PROJECT MANUAL

HUALAPAI TRIBE
EMERGENCY OPERATIONS CENTER

PEACH SPRINGS, ARIZONA

OWNER:
Hualapai Tribe
PO Box 179, W. Highway 66
Peach Springs, Arizona 86434
Kevin A. Davidson,
Hualapai Tribe Planning Director
Phone: (928) 769-1310

ARCHITECT:
Stroh Architecture, Inc.
1577 Plaza West Drive, Suite "B"
Prescott, Arizona 86303
Douglas Stroh
Phone: (928) 771-0548

Please follow link to download plans:
https://drive.google.com/file/d/16urnIPI_28yr_6Ic6PV09V7Jo6A28ROT/view?usp=sharing

MAY 27, 2021
ISSUED FOR CONSTRUCTION

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DOCUMENT 00 0107

SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:
   1. Douglas Stroh, Stroh Architecture, Inc.
   2. Arizona Certificate No. 13991.
   3. Responsible for Divisions 01-32 Sections except where indicated as prepared by other design professionals of record.

EXPIRES 06/30/2022

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DOCUMENT 00 0110

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DOCUMENT 00 1116

INVITATION TO BID

1.1 PROJECT INFORMATION

A. Notice to Bidders: Qualified bidders are invited to submit bids for Project as described in this Document according to the Instructions to Bidders.

B. Project Identification: Emergency Operations Center.

1. Project Location: Peach Springs, Arizona..

C. Owner: Hualapai Tribe.

1. Owner's Representative: Contact: Kevin A. Davidson, Hualapai Tribe Planning Director; 887 Hwy 66, Peach Springs, Arizona 86434; 928-769-1310; kdavidson@hualapai-nsn.gov .

D. Architect: Stroh Architecture, Inc, 1577 Plaza West Drive, Suite B, Prescott, Arizona 86303:.
1. Contact: William X Waldrom, Project Architect; 928-771-0548; william@stroharchitectureinc.com .

E. Construction Manager: Project Manager: Kenew, LLC, 17505 North 79th Avenue, Suite 205-C, Glendale, Arizona 85308:.

F. Project Description: Project consists of a new one story, approximately 3300 square feet Emergency Operations Center. Occupancy Type includes B Business and S-1 Storage and Construction Type is II-B Non-combustible. Occupancy separations are not required per IBC Table 508.3 and building is not sprinklered..

G. Construction Contract: Bids will be received for the following Work:

1. General Contract (all trades).

1.2 BID SUBMITTAL AND OPENING

A. Owner will receive sealed bids until the bid time and date at the location indicated below. Owner will consider bids prepared in compliance with the Instructions to Bidders issued by Owner, and delivered as follows:

1. Bid Date: June 28, 2021
2. Bid Time: 2:00 p.m., local time.
3. Location: Tribal Office, 941 Hualapai Way, Peach Springs, Arizona 86434.

B. Bids will be thereafter opened in the presence of the bidders and read aloud.

1.3 BID SECURITY

A. Bid security shall be submitted with each bid in the amount of 5 percent of the bid amount. No bids may be withdrawn for a period of 60 days after opening of bids. Owner reserves the right to reject any and all bids and to waive informalities and irregularities.

1.4 PREBID CONFERENCE

A. A prebid conference for all bidders will be held at Hualapai Health Education and Wellness Center, 488 West Hualapai Way, Peach Springs, Arizona on June 3, 2021 at 10:00 a.m., local time. Prospective bidders are requested to attend.

1.5 DOCUMENTS

A. Printed Procurement and Contracting Documents: Obtain after <**Insert date**> by contacting <**Insert Owner, Architect, or reprographic house address**>. Documents will be provided to prime bidders only; only complete sets of documents will be issued.

1. Deposit: [**$100.00**] <**Insert amount**>.
2. Shipping: Additional shipping charges of <**Insert amount**> will apply.

B. Online Procurement and Contracting Documents: Obtain access after <**Insert date**> by contacting <**Insert Owner, Architect, or reprographic house address**>. Online access will be provided to [**prime bidders only**] [**all registered bidders and suppliers**].

1.6 TIME OF COMPLETION AND LIQUIDATED DAMAGES

A. Bidders shall begin the Work on receipt of the Notice to Proceed and shall complete the Work within the Contract Time. Work is subject to liquidated damages.

1.7 BIDDER'S QUALIFICATIONS

A. Bidders must be properly licensed under the laws governing their respective trades and be able to obtain insurance and bonds required for the Work.[**A Performance Bond, a separate Labor and Material Payment Bond, and Insurance in a form acceptable to Owner will be required of the successful Bidder.**]

1.8 GOVERNING LAW

A. This contract shall be governed by the laws of the Hualapai Indian Tribe, and all disputes arising under the contract shall be decided exclusively in the Hualapai Indian Tribe's Court System.

B. Nothing contained in the contract shall diminish the sovereign rights or immunities of the Hualapai Indian Tribe, except to the extent that the contract may be enforced in Tribal Court (but only for declaratory and injunctive relief, and not for monetary damages).

1.9 TRIBAL EMPLOYMENT RIGHTS OFFICE (TERO)

A. This construction project is subject to a Tribal Employment Rights Office (TERO) tax of 5% of the total Contract Price as stated in the Construction Contract and any Addendums or Change Orders thereto.

B. A total of 5% of the total Construction amount, including labor, materials overhead and general conditions is to be paid to the Hualapai Indian Tribe and shall be transferred into the TERO fund prior to issuance of the Notice to Proceed.

C. Each change order increasing the Construction Cost, as applicable, will require payment of 1% of the total amount of the change order into the TERO fund.

D. TERO Information includes the Hualapai TERO compliance documents for the Contractor's familiarization.

E. For questions regarding TERO following the bid process, and to obtain listings of available construction personnel, contact:
   1. Mr. Bobby Havatone Hualapai TERO Officer; P.O. Box 179; Peach Springs, AZ 86434 (928) 769-2216.

1.10 TRIBAL MATERIALS AND RATES (TERO)

A. Contractors can purchase water at the rate of $30.00 per 1,000 gallons.

B. Campsite permits will be purchased by contractors the through the Hualapai Game and Fish Department. This is applicable only to unpopulated areas of the Reservation.

C. Off-site land for additional storage is available at a rate of $500.00 per month.

1.11 TAXES

A. General. Other than TERO taxes, the Hualapai Indian Tribe does not assess any other taxes, including sales taxes.
   1. No State Taxes.Arizona Transaction Privilege Tax Ruling TPR 95-11 provides that: "The gross proceeds derived from construction projects performed on Indian reservations by non-affiliated Indian or non-Indian prime contractors are not subject to the imposition of Arizona transaction privilege tax under the following conditions:
      a. The activity is performed for the tribe or a tribal entity for which the reservation was established; or
      b. The activity is performed for an individual Indian who is a member of the tribe for which the reservation was established."

B. This Hualapai Indian Tribe's Emergency Operation Center Project is being constructed for the Hualapai Indian Tribe on-Reservation solely for the benefit of the Hualapai Indian Tribe. Arizona Transaction Privilege Tax does not apply.

C. See attached for Ordinance (April 2019).

1.12 INDIAN PREFERENCE HIRING

A. The Contractor and each of his or her subcontractors shall give preference in all hiring to Indians as required by the Indian preference section of this Contract.

B. Upon initial hiring and whenever a job opening occurs thereafter, the contractor and each subcontractor shall give written notice of such opening to the Owner stating the time when, and the local place where, job applications will be accepted. Except in cases of an emergency, no one other than a qualified Indian shall be hired for any job until 48 hours (not counting Sundays and holidays) following the notice to the Owner.

C. The Contractor shall have the right to reject any job applications for a valid reason, or to terminate the employment of any Indian for appropriate reasons, but in either event, the contractor shall, within three days, send a written statement of the reasons for such action to the Owner.

1.13 INTEREST OF MEMBERS OF CONGRESS

A. No member, officer, or employee of the Owner, no member of America or resident commissioner shall be admitted to any share or part of this Contract or to any benefit to arise herefrom, but this provision shall not be construed to extend to this Contract if made with a corporation for its general benefit.

1.14 CONFLICT OF INTEREST

A. No member, officer, or employee of the Owner, no member of the of the governing body of the locality in which the project is situated, no member of the governing body of the locality in which the Owner was activated, and no other public official of such locality or localities which exercises any functions or responsibilities with respect to the project shall, during his or her tenure, or for one year thereafter, have any interest, direct or indirect, in this contract or the proceeds thereof.

1.15 LIQUIDATED DAMAGES

A. If the Contractor fails to complete the work within the time specified in the contract or any extension, the Owner would incur substantial extra costs, and the Contractor shall compensate the Owner $350.00 a day for liquidated damages, as specified in the Default section of this contract. If different completion dates are specified in the contract for separate parts or stages of the work, the amount of liquidated damages shall be assessed on those parts or stages which are delayed. To the extent that the Contractor’s delay or nonperformance is excused under another clause in the contract, liquidated damages shall not be due the Owner. The Contractor remains liable for damages caused other than by delay.

B. If the Owner terminates the Contractor's right to proceed, the resulting damage will consist of liquidated damages until such reasonable time as may be required for final completion of the work together with any increased costs occasioned the Owner in completing the work.

C. If the Owner does not terminate the Contractor's right to proceed, the resulting damage will consist of liquidated damages until the work is completed or accepted.

1.16 INDEMNIFICATION

A. Contractor shall be responsible for any wrongful or negligent acts or omissions performed by him, his employees or his subcontractors associated with his performance under this Contract and agrees to indemnify and hold the Tribe harmless from any liability or damage to person or property that arises from or is related to any such act or omission, including any attorney fees that may be incurred.

1.17 CONFIDENTIALITY

A. Contractor acknowledges that all information related to Contractor's work under this Contract, including all findings, reports, and other information either provided directly or indirectly by the Tribe in connection with the Contract or developed, compiled or created by Contractor in performing his services under this Contract, and all improvements made or conceived by Contractor under this Contract, is confidential and proprietary information owned by, and of great value to, the Tribe. Accordingly, Contractor agrees not to disclose any such confidential information to any person without the prior, written authorization of the Chairman (or his written designee) of the Tribe.

B. Regardless of how or when this Contract is terminated, within five (5) working days of completion of the work under this Contract, Contractor shall deliver to the Tribe all copies (including those on computer disk of other electronic medium) of all documents, drawings, specifications, and other materials or information which were furnished directly or indirectly by the Tribe to Contractor in connection with this Contract or which were prepared or acquired by Contractor in performance of services under this Contract.

C. Contractor shall not use any of the proprietary information described in this paragraph for anyone other than the Tribe's benefit.

1.18 CODE OF CONDUCT

A. Contractor shall comply with the provisions of the "Hualapai Indian Tribe Code of Conduct."

1.19 INTELLECTUAL PROPERTY

A. The title to all work completed by Contractor under or associated with this Contract shall be in the Tribe. Contractor will promptly disclose to the Tribe all inventions, improvements, designs, publications and ideas made or conceived by Contractor in the course of or associated with providing services under this Contract, regardless of whether Contractor develops those inventions, improvements, designs, publications or ideas after the termination on this Contract. Contractor agrees to assign to the Tribe all right and title to all such inventions, improvement, designs, publications and ideas, and all copyrights, patents, and royalties associated with or derived from such ideas.

1.20 RETAINAGE

A. Except as otherwise provided under applicable laws, the Owner will retain ten percent (10%) of the amount of progress payments until completion and acceptance of all work under the contract; except, that if upon completion of 50 percent (50%) of the work, the Project Manager,

after consulting with the Architect and the Contracting Officer, determines that the Contractor's performance and progress are satisfactory, the Owner may reduce the retainage rate to five percent (5%). If the Project Manager subsequently determines that the Contractor's performance and progress are unsatisfactory, the Owner shall reinstate the retainage until such time as the Project Manager determines that performance and progress are satisfactory.

1.21 WARRANTY OF CONSTRUCTION

A. In addition to any other warranties in this Contract, the Contractor warrants, except as provided in paragraph (J) of this clause, that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, or workmanship performed by the Contractor or any subcontractor or supplier at any tier. This warranty shall continue for a period of two years from the date of final acceptance of the work. If the Owner takes possession of any part of the work before final acceptance, this warranty shall continue for a period of two years from the date that the Owner takes full possession.

B. The Contractor shall remedy, at the Contractor's expense, any failure to conform, or any defect. In addition, the Contractor shall remedy, at the Contractor's expense, any damages to Owner-owned or controlled real or personal property when the damage is the result of: (1) The Contractor's failure to conform to contract requirements; or (2) Any defects to equipment, material, workmanship or design furnished by the Contractor.

C. The Contractor shall restore any work damaged in failing the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for two years from the date of repair or replacement.

D. The Project Manager shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect, or damage.

E. If the Contractor fails to remedy any failure, defect or damage within a reasonable time after receipt of notice, the Owner shall have the right to replace, repair or otherwise remedy the failure, defect, or damage at the Contractor's expense.

F. With respect to all warranties, expressed or implied, from subcontractors, manufactures, or suppliers for work performed and material furnished under this contact, the Contractor shall: (1) Obtain all warranties that would be given in normal commercial practice, (2) Require all warranties to be executed in writing for the benefit of the Owner, and (3) Enforce all warranties for the benefit of the Owner.

G. In the event the Contractor's warranty under paragraph (A) of the clause has expired, the Owner may bring suit at its own expense to enforce a subcontractor's, manufacturer's, or supplier's warranty.

H. Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defect or material or design furnished by the Owner nor for the repair of any damage that results from any defect in Owner-furnished material or design.

I. Notwithstanding any provisions herein to the contrary, the establishment of the time periods in paragraphs (A) and (C) above relate only to the specific obligation of the Contractor to correct the work, and have no relationship to the time within which its obligation to comply with the contract may be sought to be enforced, nor to the time within which proceeding may be

commenced to establish the Contractor’s liability with respect to its obligation other than specifically to correct the work.

J. This warranty shall not limit the Owner's rights under the Inspection and Acceptance of Construction section of this contract with respect to latent defects, gross mistakes or fraud.

