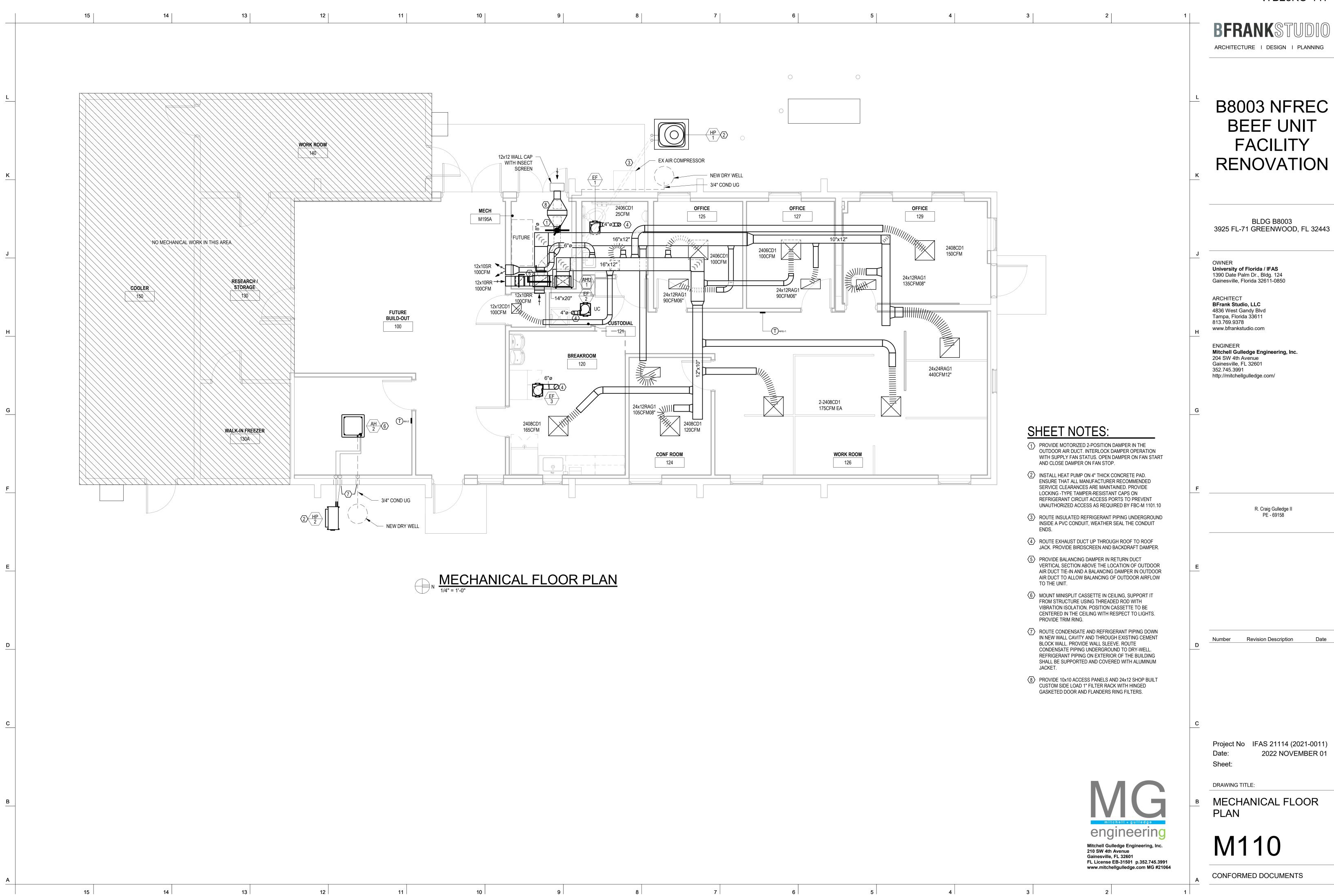
DRAWING TITLE:

MECHANICAL LEGEND, NOTES, SCHEDULES, & **DETAILS**

M001

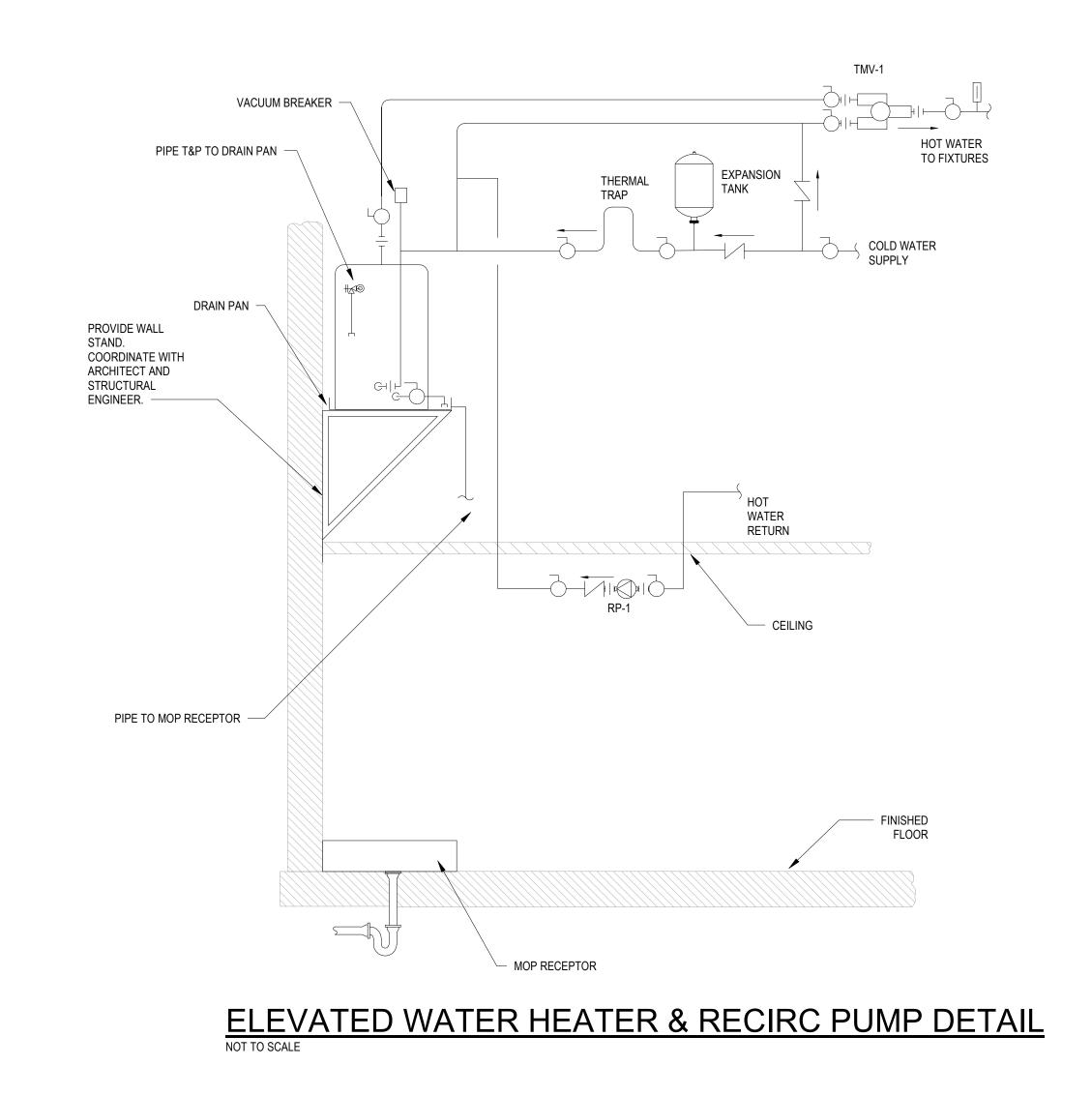
CONFORMED DOCUMENTS





BFRANKS'

ARCHITECTURE I DESIGN I PLANNING



ASPHALT OR OTHER HARD SURFACE

WATER TIGHT SCREW CAP

TWO WAY CLEANOUT DETAIL

VALVE BOX WITH SEWER STAMPED ON LID -

4" SAN

13 |

12

PLUMBING LEGEND

EQUIPMENT TAG
XX=EQUIP TYPE, YY=EQUIP. NO.

CONNECT TO EXISTING

GATE VALVE

GLOBE VALVE CHECK VALVE

□ BALL VALVE

□ BUTTERFLY VALVE

CALIBRATED BALANCING VALVE (CIRCUIT SETTER)

RELIEF VALVE

TWO WAY CONTROL VALVE

THREE WAY CONTROL VALVE

H_H PLUG VALVE PRESSURE REDUCING VALVE

— THERMOMETER

HH SENSOR WELL

| | UNION

→
(、) PRESSURE GAUGE

ECCENTRIC REDUCER CONCENTRIC REDUCER

VENTURI FLOW METER FLEXIBLE PIPE CONNECTION

TRAP PRIMER

WATER HAMMER ARRESTOR

0.5 GPM

PLUMBING GENERAL NOTES

1. COORDINATE WORK WITH OTHER TRADES. PROVIDE OFFSETS AND RELOCATE AS REQUIRED TO INSTALL A COMPLETE SYSTEM WITHOUT INTERFERING WITH OTHER TRADES. COORDINATE ANY NECESSARY CHANGES WITH THE GENERAL CONTRACTOR.

2. VERIFY INVERT ELEVATIONS WITH THE CIVIL DRAWINGS AND ON SITE CONDITIONS PRIOR TO INSTALLING ANY SYSTEM. ADJUST SYSTEM INVERT ELEVATIONS AND PROVIDE OFFSETS TO ACCOMMODATE EXISTING CONDITIONS.

3. CONTRACTOR SHALL INSTALL ALL SYSTEMS IN THEIR ENTIRETY ACCORDANCE WITH REFERENCED CODES, STANDARDS, DRAWINGS AND SPECIFICATIONS.

4. CONTRACTOR SHALL VISIT THE PROJECT SITE TO ACQUAINT THEMSELVES WITH THE EXISTING PROJECT CONDITIONS.

5.CONTRACTOR SHALL NOTIFY AND COORDINATE WITH THE OWNER AND GENERAL CONTRACTOR PRIOR TO ANY SYSTEM SHUT DOWN. PROVIDE ONE WEEK OF PRIOR NOTICE.

6. DO NOT CUT ANY BUILDING STRUCTURE WITHOUT PRIOR WRITTEN APPROVAL FROM THE

STRUCTURAL ENGINEER. PROVIDE OPENINGS IN THE STRUCTURE PER THE STRUCTURAL ENGINEER'S DIRECTIONS PRIOR TO OR DURING STRUCTURE INSTALLATION. (SEE STRUCTURAL DRAWINGS.) REQUEST INFORMATION WHEN REQUIRED TO VERIFY STRUCTURAL REQUIREMENTS WITH THE GENERAL CONTRACTOR.

7. DO NOT HAMMER THROUGH CONCRETE WALLS TO INSTALL ANY ITEM. CORE DRILL, CUT HOLES OR PROVIDE SLEEVES DURING WALL INSTALLATIONS. DAMAGE DONE BY OTHER MEANS TO BLOCK WALLS SHALL BE REPAIRED TO THE SATISFACTION OF THE ARCHITECT.

8. PROVIDE BOTH DEEP SEAL TRAPS AND (TRAP PRIMER VALVES & CONNECTIONS) FOR FLOOR DRAINS IN AREAS OTHER THAN SHOWERS OR AS NOTED FOR KITCHEN FLOOR DRAINS. VERIFY EACH FLOOR DRAIN LOCATION WITH THE GENERAL CONTRACTOR SO THAT PROPER FLOOR SLOPES CAN BE PROVIDED. FLOOR DRAINS THAT DO NOT ACCEPT WATER DUE TO IMPROPER FLOOR SLOPES WILL NOT BE ACCEPTABLE. INSTALL SUCH THAT NO TRIP HAZARD IS PRESENT WHEN COMPLETED, MEANING THE TOP SHALL BE FLUSH WITH FINISHED FLOOR.

9. PROVIDE ACCESS TO ITEMS PLACED IN WALLS OR ABOVE CEILINGS. ABOVE CEILING ITEMS SHALL BE ACCESSIBLE FROM A 6' LADDER.

10. ANY PIPING PASSING THROUGH A FOUNDATION WALL SHALL BE PROVIDED WITH A RELIEVING ARCH OR A PIPE SLEEVE TWO PIPE SIZES LARGER THAN THE PIPE PASSING THROUGH THE FOUNDATION, PER THE FLORIDA PLUMBING CODE. MODIFICATIONS TO STRUCTURE REQUIRE THE STRUCTURAL ENGINEER'S DIRECTION. NOTIFY GENERAL CONTRACTOR OF INTERFERENCES PRIOR TO INSTALLATION. PIPING SHALL NOT PASS THROUGH OR BELOW BUILDING FOOTINGS.