K. Provide duplicate, notarized copies of documents required in this Section.

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DOCUMENT 00 2113

INSTRUCTIONS TO BIDDERS

1.1 INSTRUCTIONS TO BIDDERS

A. AIA Document A701, "Instructions to Bidders," is hereby incorporated into the Procurement and Contracting Requirements by reference.

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DOCUMENT 002213

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

1.1 INSTRUCTIONS TO BIDDERS

A. Instructions to Bidders for Project consist of the following:

1. AIA Document A701, "Instructions to Bidders."
2. The following Supplementary Instructions to Bidders that modify and add to the requirements of the Instructions to Bidders.

1.2 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS, GENERAL

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

1.3 ARTICLE 1 - DEFINITIONS

A. TERO: Tribal Employment Rights Office.

1.4 ARTICLE 2 - BIDDER'S REPRESENTATIONS

A. Add Section 2.1.3.1:

1. 2.1.3.1 - The Bidder has investigated all required fees, permits, and regulatory requirements of authorities having jurisdiction and has properly included in the submitted bid the cost of such fees, permits, and requirements not otherwise indicated as provided by Owner.

B. Add Section 2.1.5:

1. 2.1.5 - The Bidder is a properly licensed Contractor according to the laws and regulations of Hualapai Tribe and State of Arizona and meets qualifications indicated in the Procurement and Contracting Documents.

C. Add Section 2.1.6:

1. 2.1.6 - The Bidder has incorporated into the Bid adequate sums for work performed by installers whose qualifications meet those indicated in the Procurement and Contracting Documents.

1.5 ARTICLE 3 - BIDDING DOCUMENTS

A. 3.2 - Interpretation or Correction of Procurement and Contracting Documents:

1. Add Section 3.2.2.1:

    a. 3.2.2.1 - Submit Bidder's Requests for Interpretation using form bound in the Project Manual.

B. 3.4 - Addenda:

1. Delete Section 3.4.3 and replace with the following:

    a. 3.4.3 - Addenda may be issued at any time prior to the receipt of bids.

2. Add Section 3.4.4.1:

    a. 3.4.4.1 - Owner may elect to waive the requirement for acknowledging receipt of 3.4.4 Addenda as follows:

        1) 3.4.4.1.1 - Information received as part of the Bid indicates that the Bid, as submitted, reflects modifications to the Procurement and Contracting Documents included in an unacknowledged Addendum.
        2) 3.4.4.1.2 - Modifications to the Procurement and Contracting Documents in an unacknowledged Addendum do not, in the opinion of Owner, affect the Contract Sum or Contract Time.

1.6 ARTICLE 4 - BIDDING PROCEDURES

A. 4.1 - Preparation of Bids:

1. Add Section 4.1.1.1:

    a. 4.1.1.1 - Printable electronic Bid Forms and related documents are available from Construction Manager.

2. Add Section 4.1.8:

    a. 4.1.8 - The Bid shall include unit prices when called for by the Procurement and Contracting Documents. Owner may elect to consider unit prices in the determination of award. Unit prices will be incorporated into the Contract.

3. Add Section 4.1.9:

    a. 4.1.9 - Owner may elect to disqualify a bid due to failure to submit a bid in the form requested, failure to bid requested alternates or unit prices, failure to complete entries in all blanks in the Bid Form, or inclusion by the Bidder of any alternates, conditions, limitations or provisions not called for.

4. Add Section 4.1.10:

    a. 4.1.10 **-** Bids shall include applicable TERO taxes. Contractors shall show separately with each monthly payment application the TERO taxes paid by them and their subcontractors in the form indicated. Reimbursement of TERO taxes, if any, shall be applied for by Owner for the sole benefit of Owner.

B. 4.3 - Submission of Bids:

1. Add Section 4.3.1.2:

a. 4.3.1.2 - Include Bidder's Contractor License Number applicable in Project jurisdiction on the face of the sealed bid envelope.

C. 4.4 - Modification or Withdrawal of Bids:

1. Add the following sections to 4.4.2:

a. 4.4.2.1 - Such modifications to or withdrawal of a bid may only be made by persons authorized to act on behalf of the Bidder. Authorized persons are those so identified in the Bidder's corporate bylaws, specifically empowered by the Bidder's charter or similar legally binding document acceptable to Owner, or by a power of attorney, signed and dated, describing the scope and limitations of the power of attorney. Make such documentation available to Owner at the time of seeking modifications or withdrawal of the Bid.

b. 4.4.2.2 - Owner will consider modifications to a bid written on the sealed bid envelope by authorized persons when such modifications comply with the following: the modification is indicated by a percent or stated amount to be added to or deducted from the Bid; the amount of the Bid itself is not made known by the modification; a signature of the authorized person, along with the time and date of the modification, accompanies the modification. Completion of an unsealed bid form, awaiting final figures from the Bidder, does not require power of attorney due to the evidenced authorization of the Bidder implied by the circumstance of the completion and delivery of the Bid.

D. 4.5 - Break-Out Pricing Bid Supplement:

1. Add Section 4.5:

a. 4.5 - Provide detailed cost breakdowns no later than two business days following Architect's request.

E. 4.6 - Subcontractors, Suppliers, and Manufacturers List Bid Supplement:

1. Add Section 4.6:

a. 4.6 - Provide list of major subcontractors, suppliers, and manufacturers furnishing or installing products on forms provided no later than two business days following Architect's request. Include those subcontractors, suppliers, and manufacturers providing work totaling three percent or more of the Bid amount. Do not change subcontractors, suppliers, and manufacturers from those submitted without approval of Architect.

1.7 ARTICLE 5 - CONSIDERATION OF BIDS

A. 5.2 - Rejection of Bids:

1. Add Section 5.2.1:

a. 5.2.1 - Owner reserves the right to reject a bid based on Owner's and Architect's evaluation of qualification information submitted following opening of bids. Owner's evaluation of the Bidder's qualifications will include: status of licensure and record of compliance with licensing requirements, record of quality of completed work, record of Project completion and ability to complete, record of financial management including financial resources available to complete Project and record of timely payment of obligations, record of Project site management including compliance with requirements of authorities having jurisdiction, record of and number of current claims and disputes and the status of their resolution, and qualifications of the Bidder's proposed Project staff and proposed subcontractors.

The Bidder acknowledges the right of the Owenr to reject any or all bids, to waive any informality or irregularity in any bed received, or to withhold the award for any reason determined to be in the Owner's best interests. In addition, the Bidder recognizes the right of the Owner to reject a bid if the Bidder failed to furnish required bid security, or to submit the data required by the bidding Documents, or if the bid is complete or irregular.

1.8 ARTICLE 6 - POSTBID INFORMATION

A. 6.1 - Contractor's Qualification Statement:

1. Add Section 6.1.1:

a. 6.1.1 - Submit Contractor's Qualification Statement no later than two business days following Architect's request.

B. 6.3 - Submittals:

1. Add Section 6.3.1.4:

a. 6.3.1.4 - Submit information requested in Sections 6.3.1.1, 6.3.1.2, and 6.3.1.3 no later than two business days following Architect's request.

1.9 ARTICLE 7 - PERFORMANCE BOND AND PAYMENT BOND

A. 7.1 - Bond Requirements:

1. Add Section 7.1.1.1:

a. 7.1.1.1 - Both a Performance Bond and a Payment Bond will be required, each in an amount equal to 100 percent of the Contract Sum.

B. 7.2 - Time of Delivery and Form of Bonds:

1. Delete the first sentence of Section 7.2.1 and insert the following:

a. The Bidder shall deliver the required bonds to Owner no later than 10 days after the date of Notice of Intent to Award and no later than the date of execution of the Contract, whichever occurs first. Owner may deem the failure of the Bidder to deliver required bonds within the period of time allowed a default.

2. Delete Section 7.2.3 and insert the following:

    a. 7.2.3 - Bonds shall be executed and be in force on the date of the execution of the Contract.

1.10 ARTICLE 8 - FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

A. <Insert supplementary text>.

1.11 ARTICLE 9 - EXECUTION OF THE CONTRACT

A. Add Article 9:

1. 9.1.1 - Subsequent to the Notice of Intent to Award, and within 10 days after the prescribed Form of Agreement is presented to the Awardee for signature, the Awardee shall execute and deliver the Agreement to Owner through [**Architect**] Construction Manager, in such number of counterparts as Owner may require.
2. 9.1.2 - Owner may deem as a default the failure of the Awardee to execute the Contract and to supply the required bonds when the Agreement is presented for signature within the period of time allowed.
3. 9.1.3 - Unless otherwise indicated in the Procurement and Contracting Documents or the executed Agreement, the date of commencement of the Work shall be the date of the executed Agreement or the date that the Bidder is obligated to deliver the executed Agreement and required bonds to Owner.
4. 9.1.4 - In the event of a default, Owner may declare the amount of the Bid security forfeited and elect to either award the Contract to the next responsible bidder or re-advertise for bids.

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SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

PROJECT: _____

_____

TO (A/E): _____

_____

FROM (CONTRACTOR): _____

DATE: _____

A/E PROJECT NUMBER: _____

CONTRACT FOR: _____

LIST SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS PROPOSED FOR USE ON THIS PROJECT AS REQUIRED BY THE CONSTRUCTION DOCUMENTS. ATTACH SUPPLEMENTAL SHEETS IF NECESSARY.

NUMBER SECTION	SECTION TITLE	FIRM	ADDRESS	PHONE NUMBER	CONTACT

☐ **Attachments**

SIGNED BY: **DATE:**

_____

COPIES: ☐ **Owner** ☐ **Consultants** ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ **File**

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DOCUMENT 003100

AVAILABLE PROJECT INFORMATION

1.1 AVAILABLE PROJECT INFORMATION

A. This Document and its referenced attachments are part of the Procurement and Contracting Requirements for Project. They provide Owner's information for the Bidder's convenience and are intended to supplement rather than serve in lieu of the Bidder's own investigations. They are made available for the Bidder's convenience and information but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.

B. A geotechnical investigation report for the Project, prepared by Engineering & Testing Consultants Inc., dated April 7, 2021, is available for viewing as appended to this Document.

C. Permit Application: Complete building permit application and file with authorities having jurisdiction within five days of the Notice of Award, including the Mohave County Development Services who provide plan review and code inspection services for the Hualapai Tribe.

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ENGINEERING & TESTING CONSULTANTS INC.

April 7, 2021

Stroh Architecture, Inc.
Attn: Mr. Douglas Stroh, NCARB, AIA
1577 Plaza West Drive, Suite B
Prescott, AZ 86303

SUBJECT: GEOTECHNICAL EXPLORATION FOR HUALAPAI EMERGENCY OPERATIONS CENTER, PEACH SPRINGS, AZ

Dear Mr. Stroh:

Engineering & Testing Consultants, Inc., (ETC) has completed our geotechnical exploration for the above referenced project.

The purpose of this exploration is to determine the general subsurface soil conditions at the site, and to present geotechnical engineering recommendations with regard to foundation support, slabs-on-grade, pavement structural section, site grading, drainage, and lateral soil pressures.

PROJECT AND SITE CONDITIONS

The project site is generally located on the southern side of Mesa View Drive, just west of the Hualapai Regional Juvenile Detention Facility.

Site topography is relatively flat to gentle.

We understand the project will include construction of a building, paved parking, and other ancillary features.

We anticipate that the proposed new building will utilize conventional spread footing foundations for support with slab-on-grade construction. ETC has not reviewed building or grading plans for the proposed development.

SUBSURFACE SOIL CONDITIONS

ETC performed two exploratory test borings within the proposed building site. The borings were performed to determine general subsurface soil conditions and to collect soil samples for laboratory analysis. If soil conditions encountered during construction differ from those described herein, this firm should be contacted to review our recommendations made in this report.

The exploratory borings encountered medium dense, Silty Sand and Gravel (SM & GM).

At depths of 12 to 14 inches the two borings medium dense to dense, highly weathered limestone rock.

The limestone rock became less weathered with depth, becoming dense to very dense at approximately 2.5 feet.

Auger refusal on more intact limestone rock was encountered at depths of 3.5 to 3¾ feet in both borings. Excavations at the site will encounter the shallow rock stratum, becoming relatively intact within approximately 3.5 feet of the surface.

A more detailed description of the subsurface conditions encountered by each of the borings is shown on the boring logs included in Appendix A. A Boring Location Map is attached as Fig. 1.

The native soils and weathered rock encountered will provide adequate support for the proposed new structure.

LABORATORY

Atterberg limits, moisture content, and gradation laboratory testing were performed for representative samples of the subsurface soils collected during the field operation. A summary of the laboratory test results is presented below in Table 1. Laboratory testing was performed in accordance with applicable ASTM standards.

As shown in Table 1, the upper soils and highly weathered limestone rock are very low in plasticity, with silty fines. Expansive clayey soils were not encountered at the site.

TABLE 1
SUMMARY OF LABORATORY TEST RESULTS

Boring	Depth (inches)	Liquid Limit (%)	Plasticity Index	Fines Content (%)	Gravel Content (%)	Moisture Content (%)	USCS
B – 1	0" – 14"	26	4	26	52	8.5	GM
	16" – 30"	36	9	20	36	7.1	SM

FOUNDATIONS

ETC recommends all foundations be seated in firm, native soils, and/or weathered rock.

All foundations shall be seated at a minimum embedment depth of **1.5 feet** below lowest, adjacent, finished grade. ETC recommends maximum allowable foundation pressures not exceed **2,500psf** be used for design.

If needed, for foundations seated in the lower, dense to very dense rock, at depths of approximately 2.5 feet below existing grade, an increased allowable foundation pressure of **3,500psf** may be utilized.

The allowable foundation pressures provided may be increased by one-third when considering total loads including wind and seismic forces.

In determining minimum required foundation embedment depth, lowest, adjacent finished grade shall be measured from within 5 feet of the foundations for exterior footings (bottom of adjacent slab/pavement) and may be measured from finish floor elevation for interior footings. Uncontrolled exterior landscaping fill shall not be considered as finished grade.

The cavity above the footings, and between the stem walls and trench sidewalls shall be adequately backfilled and compacted to prevent creating a zone of loose soil directly above footings.

Special attention shall be given to final grades and landscaping improvements to ensure efficient drainage away from foundations, slabs, pavements, and other soil-supported elements of the project.

ETC shall be contacted to observe foundation excavations prior to placement of reinforcing steel or concrete, to verify foundation-bearing soils and footing dimensions are in conformance with our recommendations presented herein.

Footing excavations on sloping ground shall be properly stepped with relatively level bottoms and shall be free of all loose or otherwise unstable soil.

Adequate drainage shall be maintained around structural areas, and positive surface drainage shall be provided to help prevent water migration into the underlying soils within building areas.

SLABS-ON-GRADE

ETC recommends a minimum of **4 inches** of processed aggregate base course in accordance with MAG Specifications, Section 702, be placed between all interior and exterior concrete slabs and the prepared subgrade soil.

A turn-down or thickened edge is also recommended for exterior slabs.

Subgrade soils shall be moisture conditioned and compacted to the specifications herein prior to placement of engineered fill and/or ABC.

Additional Considerations

Although not required for slab support, consideration should be given to installation of a vapor retarder below concrete floor slabs, due to the shallow depth of rock in the area. This would help mitigate the amount of water vapor migration into interior spaces, especially if moisture sensitive floor coverings will be used. Concrete slabs-on-grade should be allowed to cure sufficiently before installing moisture sensitive floor coverings. *If a vapor retarder will be used, an appropriate concrete mix design will be required for placement above polyethylene.*

ETC recommends the American Concrete Institute (ACI) be used as a reference for placement, curing, and finishing of Portland cement concrete (PCC). Concrete should be placed at the appropriate slump determined by mix design, required strength, and application. After placement, concrete should be cured properly and special attention shall be given to ensure adequate moisture is present during the initial curing process to prevent/reduce shrinkage and stress cracks.

The concrete slab should be properly jointed, with maximum joint spacing of 24 to 36 times the slab thickness, unless noted otherwise. Any required saw cutting should be performed to an appropriate depth and in a timely manner, typically within 12 hours of concrete finishing.

It should be noted that for exterior concrete, that the use of deicing salt within the first year of concrete placement can cause damage to the concrete surface. This can be avoided by using 4,500psi concrete with a water/cement ratio of 0.45.

DRAINAGE

Positive drainage is critical to the successful performance of any foundation or slab system. Excess moisture infiltration into foundation soils is often the primary cause of soil-related problems below structures. Efficient surface and subsurface drainage should be established prior to and maintained during and after construction to prevent water from ponding and/or saturating the soils within or adjacent to foundations, pavements, and slabs.

Special attention shall be given to providing for efficient surface drainage around the perimeter of the buildings. The design should divert water away from where it could penetrate the ground, particularly if granular fills are used. Care should be taken in design and construction to assure that water is contained to prevent seepage into the underlying soils.

ETC recommends that vegetation not be planted within 5 feet of building, and trees not within 15 feet, or the mature foliage radius.

Backfill against footings, exterior walls, and in utility trenches should be compacted to reduce the possibility of moisture infiltration through loose soil. Roof water downpipes shall not discharge stormwater adjacent to foundations.

In exterior areas where concrete slabs or pavement are not located against the building, ETC recommends the ground surface be sloped away from the building at a grade of at least 10 percent, within 5 feet of the building.

Special attention should be given to exterior grading and landscaping improvements to ensure efficient drainage away from footings, slabs, and pavements. Minimizing irrigation water near the building, positive drainage of surface water away from the building, and adequate compaction of soils around site structures, and in utility trenches is very important for the long-term stability of slabs and foundations.

PAVEMENT DESIGN

Site grading for pavement areas should be as outlined herein to provide subgrade support for the pavement structure. ETC recommends the pavement structural sections as described in Table 2 for the proposed development.

TABLE 2
PAVEMENT STRUCTURAL SECTIONS

Description	Asphaltic Concrete Thickness (inches)	Aggregate Base Thickness (inches)	Prepared Subgrade Thickness (inches)
Automobile/Light Truck Access & Parking	3	6	8

The recommended pavement sections provided in Table 2 are expected to function with periodic maintenance or overlays when the subgrade, base, and pavement are constructed in accordance with accepted Construction Standards. Efficient surface water drainage must be provided and maintained to help prevent moisture infiltration into the subgrade.

Prior to placement of aggregate base material, the exposed subgrade shall be proof-rolled to confirm stable subgrade soils.

EARTHWORK

Any existing stockpiles shall be completely removed from structural areas during the initial grading phase.

The areas where fill is required must be stripped of all vegetation, debris, loose, wet, or otherwise unstable soils and such material should be removed. Depressions and sloped ground should be widened or benched as necessary to accommodate compaction equipment and provide a level base for placing fill.

The exposed ground surface shall be scarified, moisture conditioned, and compacted to a minimum depth of 8 inches prior to fill placement, to the specifications herein. Special attention shall be given to ensure adequate moisture is present throughout the entire 8-inch depth.

It is ETC's intention that the on-site soils be used for general site grading and for engineered fill, as needed, provided that any over-sized rock pieces and debris/vegetation are removed.

It should be noted that the fine silty soils encountered can be difficult to work with to achieve proper compaction. Silt soils and fine sands generally have a narrow range of moisture contents for adequate workability and compaction. Excess moisture will cause the soil to "pump" too much and too little moisture will not allow for adequate compaction. However, during compaction, the soil may exhibit some "pumping" even at optimum moisture contents.

Engineered fill material shall be used for fill inside of stem walls, and for backfill behind retaining walls. Engineered fill, where required, shall be clean, granular soil free of vegetation, debris, organic soil, and shall conform to the following requirements, as approved by the engineer:

- 100 percent passing 4" sieve;
- 3 to 36 percent passing No. 200 sieve;
- 30 to 97 percent passing No. 4 sieve;
- Maximum Plasticity Index (PI) of 15;
- Maximum expansion index of 20.

All subbase fill required to bring the structured areas up to subgrade elevation should be placed in horizontal lifts not exceeding 8 inches compacted thickness.

All granular soils within and adjacent to buildings, slabs, foundations, and pavement areas, and backfill in utility trenches, behind retaining walls, above foundations, and against the outside of building walls shall be compacted to a minimum relative density of 95% of maximum dry density at –2% to +2% of optimum moisture content, ASTM D698.

ETC recommends the observation of the site grading operation with sufficient tests to verify proper compaction.

Constructed Slopes

All fill slopes and soil cut slopes shall be constructed at a maximum slope angle of 2:1 (horizontal: vertical). Soil in the top of cut slopes should be rounded back from the slope face to create a gradual transition to natural grade.

ETC recommends a minimum building setback distance of 5 feet from the top of any adjacent fill slope.

Water shall be intercepted and prevented from flowing down the face of any significant slope, with the use of brow ditches above any significant cut slopes, and swales above any significant fill slopes.

LATERAL DESIGN PARAMETERS

ETC recommends the following parameters be used for design of retaining structures. Wall foundations shall be constructed in accordance with the foundation recommendations herein.

Retaining wall backfill shall consist of granular, non-expansive, engineered fill, as specified herein. Retaining walls shall be waterproofed prior to being backfilled against, and drains shall be installed to help prevent saturation of wall backfill.

[1] Foundation Toe Pressure:	1.33 x allowable bearing pressure
[2] Lateral Backfill Pressure	
unrestrained walls:	36 psf/foot
restrained walls:	57 psf/foot
Lateral Passive Pressures	
firm native/compacted soils:	370 psf/foot
Coefficient of Base Friction	
firm native:	0.37

[1] Increase in allowable foundation bearing pressure (provided herein) for foundation toe pressure due to eccentric or lateral trapezoidal loading. The entire footing-bearing surface should remain in compression.

[2] Equivalent fluid pressures for vertical walls and horizontal backfill surfaces (maximum 12-foot height). Pressures do not include temporary forces imposed during compaction of the backfill, swelling pressures developed by overcompacted clayey backfill, hydrostatic pressures from inundation or saturation of backfill, or surcharge loads. Walls should be suitably braced during backfilling to prevent damage and deflection.

When calculating the stability of the wall against sliding, independent of passive resistance, ETC recommends the factor of safety be 1.5 minimum. When calculating the stability of the wall against sliding, in conjunction with the passive pressure, ETC recommends the factor of safety be 2.0 minimum.

LIMITATIONS

The figures and recommendations in this report were prepared in accordance with accepted professional engineering principles and soil mechanics practices. We make no other warranty, either implied or expressed. If during subsequent planning and construction, conditions are different than as indicated, this firm should be notified for evaluation.

We like to inform our clients that Portland cement concrete is not a perfect construction material. Due to the characteristics of Portland cement itself, cracking of the concrete may occur. Cracking will be minimized, but not eliminated, by providing appropriate control, isolation, construction joints, and quality control testing. Drying and thermal shrinkage of the slabs with resultant hairline cracking or curling may occur even if the slabs are cured under optimum curing conditions. In short, there is no practical method of insuring that all floor cracking is eliminated utilizing slab-on-grade construction at the site.

This report is not a bidding document. Any contractor reviewing this report must draw his own conclusions regarding site conditions and specific construction techniques to be used on this project. ETC has not reviewed building or grading plans for the proposed construction.

For your use. The statements herein do not constitute a guarantee or warranty. If you have any questions, please contact us at (928) 778-9001.

Sincerely,

ENGINEERING & TESTING CONSULTANTS, INC.

Michael P. Wilson, P.E.
Project Engineer

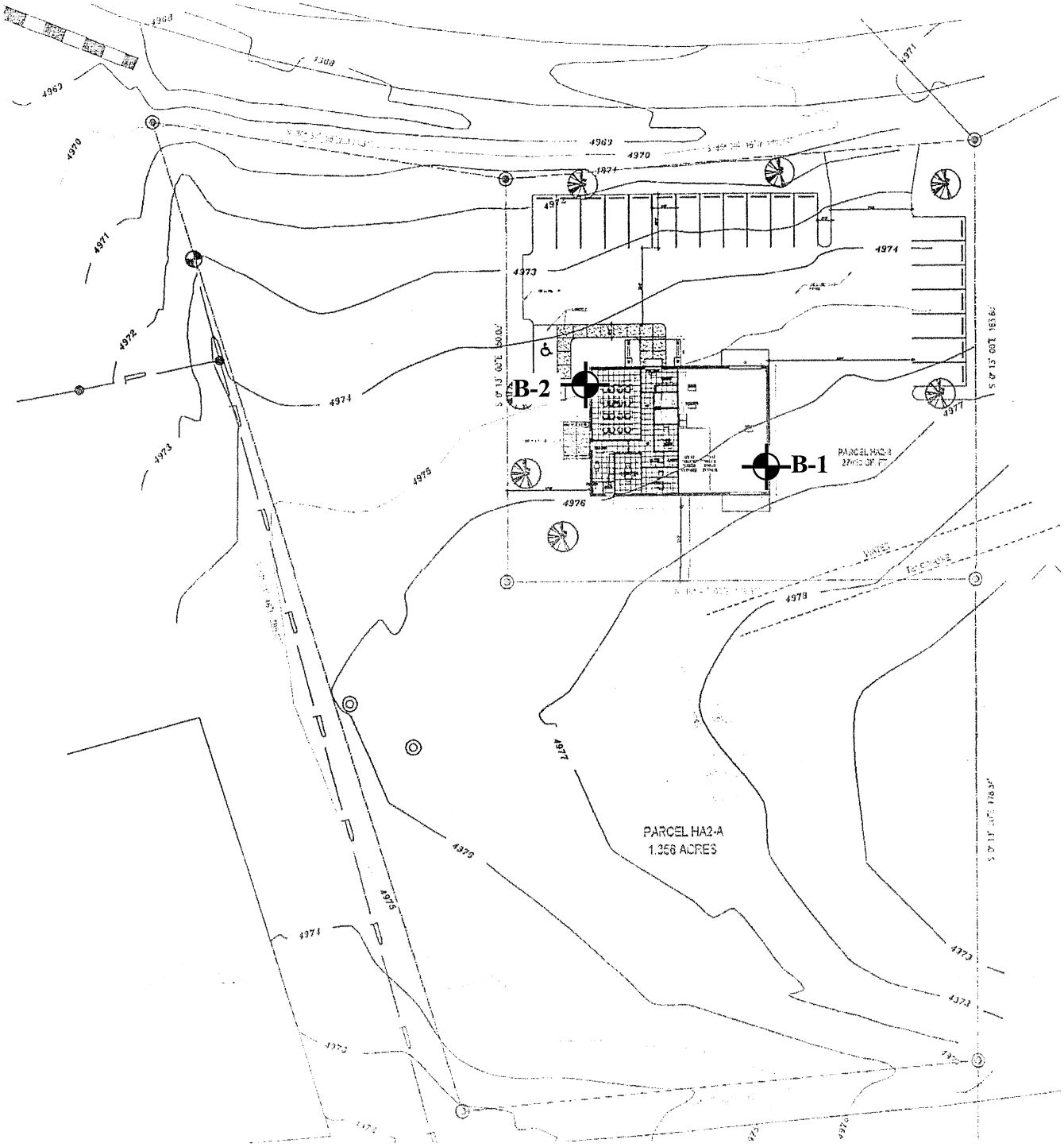
Reviewed by: Richard G. Kelley, P.E.
Project Manager

Attachments: Figure 1 & Appendix A

cc: ETC File No. 11212

APPENDIX A

FIELD EXPLORATION



Legend

Approximate Boring Location

N

Engineering & Testing Consultants, Inc. •Subsurface Drilling •Geotechnical •Environmental Support	**FIGURE 1** **BORING LOCATION MAP**	
Drawn by: others Date: 03/25/21 Project No: ETC 11212 Page No:	Hualapai Emergency Operations Center Peach Springs, AZ	ETC

GENERAL NOTES

DESCRIPTIVE SOIL CLASSIFICATION:

Soil Classification is based on the Unified Soil Classification System and ASTM Designations D-2487 and D-2488. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; they are described as: boulders, cobbles, gravel or sand. Fine grained soils have less than 50% of their dry weight retained on a #200 sieve; they are described as: Clays, if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse grained soils are defined on the basis of their relative in-place density and fine grained soils on the basis of their consistency. Example: Lean clay with sand, trace gravel, stiff (CL); silty sand, trace gravel, medium dense (SM).