11. PROTECT PIPES FROM CONTACT WITH CONCRETE. USE SLEEVES PER SPECIFICATIONS. ALLOW FOR EXPANSION AND CONTRACTION OF PIPE SYSTEMS.

12. PROVIDE FIRE STOPPING AT EACH RATED FLOOR OR WALL PENETRATION. REFER TO

ARCHITECTURAL DRAWINGS FOR LOCATIONS OF FIRE RATINGS AND SYSTEMS. 13. REFER TO THE ARCHITECTURAL DRAWINGS FOR FIXTURE LOCATIONS AND ELEVATIONS.

14. PROVIDE PROPER BRACING FOR ALL FIXTURES TO SUPPORT THE WEIGHT DESCRIBED IN THE FLORIDA BUILDING CODE - ACCESSIBILITY.

15. DO NOT INSTALL PLASTIC PIPING IN AIR PLENUMS OR IN FIRE RATED WALLS. CONVERT TO CAST IRON AND/OR COPPER TUBING AS REQUIRED.

16. MAINTAIN A 15' CLEARANCE BETWEEN OUTDOOR AIR INTAKES AND PLUMBING VENTS. VERIFY LOCATIONS WITH MECHANICAL CONTRACTOR PRIOR TO INSTALLING THE VENTS.

AS REQUIRED.

INSTALL ASSE 1070 COMPLIANT MIXING VALVE BELOW LAVATORY

DUAL WITH BOTTLE FILLER. PROVIDE WITH INTEGRAL WHA ON STOP.

17. THE ROOFING CONTRACTOR SHALL PROVIDE THE ROOF FLASHING FOR VENTS THROUGH THE ROOF. PLUMBING CONTRACTOR SHALL COORDINATE WITH THE ROOF CONTRACTOR AND GENERAL CONTRACTOR FOR EACH PENETRATION THROUGH THE ROOF. PROVIDE OFFSETS

18. IN CONCEALED LOCATIONS WHERE PIPING, OTHER THAN CAST-IRON OR GALVANIZED STEEL, IS INSTALLED THROUGH HOLES OR NOTCHES IN STUDS, JOISTS, RAFTERS OR SIMILAR MEMBERS LESS THAN 1-1/2" FROM THE NEAREST EDGE OF THE MEMBER, THE PIPE SHALL BE PROTECTED BY STEEL SHIELD PLATES. SUCH SHIELD PLATES SHALL HAVE A THICKNESS OF NOT LESS THAN 16 GA. SUCH PLATES SHALL COVER THE AREA OF THE PIPE WHERE THE MEMBER IS NOTCHED OR BORED, AND SHALL EXTEND NOT LESS THAN 2" ABOVE SOLE PLATES AND BELOW TOP PLATES. (FBC-P-305.6).

PLUMBING ABBREVIATIONS ABOVE FINISHED FLOOR ACCESS PANEL ACID VENT ACID WASTE BELOW FINISHED FLOOR BTU BRITISH THERMAL UNIT BTUH BTU PER HOUR **CUBIC FEET PER HOUR** CTG CLEAN OUT TO GRADE DEGF DEGREE FAHRENHEIT DEIONIZED WATER DIAMETER DCW DOMESTIC COLD WATER DOMESTIC HOT WATER DOMESTIC HOT WATER RETURN EACH **EXISTING** EX EWC EWH **ELECTRIC WATER COOLER** ELECTRIC WATER HEATER FBC FLORIDA BUILDING CODE FLOOR CLEAN OUT FLOOR DRAIN FPM FEET PER MINUTE FLOOR SINK FEET FEET WATER GAUGE FT WG **GAUGE** GAL GPH GALLONS GALLONS PER HOUR GPM **GALLONS PER MINUTE GWH** GAS WATER HEATER HOSE BIBB HORSEPOWER INCHES **INCHES WATER GAUGE** IN WG KW KILOWATTS KILOWATT HOUR LAVATORY LAV POUND LEAVING WATER TEMPERATURE 1,000 BTUH MINIMUM

MOP RECEPTOR NORMALLY CLOSED NATURAL GAS NOT IN CONTRACT NORMALLY OPEN NOT TO SCALE ON CENTER OUTSIDE DIAMETER

PHASE POUNDS PER SQUARE INCH REDUCED PRESSURE BACKFLOW PREVENTER REVOLUTIONS PER MINUTE SANITARY SQUARE FEET SHOWER

SPECIFICATION STAINLESS STEEL; SERVICE SINK TRENCH DRAIN THERMOSTATIC MIXING VALVE TRAP PRIMER **TYPICAL** URINAL

SINK

VOLTS OR VENT VIYB VALVE IN YARD BOX VFD VARIABLE FREQUENCY DRIVE VTR VENT THROUGH ROOF WATER CLOSET WC WCO WALL CLEAN OUT WALL HYDRANT WHA WATER HAMMER ARRESTOR

WATER PRESSURE DROP

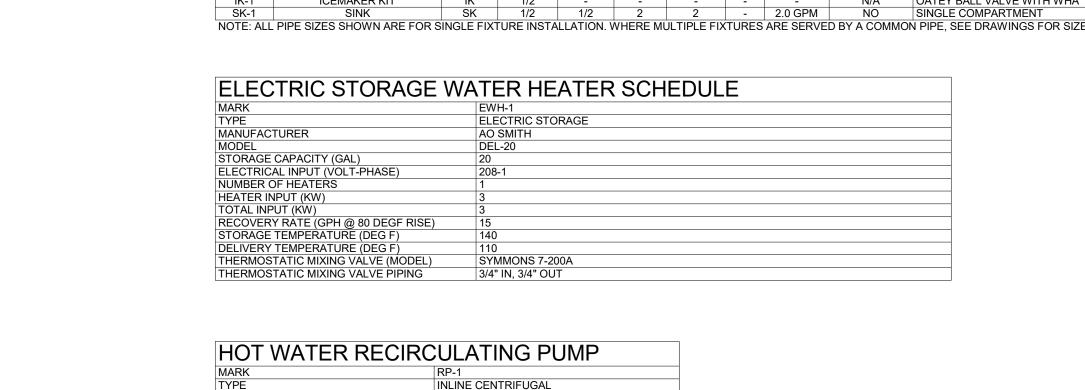
CODES AND STANDARDS

ALL PROJECT WORK SHALL BE GOVERNED BY AND ADHERE TO THE FOLLOWING CODES AND

FLORIDA BUILDING CODE 7TH EDITION (2020) FLORIDA BUILDING CODE 7TH EDITION (2020) - PLUMBING

FLORIDA BUILDING CODE 7TH EDITION (2020) - ENERGY CONSERVATION FLORIDA BUILDING CODE 7TH EDITION (2020) - MECHANICAL FLORIDA BUILDING CODE 7TH EDITION (2020) - ACCESSIBILITY FLORIDA FIRE PREVENTION CODE SEVENTH EDITION (2020) FIRE CODE (NFPA 1 - 2018 FLORIDA EDITION)