CONSISTENCY OF FINE-GRAINED SOILS:

N-Blows/ft.	Consistency
0-2	Very Soft
3-4	Soft
5-8	Medium
9-16	Stiff
17-32	Very Stiff
33+	Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS:

N-Blows/ft.	Relative Density
0-3	Very Loose
4-9	Loose
10-29	Medium Dense
30-49	Dense
50+	Very Dense

RELATIVE PROPORTIONS OF SAND AND GRAVEL:

Description Term(s) (of Components Also Present in Sampling)	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY:

Major Component of Sampling	Size Range
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES:

Description Term(s) (of Components Also Present in Sampling)	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

UNIFIED SOIL CLASSIFICATION SYSTEM*

				Soil Classification	
				Group Symbol	Group Name [B]
COARSE-GRAINED SOILS More than 50 % retained on No. 200 sieve	Gravels More than 50 % of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5 % fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]	GW	Well-graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [E]	GP	Poorly graded gravel [F]
		Gravels with Fines More than 12 % fines [C]	Fines classify as ML or MH	GM	Silty gravel [F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel [F,G,H]
	Sands 50 % or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5 % fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]	SW	Well-graded sand [I]
			$Cu < 6$ and/or $1 > Cc > 3$ [E]	SP	Poorly graded sand [I]
		Sands with Fines More than 12 % fines [D]	Fines classify as ML or MH	SM	Silty sand [G,H,I]
			Fines classify as CL or CH	SC	Clayey sand [G,H,I]
FINE-GRAINED SOILS 50 % or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	PI > 7 and plots on or above "A" line [J]	CL	Lean clay [K,L,M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K,L,M]
		organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OL	Organic clay [K,L,M,N] / Organic silt [K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay [K,L,M]
			PI plots below "A" line	MH	Elastic silt [K,L,M]
		organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OH	Organic clay [K,L,M,P] / Organic silt [K,L,M,Q]
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12 % fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay

[D] Sands with 5 to 12 % fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15 % sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15 % gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29 % plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30 % plus No. 200, predominantly sand, add "sandy" to group name.

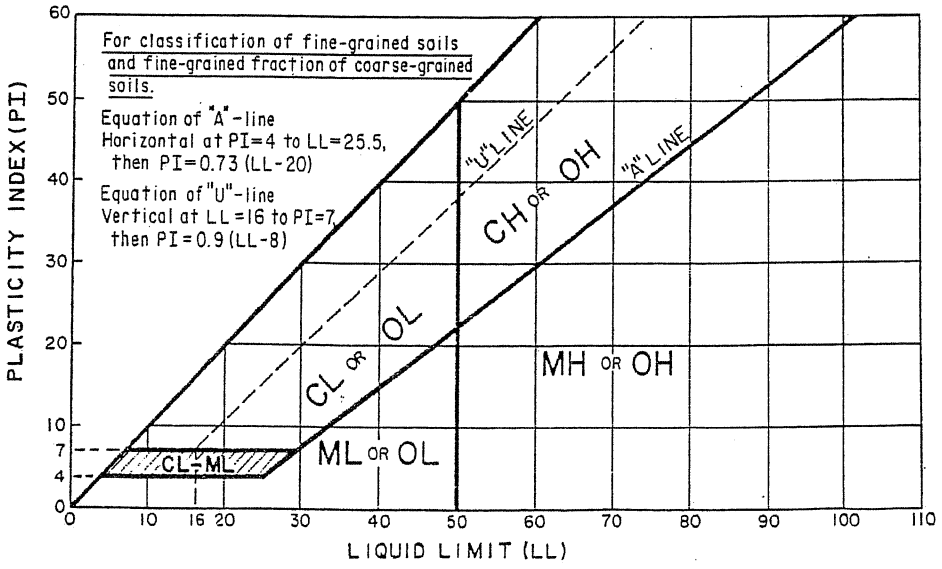
[M] If soil contains ≥ 30 % plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



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Page No: A-3

KEY TO CLASSIFICATION
(Unified Soil Classification System)

TERMS & SYMBOLS

LOG OF BORING NO. B-1

ENGINEERING & TESTING CONSULTANTS, INC.

PROJECT: Hualapai EOC | **PROJECT NO.:** 11212
CLIENT: Stroh Architecture | **DATE:** 3-25-2021
LOCATION: See Boring Location Map | **ELEVATION:** ---
DRILLER: ETC | **LOGGED BY:** J. Jones
DRILLING METHOD: Continuous flight auger

DEPTH (feet)	Description	GROUP SYMBOL	SOIL TYPE	SAMPLERS	TEST RESULTS (Plastic Limit ⊢—⊣ Liquid Limit; Water Content - ●; Penetration - ▨; 10 20 30 40 50)	Remarks
	SILTY GRAVEL WITH SAND, brown, Medium Dense	GM				4" loose topsoil
1						SPT=8/42/
	LIMESTONE, Highly Weathered, Medium Dense to Dense	ROCK				
2						
	Moderately to Highly Weathered, Dense to Very Dense					
3						
	Auger refusal on lightly weathered to intact limestone at 3.5 feet depth.					ROCK REFUSAL
4						
5						
6						
7						

LOG OF BORING NO. B-2

ENGINEERING & TESTING CONSULTANTS, INC.

PROJECT: Hualapai EOC **PROJECT NO.:** 11212
CLIENT: Stroh Architecture **DATE:** 3-25-2021
LOCATION: See Boring Location Map **ELEVATION:** ---
DRILLER: ETC **LOGGED BY:** J. Jones
DRILLING METHOD: Continuous flight auger

DEPTH (feet)	Description	GROUP SYMBOL	SOIL TYPE	SAMPLERS	TEST RESULTS (Plastic Limit ⊢ Liquid Limit; Water Content - ●; Penetration - ▨; 10 20 30 40 50)	Remarks
	SILTY GRAVEL WITH SAND, brown, Medium Dense	GM				4" loose topsoil
1						
	LIMESTONE, Highly Weathered, Medium Dense to Dense	ROCK				
2						
	Moderately to Highly Weathered, Dense to Very Dense					
3						
	Auger refusal on lightly weathered to intact limestone at 3-3/4 feet depth.					ROCK REFUSAL
4						
5						
6						
7						

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

KEY TO SYMBOLS

Symbol Description

Strata symbols

 Silty gravel

 Weatherd rock

Soil Samplers

 Bulk sample taken from 4 in. auger

 Standard penetration test

Notes:

1. Exploratory borings were drilled on 3-25-2021 using a 4-inch diameter continuous flight power auger.

2. No free water was observed at the time of drilling.

3. Boring locations were estimated from existing site features using a preliminary site plan.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.

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DOCUMENT 00 4113

BID FORM - STIPULATED SUM (SINGLE-PRIME CONTRACT)

1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: Emergency Operations Center.

C. Project Location: Peach Springs, Arizona.

D. Owner: Hualapai Tribe.

E. Project Manager: Kenew, LLC, 17505 North 79th Avenue, Suite 205-C, Glendale, Arizona 85308:

1. Contact: Chad Hafstrom, Project and Construction Management; 623-225-3321; chadh@kenewllc.com

F. Architect: Stroh Architecture, Inc., 1577 Plaza West Drive, Suite B, Prescott, Arizona 86303:

1. Contact: William X Waldrom, Project Architect; 928-771-0548; william@strohharchitectureinc.com ..

G. Architect Project Number: 21002.

1.2 CERTIFICATIONS AND BASE BID

A. Base Bid, Single-Prime (All Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by Stroh Architecture, Inc. and Architect's consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:

1. _____ Dollars ($_____).

2. The above amount may be modified by amounts indicated by the Bidder on the attached Document 004322 "Unit Prices Form" and Document 004323 "Alternates Form."

1.3 BID GUARANTEE

A. The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within 10 days after a written Notice of Award, if offered within 60 days after receipt of bids, and on failure to do so agrees to forfeit to Owner the attached cash,

cashier's check, certified check, U.S. money order, or bid bond, as liquidated damages for such failure, in the following amount constituting five percent (5%) of the Base Bid amount above:

1. _____ Dollars ($_____).

B. In the event Owner does not offer Notice of Award within the time limits stated above, Owner will return to the undersigned the cash, cashier's check, certified check, U.S. money order, or bid bond.

1.4 SUBCONTRACTORS AND SUPPLIERS

A. The following companies shall execute subcontracts for the portions of the Work indicated:

1. Site Work: _____ _____.
2. Utility Work: _____ _____.
3. Concrete Work: _____.
4. Pre-Engineer Metal Buildign Work: _____.
5. Roofing Work: _____.
6. Plumbing Work: _____.
7. HVAC Work: _____.
8. Electrical Work: _____.

1.5 TIME OF COMPLETION

A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Architect, and shall fully complete the Work within 150 calendar days.

1.6 ACKNOWLEDGEMENT OF ADDENDA

A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

1. Addendum No. 1, dated _____.
2. Addendum No. 2, dated _____.
3. Addendum No. 3, dated _____.
4. Addendum No. 4, dated _____.

1.7 BID SUPPLEMENTS

A. The following supplements are a part of this Bid Form and are attached hereto.

1. Bid Form Supplement - Alternates.

2. Bid Form Supplement - Unit Prices.

3. Bid Form Supplement - Allowances.

4. Bid Form Supplement - Bid Bond Form (AIA Document A310).

5. Schedule of Values.

6. Non-Collusive Affidavit.

7. TERO Compliance Form.

1.8 CONTRACTOR'S LICENSE

A. The undersigned further states that it is a duly licensed contractor, for the type of work proposed, in Hualapai Tribe and State of Arizona, and that all fees, permits, etc., pursuant to submitting this proposal have been paid in full.

1.9 SUBMISSION OF BID

A. Respectfully submitted this ____ day of _____, 2021.

B. Submitted By:_____(Name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title:_____(Owner/Partner/President/Vice President).

F. Witness By:_____(Handwritten signature).

G. Attest:_____(Handwritten signature).

H. By:_____(Type or print name).

I. Title:_____(Corporate Secretary or Assistant Secretary).

J. Street Address:_____.

K. City, State, Zip:_____.

L. Phone:_____.

M. License No.:_____.

N. Federal ID No.:_____(Affix Corporate Seal Here).

END OF DOCUMENT

DOCUMENT 00 4313

BID SECURITY FORMS

1.1 BID FORM SUPPLEMENT

A. A completed bid bond form is required to be attached to the Bid Form.

1.2 BID BOND FORM

A. AIA Document A310, "Bid Bond," is the recommended form for a bid bond. A bid bond acceptable to Owner, or other bid security as described in the Instructions to Bidders, is required to be attached to the Bid Form as a supplement.

B. Copies of AIA standard forms may be obtained from The American Institute of Architects; www.aia.org/contractdocs/purchase/index.htm; email: docspurchases@aia.org; (800) 942-7732.

END OF DOCUMENT

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DOCUMENT 004321

ALLOWANCE FORM

1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: Emergency Operations Center.

C. Project Location: Peach Springs, Arizona.

D. Owner: Hualapai Tribe.

E. Project Manager: Kenew, LLC, 17505 North 79th Avenue, Suite 205-C, Glendale, Arizona 85308:

1. Contact: Chad Hafstrom, Project and Construction Management; 623-225-3321; chadh@kenewllc.com

F. Architect: Stroh Architecture, Inc., 1577 Plaza West Drive, Suite B, Prescott, Arizona 86303:

1. Contact: William X Waldrom, Project Architect; 928-771-0548; william@stroharchitectureinc.com ..

G. Architect Project Number: 21002.

1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

B. The undersigned Bidder certifies that Base Bid submission to which this Bid Supplement is attached includes those allowances described in the Contract Documents and scheduled in Section 01 2100 "Allowances."

1.3 SUBMISSION OF BID SUPPLEMENT

A. Respectfully submitted this ____ day of _____, 2021.

B. Submitted By:_____(Insert name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title:_____(Owner/Partner/President/Vice President).

END OF DOCUMENT

DOCUMENT 004322

UNIT PRICES FORM

1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: Emergency Operations Center.

C. Project Location: Peach Springs, Arizona.

D. Owner: Hualapai Tribe.

E. Project Manager: Kenew, LLC, 17505 North 79th Avenue, Suite 205-C, Glendale, Arizona 85308:

1. Contact: Chad Hafstrom, Project and Construction Management; 623-225-3321; chadh@kenewllc.com

F. Architect: Stroh Architecture, Inc., 1577 Plaza West Drive, Suite B, Prescott, Arizona 86303:

1. Contact: William X Waldrom, Project Architect; 928-771-0548; william@strohharchitectureinc.com ..

G. Architect Project Number: 21002.

1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

B. The undersigned Bidder proposes the amounts below be added to or deducted from the Contract Sum on performance and measurement of the individual items of Work and for adjustment of the quantity given in the Unit-Price Allowance for the actual measurement of individual items of the Work.

C. If the unit price does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."

1.3 UNIT PRICES (AS DESCRIBED IN SECTION 012000 PRICE AND PAYMENT PROCEDURES)

A. Unit-Price No. 1: Removal of unsatisfactory soil and replacement with satisfactory soil material.

1. _____ Dollars ($_____) per unit.

B. Unit-Price No. 2: Moisture Vapor Emission Control Unit Price according to Section 090561.13 " Moisture Vapor Emission Control.".

1. _____ Dollars ($_____) per unit.

1.4 SUBMISSION OF BID SUPPLEMENT

A. Respectfully submitted this ____ day of _____, 2021.

B. Submitted By:_____(Insert name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title:_____(Owner/Partner/President/Vice President).

END OF DOCUMENT

DOCUMENT 00 4323

ALTERNATES FORM

1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: Emergency Operations Center.

C. Project Location: Peach Springs, Arizona.

D. Owner: Hualapai Tribe.

E. Project Manager: Kenew, LLC, 17505 North 79th Avenue, Suite 205-C, Glendale, Arizona 85308:

1. Contact: Chad Hafstrom, Project and Construction Management; 623-225-3321; chadh@kenewllc.com

F. Architect: Stroh Architecture, Inc., 1577 Plaza West Drive, Suite B, Prescott, Arizona 86303:

1. Contact: William X Waldrom, Project Architect; 928-771-0548; william@strohharchitectureinc.com ..

G. Architect Project Number: 21002.

1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

1.3 DESCRIPTION

A. The undersigned Bidder proposes the amount below be added to or deducted from the Base Bid if particular alternates are accepted by Owner. Amounts listed for each alternate include costs of related coordination, modification, or adjustment.

1. Cost-Plus-Fee Contract: Alternate price given below includes adjustment to Contractor's Fee.

B. If the alternate does not affect the Contract Sum, the Bidder shall indicate "NO CHANGE."

C. If the alternate does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."

D. The Bidder shall be responsible for determining from the Contract Documents the affects of each alternate on the Contract Time and the Contract Sum.

E. Owner reserves the right to accept or reject any alternate, in any order, and to award or amend the Contract accordingly within 60 days of the Notice of Award unless otherwise indicated in the Contract Documents.

F. Acceptance or non-acceptance of any alternates by the Owner shall have no affect on the Contract Time unless the "Schedule of Alternates" Article below provides a formatted space for the adjustment of the Contract Time.

1.4 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Entry Canopy:

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.
2. _____ Dollars ($_____).
3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

B. Alternate No. 2: Patio Canopy:

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.
2. _____ Dollars ($_____).
3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

C. Alternate No. 3: Fire Sprinkler System including providing design and installation of complete system starting from the pipe flange in the Riser Room:

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.
2. _____ Dollars ($_____).
3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

D. Alternate No. 4: Deisel Emergency Generator:

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.
2. _____ Dollars ($_____).
3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

E. Alternate No. 5: Walk-in Cooler and Freezer:

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.
2. _____ Dollars ($_____).
3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

F. Alternate No. 6: Entry Floor Mat:

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.
2. _____ Dollars ($_____).
3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

1.5 SUBMISSION OF BID SUPPLEMENT

A. Respectfully submitted this ____ day of _____, 2021.

B. Submitted By:_____(Insert name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title:_____(Owner/Partner/President/Vice President).

END OF DOCUMENT

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DOCUMENT 004373

PROPOSED SCHEDULE OF VALUES FORM

1.1 BID FORM SUPPLEMENT

A. A completed Proposed Schedule of Values form is required to be attached to the Bid Form.

1.2 PROPOSED SCHEDULE OF VALUES FORM

A. Proposed Schedule of Values Form: Provide a breakdown of the bid amount, including alternates, in enough detail to facilitate continued evaluation of bid. Coordinate with the Project Manual table of contents. Provide multiple line items for principal material and subcontract amounts in excess of five percent of the Contract Sum.

B. Arrange schedule of values using AIA Document G703-1992.

1. Copies of AIA standard forms may be obtained from the American Institute of Architects; https://www.aiacontracts.org/ library; (800) 942-7732.

END OF DOCUMENT

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DOCUMENT 00 4393

BID SUBMITTAL CHECKLIST

1.1 BID INFORMATION

A. Bidder: _____.

B. Project Location: Peach Springs, Arizona.

C. Owner: Hualapai Tribe.

D. Project Manager: Kenew, LLC, 17505 North 79th Avenue, Suite 205-C, Glendale, Arizona 85308:

1. Contact: Chad Hafstrom, Project and Construction Management; 623-225-3321; chadh@kenewllc.com

E. Architect: Stroh Architecture, Inc., 1577 Plaza West Drive, Suite B, Prescott, Arizona 86303:

1. Contact: William X Waldrom, Project Architect; 928-771-0548; william@strohharchitectureinc.com ..

F. Architect Project Number: 21002.

1.2 BIDDER'S CHECKLIST

A. In an effort to assist the Bidder in properly completing all documentation required, the following checklist is provided for the Bidder's convenience. The Bidder is solely responsible for verifying compliance with bid submittal requirements.

B. Attach this completed checklist to the outside of the Submittal envelope.

1. Used the Bid Form provided in the Project Manual.
2. Prepared the Bid Form as required by the Instructions to Bidders.
3. Indicated on the Bid Form the Addenda received.
4. Attached to the Bid Form: Bid Supplement Form - Allowances.
5. Attached to the Bid Form: Bid Supplement Form - Unit Prices.
6. Attached to the Bid Form: Bid Supplement Form - Alternates.
7. Attached to the Bid Form: Proposed Schedule of Values Form.
8. Attached to the Bid Form: Bid Bond OR a certified check for the amount required.
9. Bid envelope shows name and address of the Bidder.
10. Bid envelope shows the Bidder's Contractor's License Number.
11. Bid envelope shows name of Project being bid.
12. Bid envelope shows name of Prime Contract being bid, if applicable.
13. Bid envelope shows time and day of Bid Opening.
14. Verified that the Bidder can provide executed Performance Bond and Labor and Material Bond.
15. Verified that the Bidder can provide Certificates of Insurance in the amounts indicated.

END OF DOCUMENT

DOCUMENT 00 5100

NOTICE OF AWARD

1.1 BID INFORMATION

A. Bidder: <Insert successful bidder name>.

B. Bidder's Address: <Insert street address, city, state, zip, and telephone>.

A. Project Location: Peach Springs, Arizona.

B. Owner: Hualapai Tribe.

C. Project Manager: Kenew, LLC, 17505 North 79th Avenue, Suite 205-C, Glendale, Arizona 85308:

1. Contact: Chad Hafstrom, Project and Construction Management; 623-225-3321; chadh@kenewllc.com

D. Architect: Stroh Architecture, Inc., 1577 Plaza West Drive, Suite B, Prescott, Arizona 86303:

1. Contact: William X Waldrom, Project Architect; 928-771-0548; william@strohharchitectureinc.com ..

E. Architect Project Number: 21002.

1.2 NOTICE OF INTENT TO AWARD AND AWARD OF CONTRACT

A. Owner may provide Notice of Intent to Award when Council schedules the bid award for consideration at a regula council meetin and then Notice of Award after council votes to award.

B. Notice: The above Bidder is hereby notified that their bid, dated <**Insert date**>, for the above Contract has been considered and the Bidder is hereby awarded a contract for <**Insert brief description of Work or sections of Work awarded**>.

C. Alternates Accepted: The following alternates have been accepted by Owner and have been incorporated in the Contract Sum:

1. Alternate No. 1: <**Insert alternate title**>.
2. Alternate No. 2: <**Insert alternate title**>.

D. Contract Sum: The Contract Sum is <**Insert written amount**> dollars ($<**Insert numeric amount**>).

1.3 EXECUTION OF CONTRACT

A. Contract Documents: Copies of the Contract Documents will be made available to the Bidder immediately. The Bidder must comply with the following conditions precedent within 10 days of the above date of issuance of the Notice:

1. Deliver to Owner three sets of fully executed copies of the Contract Documents.
2. Deliver with the executed Contract Documents Bonds and Certificates of Insurance required by the Contract Documents.
3. Contractor to make 50% payment of TERO tax with first invoice and then balance of TERO tax at mid-completion.

B. Compliance: Failure to comply with conditions of this Notice within the time specified will entitle Owner to consider the Bidder in default, annul this Notice, and declare the Bidder's Bid security forfeited.

1. Within 15 days after the Bidder complies with the conditions of this Notice, Owner will return to the Bidder one fully executed copy of the Contract Documents.

1.4 NOTIFICATION

A. This Notice is issued by:

1. Owner:_____.
2. Authorized Signature:_____ _____ (Handwritten signature).
3. Signed By:_____(Type or print name).
4. Title:_____(Owner/Partner/President/Vice President).

END OF DOCUMENT

DOCUMENT 00 6000

PROJECT FORMS

1.1 FORM OF AGREEMENT AND GENERAL CONDITIONS

A. The following form of Owner/Contractor Agreement and form of the General Conditions shall be used for Project:

1. AIA Document A105, "Standard Form of Agreement between Owner and Contractor for a Small Project, Where the Basis of Payment Is a Stipulated Sum."

2. AIA Document A105 is a stand-alone document with its own general conditionsThe General Conditions are part of AIA Document A105 and are incorporated by reference.
3. The Supplementary Conditions for Project are the Hualapai Tribe's conditions are separately prepared and included in the Project Manual.
4. Owner's document(s) bound following this Document.

1.2 ADMINISTRATIVE FORMS

A. Administrative Forms: Additional administrative forms are specified in Division 01 General Requirements Sections.

B. Copies of AIA standard forms may be obtained from the following:

1. The American Institute of Architects: www.aia.org/contractdocs/purchase/index.htm; docspurchases@aia.org; (800) 942-7732.

C. Preconstruction Forms:

1. Form of Performance Bond and Labor and Material Bond: AIA Document A312, "Performance Bond and Payment Bond."
2. Form of Certificate of Insurance: AIA Document G715, "Supplemental Attachment for ACORD Certificate of Insurance 25-S."

D. Information and Modification Forms:

1. Form for Requests for Information (RFIs): AIA Document G716, "Request for Information (RFI)."
2. Form of Request for Proposal: AIA Document G709, "Work Changes Proposal Request."
3. Change Order Form: AIA Document G701, "Change Order."
4. Form of Architect's Memorandum for Minor Changes in the Work: AIA Document G707, "Architect's Supplemental Instructions."
5. Form of Change Directive: AIA Document G714, "Construction Change Directive."

E. Payment Forms:

1. Schedule of Values Form: AIA Document G703, "Continuation Sheet."

2. Payment Application: AIA Document G702/703, "Application and Certificate for Payment and Continuation Sheet."
3. Form of Contractor's Affidavit: AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
4. Form of Affidavit of Release of Liens: AIA Document G706A, "Contractor's Affidavit of Payment of Release of Liens."
5. Form of Consent of Surety: AIA Document G707, "Consent of Surety to Final Payment."
   a. Refer to Retention requirements in Section 011000 Summary.

END OF DOCUMENT

SECTION 01 1000

SUMMARY

PART 1 - GENERAL

1.1 PROJECT INFORMATION

A. Project Identification: Emergency Operations Center.

1. Project Location: Peach Springs, Arizona.

B. Owner: Hualapai Tribe.
1. Contact: Kevin A. Davidson, Hualapai Tribe Planning Director; 928-769-1310; kdavidson@hualapai-nsn.gov .

C. Project Manager: Kenew, LLC, 17505 North 79th Avenue, Suite 205-C, Glendale, Arizona 85308:
1. Contact: Chad Hafstrom, Project and Construction Management; 623-225-3321; chadh@kenewllc.com .

D. Architect: Stroh Architecture, Inc, 1577 Plaza West Drive, Suite B, Prescott, Arizona 86303:
1. Contact: William X Waldrom, Project Architect; 928-771-0548; william@stroharchitectureinc.com .

E. Architect's Consultants: Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. Civil Engineering: Kelley-Wise Engineering, Inc., 146 Grove Avenue, Prescott, Arizona 86301:0
   a. Contact: Gary Kelley, PE; 928-771-1730; gkelley@kelley-wise.com .

2. Structural Engineering: Frost Structural Engineering, 1678 Oaklawn Drive, Suite C, Prescott, Arizona 86305.
   a. Contact: Rick Frost, PE; 928-776-4757; rickf@frststructural.com .

3. Mechanical and Plumbing Engineering: Ardebili Engineering, LLC, 8100 East Indian School Road, Suite 203, Scottsdale, Arizona 85251.
   a. Contact: Wendy Pinkowski; 480-626-7072; wendy@ardebilieng.com .

4. Electrical Engineering: Ardebili Engineering, LLC, 8100 East Indian School Road, Suite 203, Scottsdale, Arizona 85251.
   a. Contact: Sam Buhr, PE; 480-626-7072 (Direct 480-626-1866); sam@ardebilieng.com .

F. Project Website: A project website administered by Construction Manager may be used for purposes of managing communication and documents during the construction stage.

G. The Work consists of a new one story, approximately 3300 square feet Emergency Operations Center. Occupancy Type includes B Business and S-1 Storage and Construction Type is II-B

Non-combustible. Occupancy separations are not required per 2018 IBC Table 508.3 and building is not sprinklered.

H. Work by Owner: Owner will clear site of shipping containers.

1.2 WORK RESTRICTIONS

A. Contractor's Use of Premises: During construction, Contractor will have full use of site indicated. Contractor's use of premises is limited only by Owner's right to perform work or employ other contractors on portions of Project.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 6:00 p.m., Monday through Saturday, unless otherwise indicated.

C. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

1.3 GOVERNING LAW

A. This contract shall be governed by the laws of the Hualapai Indian Tribe, and all disputes arising under the contract shall be decided exclusively in the Hualapai Indian Tribe's Court System.

B. Nothing contained in the contract shall diminish the sovereign rights or immunities of the Hualapai Indian Tribe, except to the extent that the contract may be enforced in Tribal Court (but only for declaratory and injunctive relief, and not for monetary damages).

1.4 TRIBAL EMPLOYMENT RIGHTS OFFICE (TERO)

A. This construction project is subject to a Tribal Employment Rights Office (TERO) tax of 5% of the total Contract Price as stated in the Construction Contract and any Addendums or Change Orders thereto.

B. A total of 5% of the total Construction amount, including labor, materials overhead and general conditions is to be paid to the Hualapai Indian Tribe and shall be transferred into the TERO fund prior to issuance of the Notice to Proceed.

C. Each change order increasing the Construction Cost, as applicable, will require payment of 1% of the total amount of the change order into the TERO fund.

D. TERO Information includes the Hualapai TERO compliance documents for the Contractor's familiarization.

E. For questions regarding TERO following the bid process, and to obtain listings of available construction personnel, contact:
   1. Mr. Bobby Havatone Hualapai TERO Officer; P.O. Box 179; Peach Springs, AZ 86434 (928) 769-2216.

1.5 TRIBAL MATERIALS AND RATES (TERO)

A. Contractors can purchase water at the rate of $30.00 per 1,000 gallons.

B. Campsite permits will be purchased by contractors the through the Hualapai Game and Fish Department. This is applicable only to unpopulated areas of the Reservation.