LIFE SAFETY CODE (NFPA 101 - 2018 FLORIDA EDITION) NATIONAL ELECTRIC CODE (NFPA 70) - 2017 EDITION



| LIOTIMATED DECIDOLIL ATINIO DUBAD | | | | | |
|-----------------------------------|---------------------------|--|--|--|--|
| HOT WATER RECIRCULATING PUMP | | | | | |
| MARK | RP-1 | | | | |
| TYPE | INLINE CENTRIFUGAL | | | | |
| MANUFACTURER | TACO | | | | |
| MODEL | 007-IFC | | | | |
| MATERIAL | STAINLESS STEEL | | | | |
| FLOW RATE (GPM) | 5 | | | | |
| HEAD (FT WG) | 11 | | | | |
| MOTOR HP | 1/25 | | | | |
| RPM | 3250 | | | | |
| ELECTRICAL (VOLTS-PHASE-AMPS) | 120V - 1 - 0.76A | | | | |
| DISCONNECT | PROVIDE WITH PLUG | | | | |
| CONTROL TYPE | AQUASTAT AND TIMER | | | | |
| CONTROLLER | TACO MODELS 265-1 & 563-2 | | | | |

ELECTRIC STORAGE

PLUMBING FIXTURE SCHEDULE

WATER CLOSET

URINAL LAVATORY

ELECTRIC WATER COOLER

MOP RECEPTOR

ICEMAKER KIT



BEEF UNIT FACILITY RENOVATION

B8003 NFREC

BLDG B8003 3925 FL-71 GREENWOOD, FL 32443

University of Florida / IFAS 1390 Date Palm Dr., Bldg. 124 Gainesville, Florida 32611-0850

ARCHITECT **BFrank Studio, LLC** 4836 West Gandy Blvd Tampa, Florida 33611 813.769.9378 www.bfrankstudio.com

ENGINEER Mitchell Gulledge Engineering, Inc. 204 SW 4th Avenue Gainesville, FL 32601 352.745.3991 http://mitchellgulledge.com/