C. Off-site land for additional storage is available at a rate of $500.00 per month.

1.6 TAXES

A. General. Other than TERO taxes, the Hualapai Indian Tribe does not assess any other taxes, including sales taxes.
   1. No State Taxes.Arizona Transaction Privilege Tax Ruling TPR 95-11 provides that: "The gross proceeds derived from construction projects performed on Indian reservations by non-affiliated Indian or non-Indian prime contractors are not subject to the imposition of Arizona transaction privilege tax under the following conditions:
      a. The activity is performed for the tribe or a tribal entity for which the reservation was established; or
      b. The activity is performed for an individual Indian who is a member of the tribe for which the reservation was established."

B. This Hualapai Indian Tribe's Emergency Operation Center Project is being constructed for the Hualapai Indian Tribe on-Reservation solely for the benefit of the Hualapai Indian Tribe. Arizona Transaction Privilege Tax does not apply.

C. See attached for Ordinance (April 2019).

1.7 INDIAN PREFERENCE HIRING

A. The Contractor and each of his or her subcontractors shall give preference in all hiring to Indians as required by the Indian preference section of this Contract.

B. Upon initial hiring and whenever a job opening occurs thereafter, the contractor and each subcontractor shall give written notice of such opening to the Owner stating the time when, and the local place where, job applications will be accepted. Except in cases of an emergency, no one other than a qualified Indian shall be hired for any job until 48 hours (not counting Sundays and holidays) following the notice to the Owner.

C. The Contractor shall have the right to reject any job applications for a valid reason, or to terminate the employment of any Indian for appropriate reasons, but in either event, the contractor shall, within three days, send a written statement of the reasons for such action to the Owner.

1.8 INTEREST OF MEMBERS OF CONGRESS

A. No member, officer, or employee of the Owner, no member of America or resident commissioner shall be admitted to any share or part of this Contract or to any benefit to arise herefrom, but this provision shall not be construed to extend to this Contract if made with a corporation for its general benefit.

1.9 CONFLICT OF INTEREST

A. No member, officer, or employee of the Owner, no member of the of the governing body of the locality in which the project is situated, no member of the governing body of the locality in which the Owner was activated, and no other public official of such locality or localities which exercises any functions or responsibilities with respect to the project shall, during his or her tenure, or for one year thereafter, have any interest, direct or indirect, in this contract or the proceeds thereof.

1.10 LIQUIDATED DAMAGES

A. If the Contractor fails to complete the work within the time specified in the contract or any extension, the Owner would incur substantial extra costs, and the Contractor shall compensate the Owner $350.00 a day for liquidated damages, as specified in the Default section of this contract. If different completion dates are specified in the contract for separate parts or stages of the work, the amount of liquidated damages shall be assessed on those parts or stages which are delayed. To the extent that the Contractor’s delay or nonperformance is excused under another clause in the contract, liquidated damages shall not be due the Owner. The Contractor remains liable for damages caused other than by delay.

B. If the Owner terminates the Contractor's right to proceed, the resulting damage will consist of liquidated damages until such reasonable time as may be required for final completion of the work together with any increased costs occasioned the Owner in completing the work.

C. If the Owner does not terminate the Contractor's right to proceed, the resulting damage will consist of liquidated damages until the work is completed or accepted.

1.11 INDEMNIFICATION

A. Contractor shall be responsible for any wrongful or negligent acts or omissions performed by him, his employees or his subcontractors associated with his performance under this Contract and agrees to indemnify and hold the Tribe harmless from any liability or damage to person or property that arises from or is related to any such act or omission, including any attorney fees that may be incurred.

1.12 CONFIDENTIALITY

A. Contractor acknowledges that all information related to Contractor’s work under this Contract, including all findings, reports, and other information either provided directly or indirectly by the Tribe in connection with the Contract or developed, compiled or created by Contractor in performing his services under this Contract, and all improvements made or conceived by Contractor under this Contract, is confidential and proprietary information owned by, and of great value to, the Tribe. Accordingly, Contractor agrees not to disclose any such confidential information to any person without the prior, written authorization of the Chairman (or his written designee) of the Tribe.

B. Regardless of how or when this Contract is terminated, within five (5) working days of completion of the work under this Contract, Contractor shall deliver to the Tribe all copies (including those on computer disk of other electronic medium) of all documents, drawings, specifications, and other materials or information which were furnished directly or indirectly by

the Tribe to Contractor in connection with this Contract or which were prepared or acquired by Contractor in performance of services under this Contract.

C. Contractor shall not use any of the proprietary information described in this paragraph for anyone other than the Tribe's benefit.

1.13 CODE OF CONDUCT

A. Contractor shall comply with the provisions of the "Hualapai Indian Tribe Code of Conduct."

1.14 INTELLECTUAL PROPERTY

A. The title to all work completed by Contractor under or associated with this Contract shall be in the Tribe. Contractor will promptly disclose to the Tribe all inventions, improvements, designs, publications and ideas made or conceived by Contractor in the course of or associated with providing services under this Contract, regardless of whether Contractor develops those inventions, improvements, designs, publications or ideas after the termination on this Contract. Contractor agrees to assign to the Tribe all right and title to all such inventions, improvement, designs, publications and ideas, and all copyrights, patents, and royalties associated with or derived from such ideas.

1.15 RETAINAGE

A. Except as otherwise provided under applicable laws, the Owner will retain ten percent (10%) of the amount of progress payments until completion and acceptance of all work under the contract; except, that if upon completion of 50 percent (50%) of the work, the Project Manager, after consulting with the Architect and the Contracting Officer, determines that the Contractor's performance and progress are satisfactory, the Owner may reduce the retainage rate to five percent (5%). If the Project Manager subsequently determines that the Contractor's performance and progress are unsatisfactory, the Owner shall reinstate the retainage until such time as the Project Manager determines that performance and progress are satisfactory.

1.16 WARRANTY OF CONSTRUCTION

A. In addition to any other warranties in this Contract, the Contractor warrants, except as provided in paragraph (J) of this clause, that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, or workmanship performed by the Contractor or any subcontractor or supplier at any tier. This warranty shall continue for a period of two years from the date of final acceptance of the work. If the Owner takes possession of any part of the work before final acceptance, this warranty shall continue for a period of two years from the date that the Owner takes full possession.

B. The Contractor shall remedy, at the Contractor's expense, any failure to conform, or any defect. In addition, the Contractor shall remedy, at the Contractor's expense, any damages to Owner-owned or controlled real or personal property when the damage is the result of: (1) The Contractor's failure to conform to contract requirements; or (2) Any defects to equipment, material, workmanship or design furnished by the Contractor.

C. The Contractor shall restore any work damaged in failing the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for two years from the date of repair or replacement.

D. The Project Manager shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect, or damage.

E. If the Contractor fails to remedy any failure, defect or damage within a reasonable time after receipt of notice, the Owner shall have the right to replace, repair or otherwise remedy the failure, defect, or damage at the Contractor's expense.

F. With respect to all warranties, expressed or implied, from subcontractors, manufactures, or suppliers for work performed and material furnished under this contact, the Contractor shall: (1) Obtain all warranties that would be given in normal commercial practice, (2) Require all warranties to be executed in writing for the benefit of the Owner, and (3) Enforce all warranties for the benefit of the Owner.

G. In the event the Contractor’s warranty under paragraph (A) of the clause has expired, the Owner may bring suit at its own expense to enforce a subcontractor's, manufacturer's, or supplier's warranty.

H. Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defect or material or design furnished by the Owner nor for the repair of any damage that results from any defect in Owner-furnished material or design.

I. Notwithstanding any provisions herein to the contrary, the establishment of the time periods in paragraphs (A) and (C) above relate only to the specific obligation of the Contractor to correct the work, and have no relationship to the time within which its obligation to comply with the contract may be sought to be enforced, nor to the time within which proceeding may be commenced to establish the Contractor’s liability with respect to its obligation other than specifically to correct the work.

J. This warranty shall not limit the Owner's rights under the Inspection and Acceptance of Construction section of this contract with respect to latent defects, gross mistakes or fraud.

K. Provide duplicate, notarized copies of documents required in this Section.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 2000

PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 ALLOWANCES

A. Advise Architect of the date when 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.

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

E. 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.
   1. Store materials which can be easily removed from the site in a bonded warehouse if they can not be securely stored on site.

F. 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 under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.2 UNIT PRICES

A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

B. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

C. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

1.3 ALTERNATES

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the Base Bid amount if

Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

B. Coordination: Revise 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.

C. Notification: Immediately following award of the Contract, notify each party involved, in writing, whether alternates have been accepted, rejected, or deferred for later consideration.

1.4 PAYMENT PROCEDURES

A. Submit a Schedule of Values at least seven days before the initial Application for Payment. Break down the Contract Sum into at least one line item for each Specification Section in the Project Manual table of contents. Coordinate the schedule of values with Contractor's construction schedule.

1. Arrange schedule of values consistent with format of AIA Document G703.
2. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
3. 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.
4. Provide separate line items in the schedule of values for initial cost of materials and for total installed value of that part of the Work.
5. Provide a separate line item in the schedule of values for each allowance.

B. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 or other forms acceptable to Contruction Manager, Architect and Owner as form for Applications for Payment.

C. Submit three copies of each application for payment according to the schedule established in Owner/Contractor Agreement.

1. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor.

2. With each Application for Payment submit certified payroll reports for TERO compliance.With each Application for Payment submit water meter reading to TERO.

3. 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.

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.

    a. Include insurance certificates, proof that taxes, fees, and similar obligations were paid, and evidence that claims have been settled.
    b. Include affidavit of payment of debts and claims on AIA Document G706.
    c. Include affidavit of release of liens on AIA Document G706A.
    d. Include consent of surety to final payment on AIA Document G707.
    e. Submit final meter readings for utilities, a record of stored fuel, and similar data as of the date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALLOWANCES

A. Testing Allowance: Allow the sum of <**Insert dollar amount**> for

3.2 SCHEDULE OF UNIT PRICES

A. Unit Price No. 1: Removal of unsatisfactory soil and replacement with satisfactory soil material.

1. Description: Unsatisfactory soil excavation and disposal off-site and replacement with satisfactory fill material or engineered fill from off-site, as required, in accordance with Civil Drawings.
2. Unit of Measurement: cubic yard of soil excavated, based on in-place surveys of volume before and after removal.

B. Unit Price No. 2:
1. Description: Moisture Vapor Emission Control Unit Price according to Section 090561.13 " Moisture Vapor Emission Control."
2. Unit of Measurement: per 400 square feet

3.3 SCHEDULE OF ALTERNATES

A. Refer to Drawings for descriptions and scope of Alternates.
1. Alternate No. 1: Entry Canopy:
2. Alternate No. 2: Patio Canopy:
3. Alternate No. 3: Fire Sprinkler System including providing design and installation of complete system starting from the pipe flange in the Riser Room:
4. Alternate No. 4: Deisel Emergency Generator:
5. Alternate No. 5: Walk-in Cooler and Freezer:
6. Alternate No. 6: Entry Floor Mat:

END OF SECTION

SECTION 012100

ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

B. Types of allowances include the following:

1. Lump-sum allowances.
2. Unit-cost allowances.
3. Quantity allowances.
4. Contingency allowances.

C. Related Requirements:
1. Section 012200 "Unit Prices" for procedures for using unit prices, including adjustment of quantity allowances when applicable.

1.2 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner 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.

1.3 ACTION SUBMITTALS

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

1.4 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.

1.5 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 applicable taxes if any, 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 or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.6 UNIT-COST 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 applicable taxes if any, 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 or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.7 QUANTITY 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 applicable taxes if any, 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 or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

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, applicable taxes if any, 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.

D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.9 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 markups.
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: Quantity Allowance: Include 2000 cu. yd. of unsatisfactory soil excavation and disposal off-site and replacement with satisfactory soil material from off-site, as specified in Section 312000 "Earth Moving."

1. Coordinate quantity allowance adjustment with unit-price requirements in Section 012200 "Unit Prices."

B. Allowance No. 4: Lump-Sum Allowance: Include the sum of $30,000.00 for three chandeliers for the main lobby, as specified in [**Section 265113 "Incandescent Interior Lighting."**] [**Section 265119 LED "Interior Lighting."**]

1. This allowance includes material, receiving, handling, and installation costs, and Contractor overhead and profit.

C. Allowance No. 5: Unit-Cost Allowance: Include the sum of $350.00 per thousand for buff-colored face brick, as specified in Section 042000 "Unit Masonry" and as shown on Drawings.

D. Allowance No. 6: Quantity Allowance: Include 5000 sq. yd. of Carpet Type 1 installed, including urethane foam carpet cushion and related amount of tackless strip, as specified in Section 096816 "Sheet Carpeting."

E. Allowance No. 7: Contingency Allowance: Include a contingency allowance of $100,000.00 for use according to Owner's written instructions.

F. Allowance No. <Insert number>: [Lump-Sum] [Unit-Cost] [Quantity] [Contingency] Allowance: Include the sum of <Insert dollar or quantity amount of allowance>. Include <Insert allowance description>, as specified in Section <Insert Section number> "<Insert Section title>"[and as shown on Drawings].

1. This allowance includes [**material cost**] [**receiving, handling, and installation**] [**and**] [**Contractor overhead and profit**].
2. Coordinate quantity allowance adjustment with corresponding unit-price requirements in Section 012200 "Unit Prices."

END OF SECTION

SECTION 01 2500

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUBSTITUTION PROCEDURES

A. Substitutions include changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

B. 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 provided in the Project Manual.
2. Submit requests within 60 days after the Notice to Proceed.
3. Identify product to be replaced and show compliance with requirements for substitutions. Include a detailed comparison of significant qualities of proposed substitution with those of the Work specified, a list of changes needed to other parts of the Work required to accommodate proposed substitution, and any proposed changes in the Contract Sum or the Contract Time should the substitution be accepted.

C. Architect will review proposed substitutions and notify Contractor of their acceptance or rejection by Change Order. If necessary, Architect will request additional information or documentation for evaluation.

1. 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.

D. Do not submit unapproved substitutions on Shop Drawings or other submittals.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SUBSTITUTION REQUEST
(After the Bidding/Negotiating Phase)

PROJECT: _____ SUBSTITUTION REQUEST NUMBER: _____

_____ FROM: _____

TO: _____ DATE: _____

_____ A/E PROJECT NUMBER: _____

RE: _____ CONTRACT FOR: _____

SPECIFICATION TITLE: _____ DESCRIPTION: _____

SECTION: _____ PAGE: _____ ARTICLE/PARAGRAPH: _____

PROPOSED SUBSTITUTUION: _____

MANUFACTURER: _____ ADDRESS: _____ PHONE: _____

TRADE NAME: _____ MODEL NO.: _____

INTALLER: _____ ADDRESS: _____ PHONE: _____

HISTORY: ☐ New Product ☐ 1-4 years old ☐ 5-10 years old ☐ More than 10 years old

DIFFERENCES BETWEEN PROPOSED SUBSTITUTION AND SPECIFIED PRODUCT: _____

_____

_____

☐ Point-by-point comparative data attached — REQUIRED BY A/E

REASON FOR NOT PROVIDING SPECIFIED ITEM: _____

_____

SIMILAR INSTALLATION:

PROJECT: _____ ARCHITECT: _____

ADDRESS: _____ OWNER: _____

_____ DATE INSTALLED: _____

PROPOSED SUBSTITUTION AFFECTS OTHER PARTS OF WORK: ☐ No ☐ Yes; explain _____

_____

SAVINGS TO OWNER FOR ACCEPTING SUBSTITUTION:

PROPOSED SUBSTITUTION CHANGES CONTRACT TIME: ☐ No ☐ Yes ☐ [Add] ☐ [Deduct] _____ days.

SUPPORTING DATA ATTACHED: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

CONTINUE ON NEXT PAGE

CSI Form 13.1A (August 2020 version)

SUBSTITUTION REQUEST
(After the Bidding/Negotiating Phase—Continued)

The Undersigned certifies:
- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

SUBMITTED BY: _____

SIGNED BY: _____

FIRM: _____

ADDRESS: _____

TELEPHONE: _____

☐ **Attachments**

A/E's REVIEW AND RECOMMENDATION:

☐ Approve Substitution—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.

☐ Approve Substitution as noted—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.

☐ Reject Substitution—Use specified materials.

☐ Substitution Request received too late—Use specified materials.

SIGNED BY: **DATE:**

OWNER'S REVIEW AND ACTION:

☐ Substitution approved—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures. Prepare Change Order

☐ Substitution approved as noted—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures. Prepare Change Order.

☐ Substitution rejected—Use specified materials.

SIGNED BY: **DATE:**

ADDITIONAL COMMENTS: ☐ **Contractor** ☐ **Subcontractor** ☐ **Supplier** ☐ **Manufacturer** ☐ **A/E**

CSI Form 13.1A (August 2020 version)

SECTION 01 2600

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 CONTRACT MODIFICATION PROCEDURES

A. Architect will issue supplemental instructions through Construction Manager authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time[.]

B. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work.

1. Proposal Requests 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.

C. 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.

D. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701, for all changes to the Contract Sum or the Contract Time.

E. 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.

F. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive. 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

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SECTION 01 3000

ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 PROJECT MANAGEMENT AND COORDINATION

A. Subcontract List: Submit a written summary identifying individuals or firms proposed for each portion of the Work. Use CSI Form 1.5A appended to this section or other form acceptable to Construction Manager, Architect, and Owner.

B. 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. List e-mail addresses and telephone numbers.

C. Within 15 days of starting construction operations, submit TERO compliance plan.

D. Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work.

E. Requests for Information (RFIs): On discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI. Use CSI Form 13.2A form appended to this section or other form acceptable to Construction Manager, Architect, and Owner.

F. Preconstruction Conference: Construction Manager 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.

G.

1. Attendees: Authorized representatives of Owner, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Responsibilities and personnel assignments.
    b. Tentative construction schedule.
    c. Phasing.
    d. Critical work sequencing and long lead items.
    e. Designation of key personnel and their duties.
    f. Lines of communications.
    g. Use of web-based Project software.
    h. Procedures for processing field decisions and Change Orders.
    i. Procedures for RFIs.
    j. Procedures for testing and inspecting.
    k. Procedures for processing Applications for Payment.

l. Distribution of the Contract Documents.
m. Submittal procedures.
n. Preparation of Record Documents.
o. Use of the premises.
p. Work restrictions.
q. Working hours.
r. Owner's occupancy requirements.
s. Responsibility for temporary facilities and controls.
t. Procedures for moisture and mold control.
u. Procedures for disruptions and shutdowns.
v. Construction waste management and recycling.
w. Parking availability.
x. Office, work, and storage areas.
y. Equipment deliveries and priorities.
z. First aid.
aa. Security.
bb. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

H. Schedule and conduct progress meetings at Project site at biweekly intervals. Notify Owner and Architect of meeting dates and times. Require attendance of each subcontractor or other entity concerned with current progress or involved in planning, coordination, or performance of future activities.

1. Record minutes and distribute to everyone concerned, including Owner and Architect.

2. Meetings may be virtual when acceptable to Owner.

1.2 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files 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. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement or other Agreement form acceptable to Owner and Architect.

B. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

1. 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.
2. Architect will discard submittals received from sources other than Contractor.

C. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with unique identifier, including project identifier, Specification Section number, and revision identifier.
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.

D. Identify options requiring selection by Architect.

E. Identify deviations from the Contract Documents on submittals.

F. Contractor's Construction Schedule Submittal Procedure:

1. Submit required submittals in the following format:
   a. PDF electronic file.
   b. Two paper copies.

2. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

   a. 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.

3. 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.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections.

1. Post electronic submittals as PDF electronic files directly to Project Web 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. If Project Web site is not established by Construction Manager submit electronic submittals via email as PDF electronic files.

   a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2.2 ACTION SUBMITTALS

A. Submit PDF file of each submittal unless otherwise indicated. Architect will return annotated file.

B. Product Data: Mark each copy to show applicable products and options. Include the following:

1. Manufacturer's written recommendations, product specifications, and installation instructions.
2. Wiring diagrams showing factory-installed wiring.
3. Printed performance curves and operational range diagrams.
4. Testing by recognized testing agency.
5. Compliance with specified standards and requirements.

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. Submit in PDF files formatted as sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches. Include the following:

1. Dimensions and identification of products.
2. Fabrication and installation drawings and roughing-in and setting diagrams.
3. Wiring diagrams showing field-installed wiring.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.

D. Samples: Submit Samples for review of kind, color, pattern, and texture and for a comparison of these characteristics between submittal and actual component as delivered and installed. Include name of manufacturer and product name on label.

1. If variation is inherent in material or product, submit at least three sets of paired units that show variations.

2.3 INFORMATIONAL SUBMITTALS

A. Informational Submittals: Submit PDF file of each submittal unless otherwise indicated. Architect will not return copies.

B. Qualification Data: Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

2.4 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 criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit PDF file of a statement, 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.

2.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type schedule within 30 days of date established for commencement of the Work and at least one week prior to pre-construction meeting.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

C. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

D. 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 indicate date by which recovery will be accomplished.

PART 3 - EXECUTION

3.1 SUBMITTAL REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Architect will review each action submittal, make marks to indicate corrections or modifications required, will stamp each submittal with an action stamp, and will mark stamp appropriately to indicate action.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

3.2 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. As the Work progresses, indicate Actual Completion percentage for each activity.

B. Distribute copies of approved schedule to Owner, Architect, subcontractors, testing and inspecting agencies, and parties identified by Contractor with a need-to-know schedule responsibility. When revisions are made, distribute updated schedules to the same parties.

3.3 ON SITE CONSTRUCTION DOCUMENTS AND BUILDING PERMIT

A. Maintain construction documents and building permit card on site in secure location.

END OF SECTION

SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

PROJECT: _____

_____

TO (A/E): _____

_____

FROM (CONTRACTOR): _____

DATE: _____

A/E PROJECT NUMBER: _____

CONTRACT FOR: _____

LIST SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS PROPOSED FOR USE ON THIS PROJECT AS REQUIRED BY THE CONSTRUCTION DOCUMENTS. ATTACH SUPPLEMENTAL SHEETS IF NECESSARY.

NUMBER SECTION	SECTION TITLE	FIRM	ADDRESS	PHONE NUMBER	CONTACT

☐ **Attachments**

SIGNED BY: **DATE:**

_____

COPIES: ☐ **Owner** ☐ **Consultants** ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ **File**

SECTION 01 4000

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. 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.

B. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements, comply with the most stringent requirement. Refer uncertainties to Architect for a decision.

C. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum. The actual installation may exceed the minimum within reasonable limits. Indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision.

D. 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.

E. 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.

F. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, notices, receipts for fee payments, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

G. 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.

H. Testing Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspecting indicated; and where required by authorities having jurisdiction, that is acceptable to authorities.

I. 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.

J. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor of irregularities or deficiencies in the Work observed during performance of its services.
2. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
3. Do not perform any duties of Contractor.

K. Associated Services: Cooperate with testing agencies and provide reasonable auxiliary services as requested. 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. Security and protection for samples and for testing and inspecting equipment.

L. 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.

M. Special Tests and Inspections: Owner will engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

B. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

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SECTION 01 4200

REFERENCES

PART 1 - GENERAL

1.1 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": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

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.

J. TERO: Tribal Employment Rights Office.

1.2 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.

1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.

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.

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
1. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
1. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
2. ICC - International Code Council; www.iccsafe.org.
3. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

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

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOE - Department of Energy; www.energy.gov.
5. EPA - Environmental Protection Agency; www.epa.gov.
6. FAA - Federal Aviation Administration; www.faa.gov.
7. FG - Federal Government Publications; www.gpo.gov/fdsys.
8. GSA - General Services Administration; www.gsa.gov.
9. HUD - Department of Housing and Urban Development; www.hud.gov.
10. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
11. OSHA - Occupational Safety & Health Administration; www.osha.gov.
12. SD - Department of State; www.state.gov.
13. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
14. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
15. USPS - United States Postal Service; www.usps.com.

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and

regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.govinfo.gov.
2. DSCC - Defense Supply Center Columbus; (See FS).
3. FED-STD - Federal Standard; (See FS).
4. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.

    a. Available from Defense Standardization Program; www.dsp.dla.mil.
    b. Available from General Services Administration; www.gsa.gov.
    c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.
5. USAB - United States Access Board; www.access-board.gov.
6. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 5000

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Use Charges: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated.

B. Erosion- and Sedimentation-Control Plan: Submit plan showing compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70 and Mohave Electric Cooperative requirements.

D. Accessible Temporary Egress: Comply with applicable provisions in ICC A117.1.

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 and top and bottom rails.

2.2 TEMPORARY FACILITIES

A. Provide field offices, storage and fabrication sheds, and other support facilities as necessary for construction operations. 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.

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. 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.

PART 3 - EXECUTION

3.1 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.

C. Heating and Cooling: Provide temporary heating and cooling required 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.

D. Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

3.2 SUPPORT FACILITIES INSTALLATION

A. Install project identification and other signs in locations approved by Owner to inform the public and persons seeking entrance to Project.

B. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

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

B. Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

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. Perform control operations lawfully, using environmentally safe materials.

E. Furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

F. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

G. Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

H. Install and maintain temporary fire-protection facilities. Comply with NFPA 241.

3.4 MOISTURE AND MOLD CONTROL

A. Before installation of weather barriers, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.

1. Protect stored and installed material from flowing or standing water.
2. Remove standing water from decks.
3. Keep deck openings covered or dammed.

B. After installation of weather barriers but before full enclosure and conditioning of building, protect as follows:

1. Do not load or install drywall or porous materials into partially enclosed building.
2. Discard water-damaged material.
3. Do not install material that is wet.
4. Discard, replace, or clean stored or installed material that begins to grow mold.
5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

3.5 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. 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.

C. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period.

END OF SECTION

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SECTION 01 6000

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

B. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced.

1. Show compliance with requirements for comparable product requests.
2. Architect will review the proposed product and notify Contractor of its acceptance or rejection.

C. Basis-of-Design Product Specification Submittal: Show compliance with requirements.

D. Compatibility of Options: If Contractor is given option of selecting between two or more products, select product compatible with products previously selected.

E. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Deliver products to Project site in manufacturer's original sealed container or packaging, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
3. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
4. Store materials in a manner that will not endanger Project structure.
5. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

F. 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.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. Provide products that comply with the Contract Documents, are undamaged, and, unless otherwise indicated, are new at the time of installation.

1. Provide products complete with accessories, trim, finish, and other devices and components needed for a complete installation and the intended use and effect.

2. Where products are accompanied by the term "as selected," Architect will make selection with Owner's consent.
3. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Where the following headings are used to list products or manufacturers, the Contractor's options for product selection are as follows:

1. Products:

a. Where requirements include "one of the following," provide one of the products listed that complies with requirements.
b. Where requirements do not include "one of the following," provide one of the products listed that complies with requirements or a comparable product.

2. Manufacturers:

a. Where requirements include "one of the following," provide a product that complies with requirements by one of the listed manufacturers.
b. Where requirements do not include "one of the following," provide a product that complies with requirements by one of the listed manufacturers or another manufacturer.

3. Basis-of-Design Product: Provide the product named, or indicated on the Drawings, or a comparable product by one of the listed manufacturers.