R. Craig Gulledge II PE - 69158

Revision Description Number

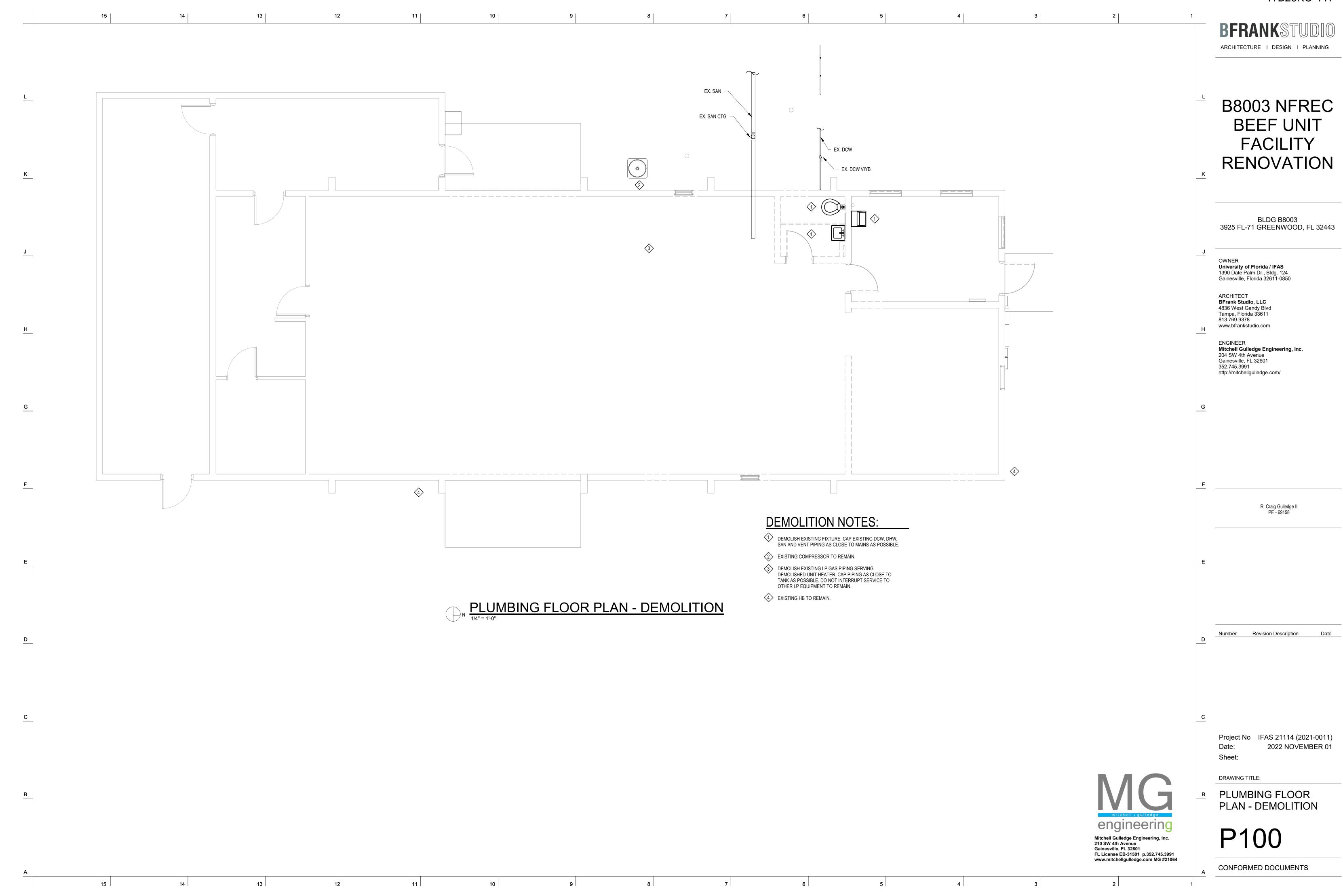
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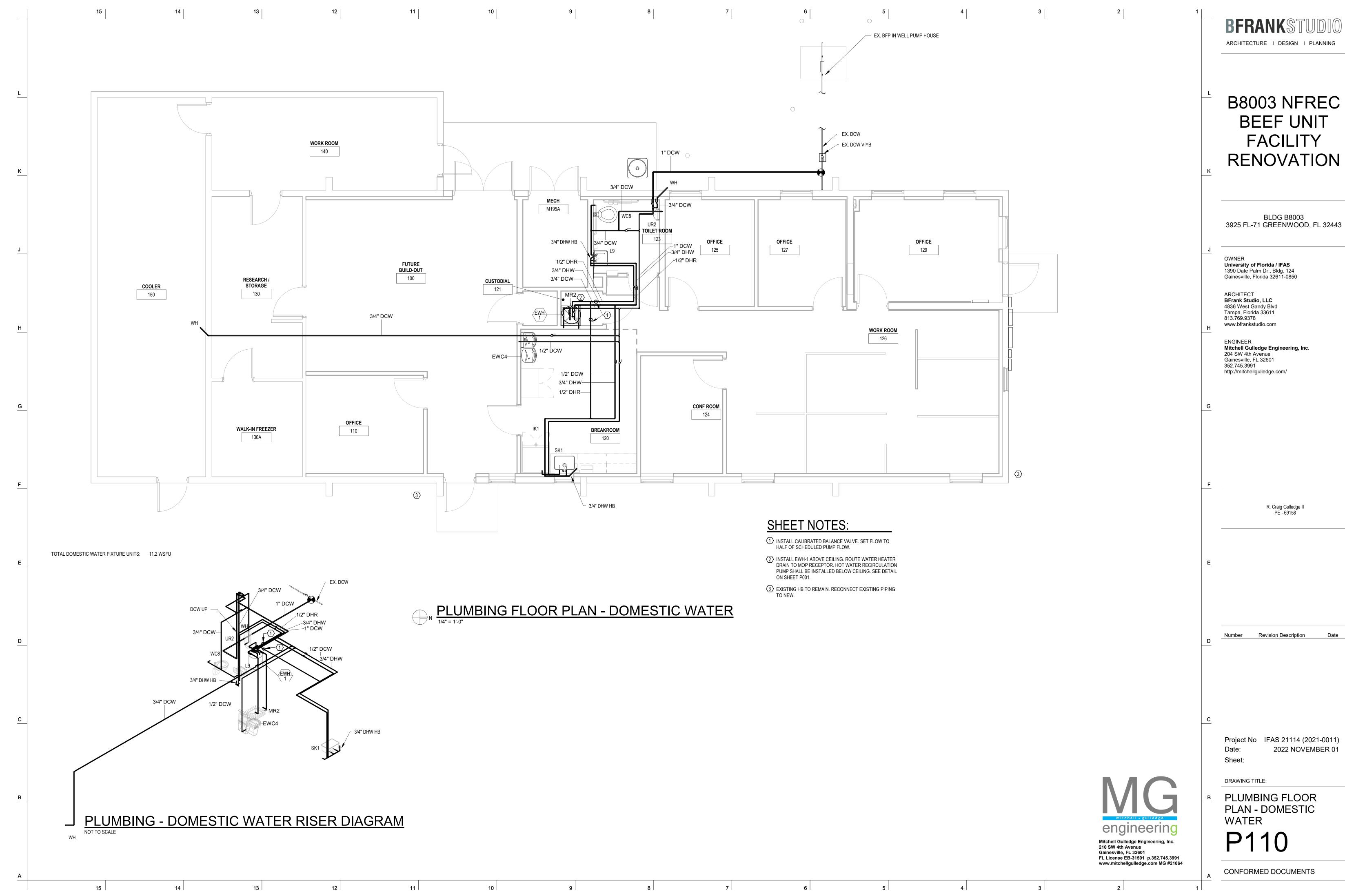
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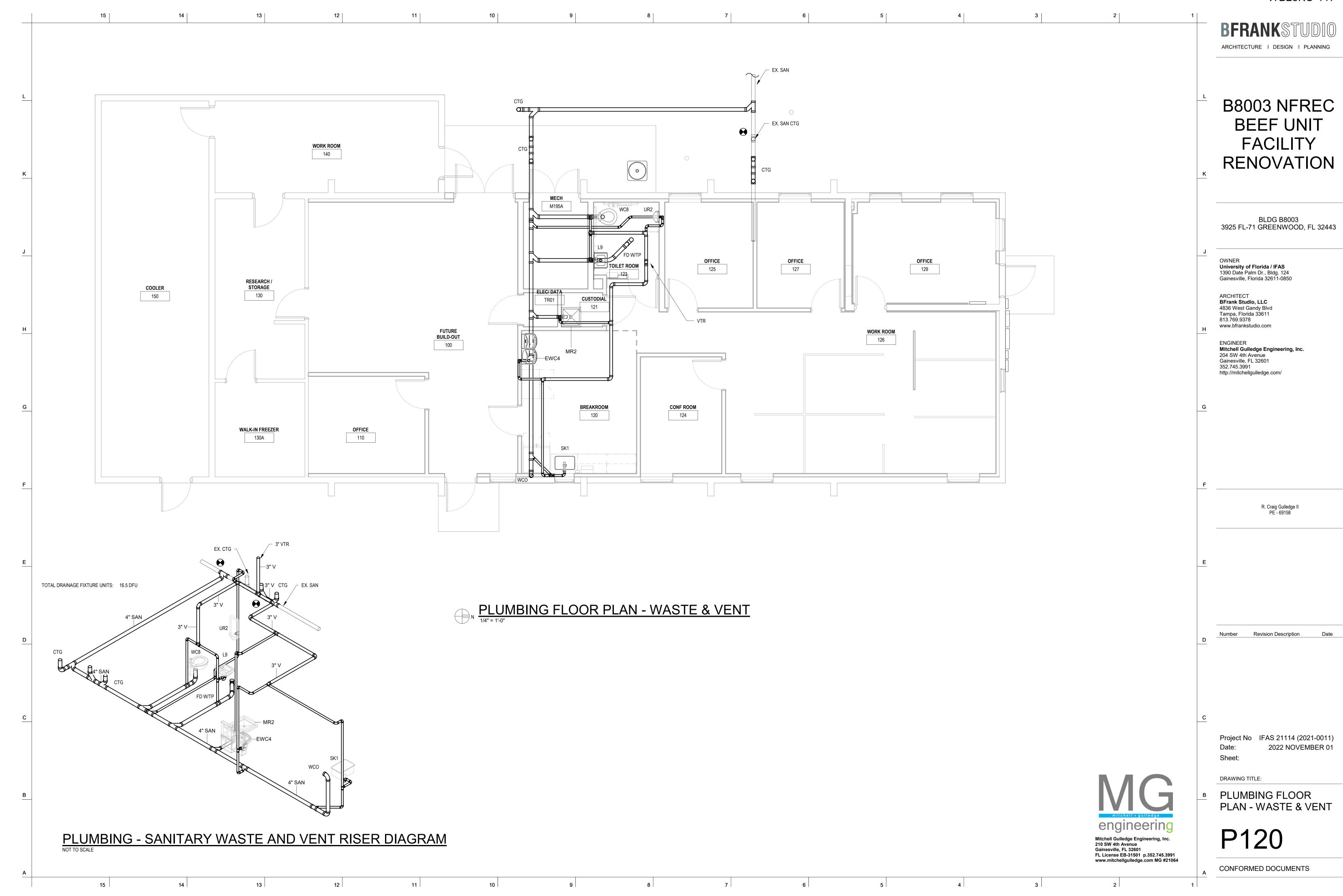
PLUMBING LEGEND **NOTES & DETAILS**

P001

CONFORMED DOCUMENTS



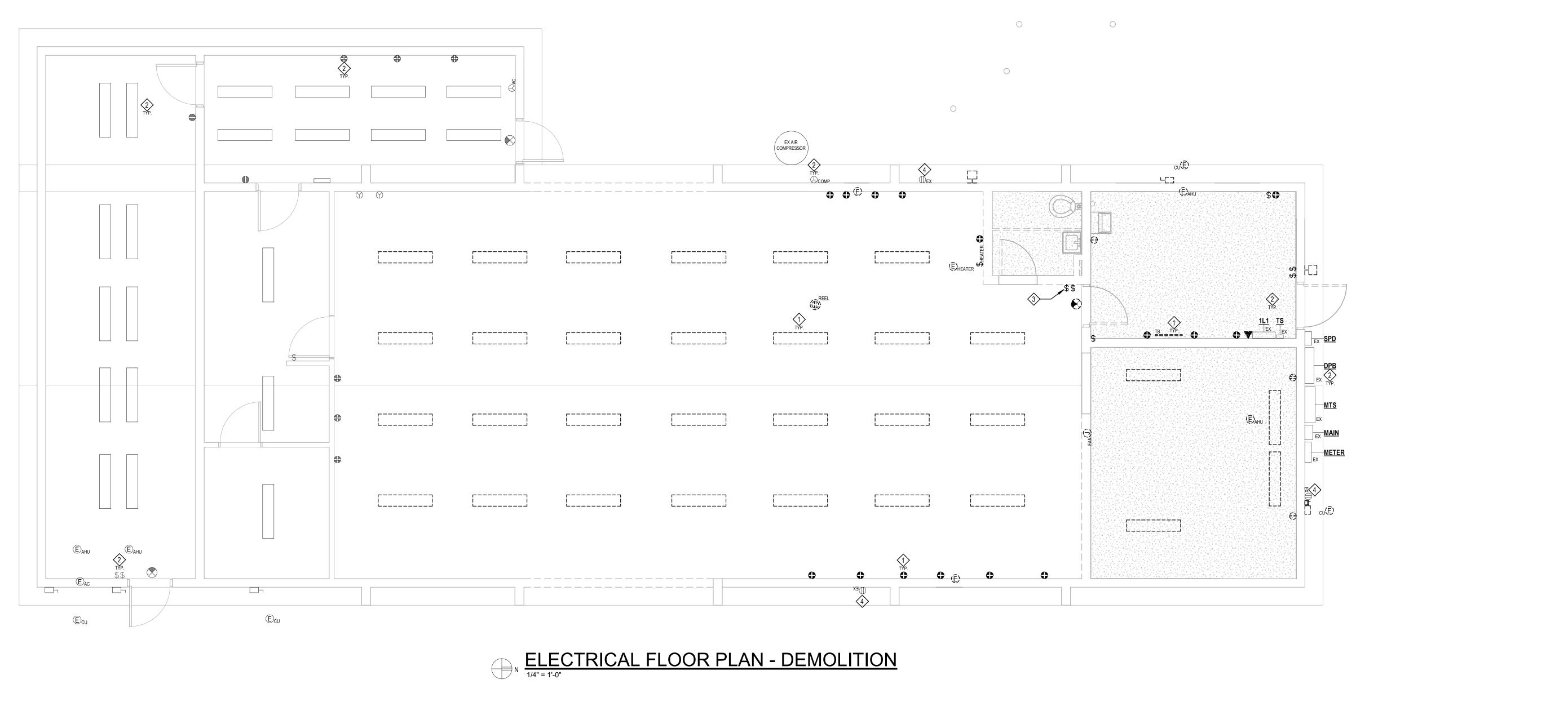




12

11

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GENERAL DEMOLITION NOTES:

- ALL CIRCUITS AND SYSTEMS OUTSIDE OF THE PROJECT AREA SHALL REMAIN IN SERVICE AT ALL TIMES THROUGHOUT THE WORK. COORDINATE ANY NECESSARY OUTAGES WITH OWNER PRIOR TO PROCEEDING.
- DEMOLISH ALL FIXTURES, DEVICES, AND ASSOCIATED CIRCUITS AND FEEDERS INCLUDING RACEWAYS AND BOXES BACK TO THE SERVING PANEL. MAINTAIN FUNCTIONALITY OF ALL REMAINING FIXTURES AND EQUIPMENT.
- DEMOLISH ANY SYSTEMS AND APPURTENANCES DISCOVERED WITHIN WALLS BEING DEMOLISHED. WHERE THESE SYSTEMS SERVE AREAS OUTSIDE OF THE PROJECT BOUNDARY, COORDINATE WITH OWNER, ARCHITECT, ENGINEER TO MAINTAIN EXISTING FUNCTIONALITY IN A WAY COMPATIBLE WITH THIS PROJECT.
- COORDINATE DEMOLITION-AREA WITH ARCHITECTURAL PLANS. NOT ALL DEVICES IN DEMOLITION AREA MAY BE SHOWN ON THIS SHEET. FIELD VERIFY EXACT DEVICES IN DEMOLITION AREA AND DEMOLISH ACCORDINGLY.
- FOR DATA AND SECURITY-CAMERA SYSTEMS DEMOLITION, COORDINATE DEMOLITION EFFORTS WITH OWNER AND OWNER'S LOW-VOLTAGE SYSTEM'S CONTRACTOR.

SHEET NOTES:

- TYPICAL DASHED DEVICE TO BE DEMOLISHED.
- 2 TYPICAL EXISTING DEVICE TO REMAIN.
- intercept and prepare existing lighting circuit for reuse in warehouse/shop. See also note 4 on sheet e120.
- PRESERVE THE CIRCUIT FOR EXISTING EXTERIOR RECEPTACLE. RECONNECT AS NEEDED FOR OPERATION.

AREA OUT OF SCOPE

SEE ARCHITECTURAL SHEETS FOR AREA OUT OF SCOPE OF WORK. ALL EQUIPMENT, DEVICES, CIRCUITS, ETC SHALL REMAIN UNDISTURBED IN THE AREA OUT OF SCOPE OF WORK.

> engineering Mitchell Gulledge Engineering, Inc. 210 SW 4th Avenue Gainesville, FL 32601 FL License EB-31501 p.352.745.3991 www.mitchellgulledge.com MG #21064

ARCHITECTURE I DESIGN I PLANNING

B8003 NFREC BEEF UNIT **FACILITY** RENOVATION

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> Andrew P. McCaddin PE - 83318

Number Revision Description

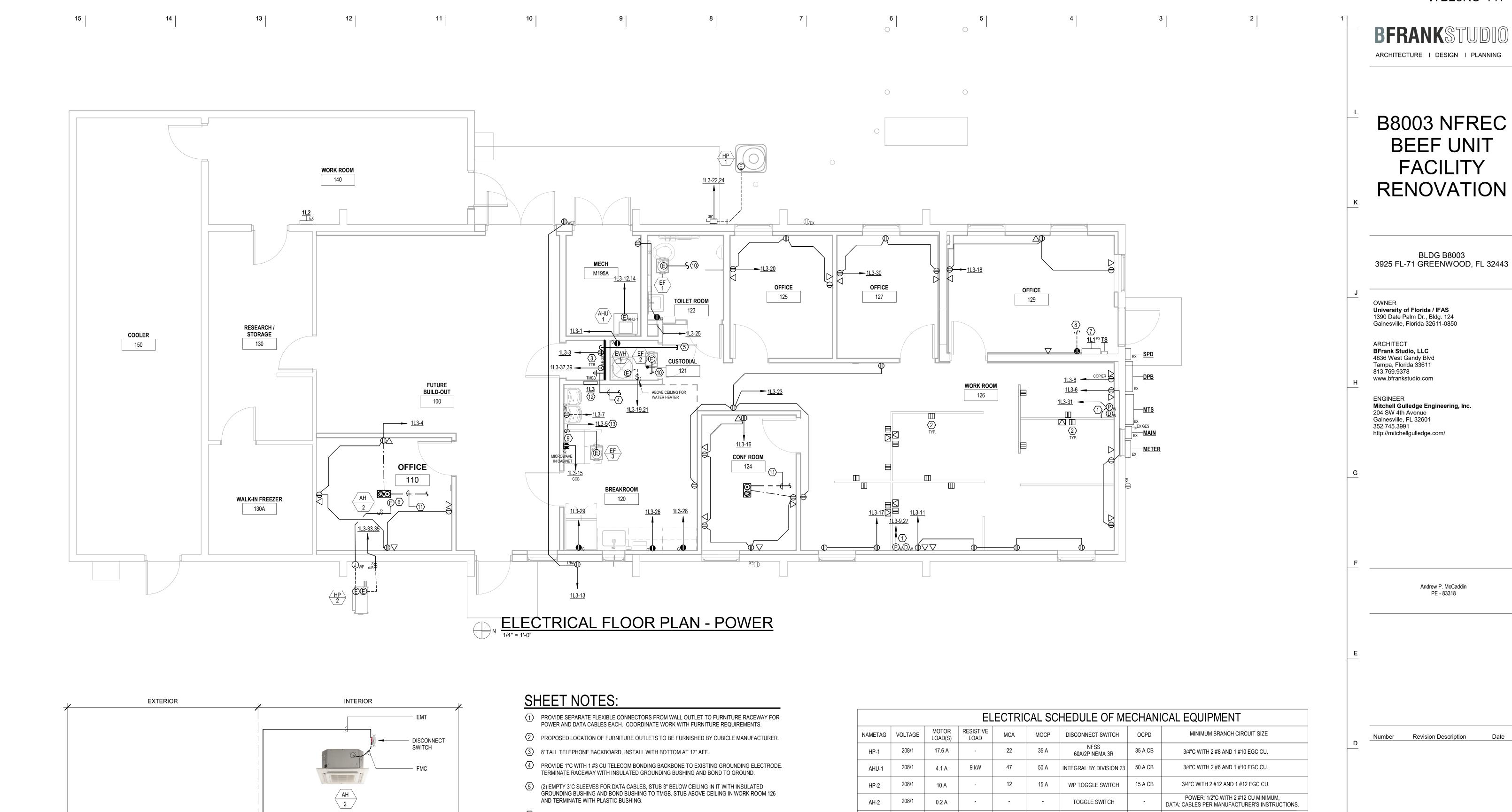
Project No IFAS 21114 (2021-0011) 2022 NOVEMBER 01 Sheet:

DRAWING TITLE:

ELECTRICAL FLOOR PLAN - DEMOLITION

E100

CONFORMED DOCUMENTS



Project No IFAS 21114 (2021-0011) 2022 NOVEMBER 01 Sheet:

DRAWING TITLE:

ELECTRICAL FLOOR PLAN - POWER

E110

CONFORMED DOCUMENTS

- 6 INSTALL DISCONNECT ON PHASE CONDUCTORS, ABOVE ACCESSIBLE CEILING NEXT TO UNIT.
- GC TO CLEAN AND PAINT PANEL AND EXISTING RACEWAYS PER ARCHITECTURAL SPECIFICATIONS.
- CONNECT TO PANEL 1L1, ONE OF EXISTING SPARE 20A/1P CB. 1/2"C WITH 2 #12 AND 1 #12 EGC CU
- MOUNT RECEPTACLE HORIZONTALLY AT 40" AFF FLUSH WITH BACK WALL OF CABINETRY FOR
- (10) CONNECT TO ROOM LIGHTING CIRCUIT. 1/2"C WITH 2 #12 AND 1 #12 EGC CU MIN.
- (2) 1"C UG WITH PULLSTRINGS VIA NEAREST WALL TO ABOVE CEILING. TERMINATE WITH PLASTIC BUSHINGS FOR DATA AND HDMI.
- PROVIDE NEC 110.26 CLEARANCE, COORDINATE WORK WITH ARCHITECTURAL ELEMENTS.
- (13) CONNECT TO UNSWITCHED (HOT) LIGHTING CIRCUIT. INSTALL TOGGLE SWITCH ABOVE COUNTER.

| RP-1 | 120/1 | 0.8 A | - | 1 | 15 A | PLUG & CORD | 20 A CB | 1/2"C WITH 2 #12 AND 1 #12 EGC CU. |
|---|-------|---------------|------|------|-------|-------------|---------|------------------------------------|
| INFORMATION ABOVE IS BASIS OF DESIGN AND MAY VARY FROM DELIVERED EQUIPMENT. COORDINATE LOCATION AND REQUIREMENTS WITH MECHANICAL AND PLUMBING DIVISION AND REQUIREMENT OF THE DELIVERED-EQUIPMENT. PROVIDE ACCORDINGLY. | | | | | | | | |
| | | | | | | | | |
| FXTF | :RIOR | P R∩XF | S AN | D FN | CL OS | URES | | |
| | | R FOR ANY BOX | | | | | | |

20 A

20 A

INTEGRAL BY DIVISION 23 20 A CB

TOGGLE SWITCH

2P NEMA 1

1/2"C WITH 2 #12 AND 1 #12 EGC CU.

1/2"C WITH 2 #12 AND 1 #12 EGC CU.

engineering

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Gainesville, FL 32601

EF-#

EWH-1

120/1

208/1

WALLS OR NEAR TRENCHING.

128 W

3 kW

(3) TYPICAL MINISPLIT CONNECTION DETAIL
NOT TO SCALE

HP 2

BRANCH CIRCUIT FROM PANEL

WP DISCONNECT SWITCH AND BOX

WP BOX, EXTERIOR-WALL MOUNTED

OUTDOOR UNIT. LFMC OUTDOORS.

SEPARATE RACEWAYS FOR INDOOR AND

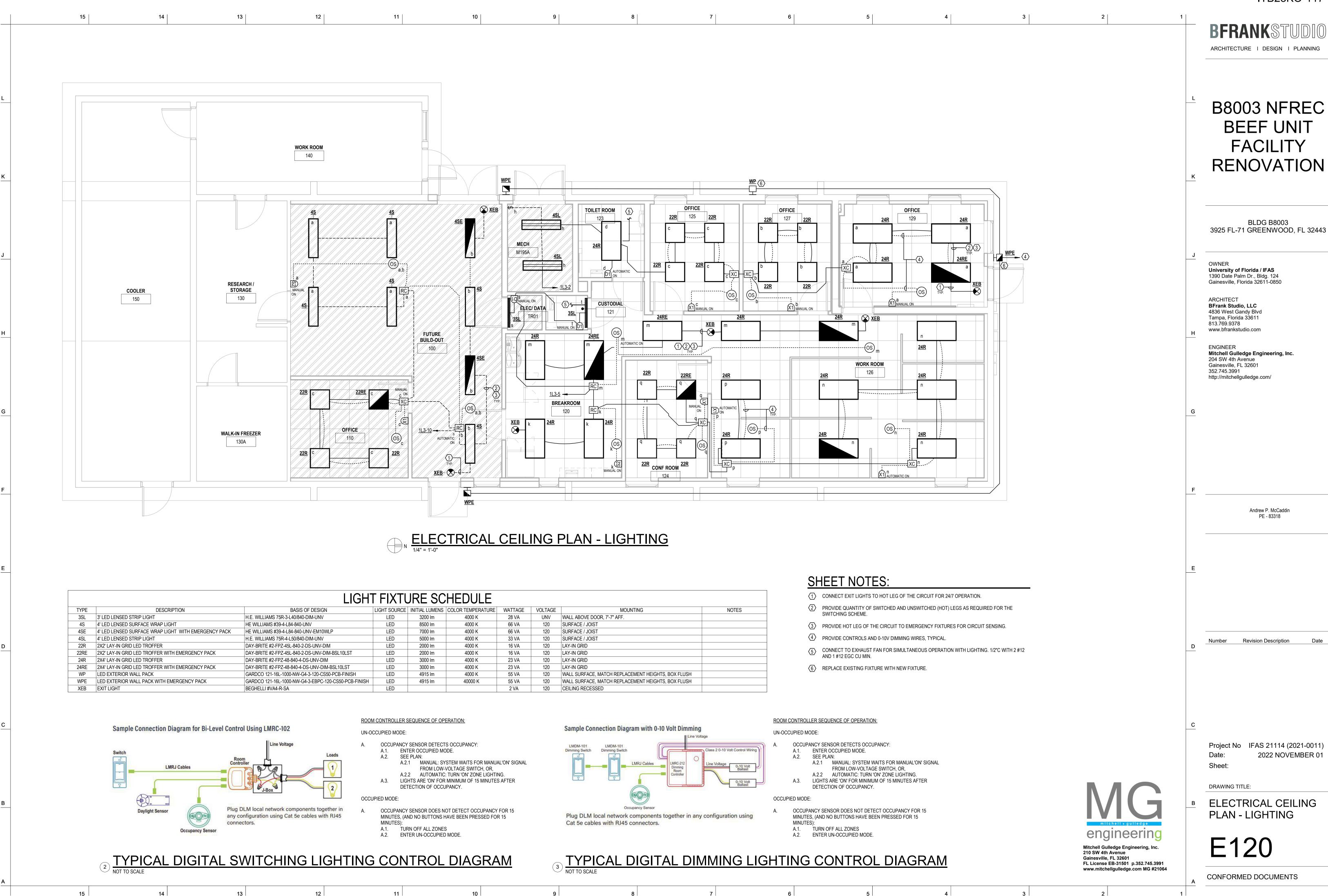
11

THROUGH EXTERIOR WALL

FOR INDOOR UNIT WIRING

12

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13 |

12 |

12

11

11 |

CONFORMED DOCUMENTS

Mitchell Gulledge Engineering, Inc.

FL License EB-31501 p.352.745.3991 www.mitchellgulledge.com MG #21064

210 SW 4th Avenue Gainesville, FL 32601