C. 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.

D. 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. Architect will consider Contractor's request for comparable product when the following conditions are satisfied:

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.
3. List of similar installations for completed projects, if requested.
4. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 7000

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 EXECUTION REQUIREMENTS

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

B. Cutting and Patching:

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching.
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.
3. 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.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.2 CLOSEOUT SUBMITTALS

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

C. Operation and Maintenance Data: Submit one copy of manual.

D. PDF Electronic File: Assemble manual into a composite electronically indexed file. Submit on digital media.

E. Record Drawings: Submit one set(s) of marked-up record prints.

F. Record Digital Data Files: Submit data file and one set(s) of plots.

G. Record Product Data: Submit one paper copy and annotated PDF electronic files and directories of each submittal.

H. Warranties.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

A. 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.

B. Submittals Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:

1. Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other sections, including project record documents, operation and maintenance manuals, property surveys, similar final record information, warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
3. Submit maintenance material submittals specified in other sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect.
4. Submit test/adjust/balance records.
5. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Advise Owner of changeover in heat and other utilities.
6. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
7. Remove temporary facilities and controls.
8. Complete final cleaning requirements, including touchup painting.
9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will proceed with inspection or advise Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

1.4 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting inspection for determining final completion, complete the following:

1. Submit a final Application for Payment.
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare final Certificate for Payment after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

B. 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.

2.2 OPERATION AND MAINTENANCE DOCUMENTATION

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

B. Organization: Unless otherwise indicated, organize manual into separate sections for each system and subsystem, and separate sections for each piece of equipment not part of a system.

C. Organize data into three-ring binders with identification on front and spine of each binder, and envelopes for folded drawings. Include the following:

1. Manufacturer's operation and maintenance documentation.
2. Maintenance and service schedules.
3. Maintenance service contracts. Include name and telephone number of service agent.
4. Emergency instructions.
5. Spare parts list and local sources of maintenance materials.
6. Wiring diagrams.
7. Copies of warranties. Include procedures to follow and required notifications for warranty claims

2.3 RECORD DRAWINGS

A. Record Prints: Maintain a set of prints of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued. Mark to show actual installation where installation varies from that shown originally. Accurately record information in an acceptable drawing technique.

1. Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

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.

1. Format: Annotated PDF electronic file.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

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, and other construction affecting the Work.

B. 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.

1. Verify compatibility with and suitability of substrates.
2. Examine roughing-in for mechanical and electrical systems.
3. Examine walls, floors, and roofs for suitable conditions.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Take field measurements as required to fit the Work properly. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication.

E. Verify space requirements and dimensions of items shown diagrammatically on Drawings.

F. Surface and Substrate Preparation: Comply with manufacturer's written recommendations for preparation of substrates to receive subsequent work.

3.2 CONSTRUCTION LAYOUT AND FIELD ENGINEERING

A. Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks.

B. Engage a land surveyor to lay out the Work using accepted surveying practices.

3.3 INSTALLATION

A. 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. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
3. 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.

C. 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.

D. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed.

E. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place. 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.

F. 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.

G. Use products, cleaners, and installation materials that are not considered hazardous.

3.4 CUTTING AND PATCHING

A. Provide temporary support of work to be cut.

B. 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.

C. Cutting: Cut in-place construction using methods least likely to damage elements retained or adjoining construction.

1. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

D. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction in a manner that will minimize evidence of patching and refinishing.
2. 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.
3. 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.

3.5 CLEANING

A. Clean Project site and work areas daily, including common areas. Dispose of materials lawfully.

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.
3. Remove debris from concealed spaces before enclosing the space.

B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion:

1. Clean Project site, yard, and grounds, in areas disturbed by construction activities. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
2. Sweep paved areas broom clean. Remove spills, stains, and other foreign deposits.
3. Remove labels that are not permanent.
4. Clean transparent materials, including mirrors. Remove excess glazing compounds.
5. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Sweep concrete floors broom clean.
6. Vacuum carpeted surfaces and wax resilient flooring.
7. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and foreign substances. Clean plumbing fixtures. Clean light fixtures, lamps, globes, and reflectors.
8. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
9. Magnet sweep to pick up screws, nail, sharp metal scraps, and other metal debris.

3.6 OPERATION AND MAINTENANCE MANUAL PREPARATION

A. 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.

B. 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 unavailable and where the information is necessary for proper operation and maintenance of equipment or systems.

C. 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.

3.7 DEMONSTRATION AND TRAINING

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system. Include a detailed review of the following:

1. Include instruction for basis of system design and operational requirements, review of documentation, emergency procedures, operations, adjustments, troubleshooting, maintenance, and repairs.

END OF SECTION

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SECTION 03 2000

CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel reinforcement bars.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.

2. Bar supports.

3. Mechanical splice couplers.

B. Shop Drawings: Comply with ACI SP-066:

1. Include placing drawings that detail fabrication, bending, and placement.

2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1. Reinforcement to Be Welded: Welding procedure specification in accordance with AWS D1.4/D1.4M

B. Material Test Reports: For the following, from a qualified testing agency:

1. Steel Reinforcement:

a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.

2. Mechanical splice couplers.

C. Field quality-control reports.

D. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4/D 1.4M.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615/A615M, Grade as inidicated on Structural Drawings, deformed.

2.2 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.

1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.

B. Mechanical Splice Couplers: ACI 318 Type 1, same material of reinforcing bar being spliced; mechanical-lap type.

C. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch in diameter.

1. Finish: Plain

2.3 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:

1. Do not cut or puncture vapor retarder.

2. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.

B. Accurately position, support, and secure reinforcement against displacement.

1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.

2. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with ACI 318.

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Splices: Lap splices as indicated on Drawings.

1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.

2. Stagger splices in accordance with ACI 318.

3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.

4. Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.

3.3 INSTALLATION TOLERANCES

A. Comply with ACI 117.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel-reinforcement placement.

2. Steel-reinforcement mechanical splice couplers.

3. Steel-reinforcement welding.

4. Concrete placement.

END OF SECTION

SECTION 03 3000

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 03 1000 "Concrete Forming and Accessories" for form-facing materials, form liners, insulating concrete forms, and waterstops.
2. Section 03 2000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
3. Section 31 2000 "Earth Moving" for drainage fill under slabs-on-ground.

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, and other pozzolans materials subject to compliance with requirements.

B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Aggregates.
4. Admixtures:

    a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.

5. Vapor retarders.
6. Liquid floor treatments.
7. Abrasive nosings for cast in place stairs.
8. Curing materials.
9. Joint fillers.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
10. Intended placement method.
11. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Vapor retarders.
5. Joint-filler strips.

B. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Aggregates.
6. Admixtures:

C. Research Reports: For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.

D. Preconstruction Test Reports: For each mix design.

E. Field quality-control reports.

F. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.

1. Include the following information in each test report:

a. Admixture dosage rates.
b. Slump.
c. Air content.
d. Seven-day compressive strength.
e. 28-day compressive strength.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301.

1.9 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type II, gray.
2. Fly Ash: ASTM C618, Class C or F.
3. Blended Hydraulic Cement: ASTM C595/C595M, Type IS, portland blast-furnace slag cement.

B. Normal-Weight Aggregates: ASTM C33/C33M, Class 3S aggregate or better, graded. Provide aggregates from a single source.

1. Alkali-Silica Reaction: Comply with one of the following:

   a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
   b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
   c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.

2. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C260/C260M.

D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.

E. Water and Water Used to Make Ice: ASTM C94/C94M, potable or complying with ASTM C1602/C1602M, including all limits listed in Table 2 and the requirements of paragraph 5.4

2.3 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A**,** not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

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

a. Fortifiber Building Systems Group.
b. ISI Building Products.
c. Raven Industries, Inc.
d. Reef Industries, Inc.
e. Stego Industries, LLC.
f. W.R. Meadows, Inc.

2.4 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Euclid Chemical Company (The); an RPM company; Euco Diamond Hard or a comparable product by one of the following:
a. Dayton Superior.
b. Laticrete International, Inc.
c. PROSOCO, Inc.
d. W.R. Meadows, Inc.

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

1. Color:

a. Ambient Temperature Below 50 deg F: Black.
b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
c. Ambient Temperature Above 85 deg F: White.

C. Water: Potable or complying with ASTM C1602/C1602M.

D. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.

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

a. Dayton Superior.
b. Euclid Chemical Company (The); an RPM company.
c. Laticrete International, Inc.
d. W.R. Meadows, Inc.

2.6 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash or Other Pozzolans: 18 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete and concrete with a w/cm below 0.50.

2.7 CONCRETE MIXTURES

A. Class A : Normal-weight concrete used for footings, grade beams, and tie beams.

1. Exposure Class: ACI 318 S3.
2. Minimum Compressive Strength: 2500 psi at 28 days.
3. Maximum w/cm: 0.45.
4. Slump Limit: 4 inches, plus or minus 1 inch.
5. Slump Flow Limit: 22 inches, plus or minus 1.5 inches
6. Air Content:

    a. Exposure Class F1: 5.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size.
    b. Exposure Classes F2 and F3: 6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size.

7. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

B. Class C: Normal-weight concrete used for interior slabs-on-ground.

1. Exposure Class: ACI 318 C1.
2. Minimum Compressive Strength: 3000 psi at 28 days.
3. Maximum w/cm: 0.45.
4. Minimum Cementitious Materials Content: 470 lb/cu. yd.
5. Slump Limit: 4 inches, plus or minus 1 inch.
6. Slump Flow Limit: 22 inches, plus or minus 1.5 inches.
7. Air Content:

    a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

8. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M and furnish batch ticket information.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete in accordance with ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.2 INSTALLATION OF VAPOR RETARDER

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
2. Face laps away from exposed direction of concrete pour.
3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
4. Lap joints 6 inches and seal with manufacturer's recommended tape.
5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
7. Protect vapor retarder during placement of reinforcement and concrete.

a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

3.3 JOINTS

A. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.

3.4 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.

5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.5 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.

    a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
    b. Remove projections larger than 1 inch.
    c. Tie holes do not require patching.
    d. Surface Tolerance: ACI 117 Class D.
    e. Apply to concrete surfaces not exposed to public view.

2. ACI 301Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.

    a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
    b. Remove projections larger than 1/4 inch.
    c. Patch tie holes.
    d. Surface Tolerance: ACI 117 Class B.
    e. Locations: Apply to concrete surfaces exposed to public view,.

3. ACI 301 Surface Finish SF-3.0:

    a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
    b. Remove projections larger than 1/8 inch.
    c. Patch tie holes.
    d. Surface Tolerance: ACI 117 Class A.
    e. Locations: Apply to concrete surfaces exposed to public view,.

B. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.6 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish:

1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch in one direction.
3. Apply scratch finish to surfaces to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish.

D. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
7. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated on Drawings. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

G. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish to concrete stair treads, platforms, ramps as indicated on Drawings

1. Apply in accordance with manufacturer's written instructions and as follows:

    a. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate over surface in one or two applications.

b. Tamp aggregate flush with surface, but do not force below surface.
c. After broadcasting and tamping, apply float finish.
d. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

3.7 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

3.8 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:

    a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
    b. Continuous Sprinkling: Maintain concrete surface continuously wet.
    c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
    d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
    e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.

        1) Recoat areas subject to heavy rainfall within three hours after initial application.

2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:

1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:

a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12-inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.

a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12 inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.

a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

c. Floors to Receive Curing Compound:

1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Maintain continuity of coating, and repair damage during curing period.
4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

3.9 TOLERANCES

A. Conform to ACI 117.

3.10 APPLICATION OF LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment in accordance with manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than 28 days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.
4. Rinse with water; remove excess material until surface is dry.
5. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller in accordance with manufacturer's written instructions.

3.11 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

    a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:

        1) Project name.
        2) Name of testing agency.
        3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
        4) Name of concrete manufacturer.
        5) Date and time of inspection, sampling, and field testing.
        6) Date and time of concrete placement.
        7) Location in Work of concrete represented by samples.
        8) Date and time sample was obtained.
        9) Truck and batch ticket numbers.
        10) Design compressive strength at 28 days.
        11) Concrete mixture designation, proportions, and materials.
        12) Field test results.
        13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
        14) Type of fracture and compressive break strengths at seven days and 28 days.

C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

D. Inspections:

1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. Batch Plant Inspections: On a random basis, as determined by Architect.

E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M:

   a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   b. Perform additional tests when concrete consistency appears to change.

3. Slump Flow: ASTM C1611/C1611M:

   a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   b. Perform additional tests when concrete consistency appears to change.

4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete;.

   a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

5. Concrete Temperature: ASTM C1064/C1064M:

   a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.

6. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.

   a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

7. Compression Test Specimens: ASTM C31/C31M:

   a. Cast and laboratory cure two sets of two 6-inch by 12-inch or 4-inch by 8-inch cylinder specimens for each composite sample.
   b. Cast, initial cure, and field cure two sets of two standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C39/C39M.

   a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.
   b. Test one set of two field-cured specimens at seven days and one set of two specimens at 28 days.
   c. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive

strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.

11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests:

    a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
    b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.

        1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 section 1.6.6.3.

13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 24 hours of completion of floor finishing and promptly report test results to Architect.

3.12 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION

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SECTION 05 1200

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product data Statement of recycled content Shop Drawings Welding Procedure Specifications (WPSs) and mill test reports.

B. Comply with applicable provisions of the following:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

PART 2 - PRODUCTS

2.1 STRUCTURAL STEEL

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. W-Shapes: ASTM A 992/A 992M ASTM A 572/A 572M, Grade 50.

C. Channels, Angles, M, S-Shapes: ASTM A 36/A 36M ASTM A 572/A 572M, Grade 50.

D. Plate and Bar: ASTM A 36/A 36M ASTM A 572/A 572M, Grade 50.

E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B Grade C, structural tubing.

F. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.

2.2 ACCESSORIES

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.

B. Anchor Rods: ASTM F 1554, Grade 36.

1. Configuration: Straight and Hooked as indicated.
2. Nuts: ASTM A 563 heavy-hex carbon steel.
3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: ASTM F 436, Type 1, hardened carbon steel.

C. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

D. Grout: ASTM C 1107, nonmetallic, shrinkage resistant, factory packaged.

2.3 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303 and AISC 360.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

C. Shop Priming: Prepare surfaces according to SSPC-SP 2 or SSPC-SP 3. Shop prime steel to a dry film thickness of at least 1.5 mils. Do not prime surfaces to be embedded in concrete or mortar or to be field welded.

PART 3 - EXECUTION

3.1 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Baseplates Bearing Plates and Leveling Plates: Clean concrete and masonry surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of base plate.
3. Snug-tighten Pretension anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure.

C. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

D. Do not use thermal cutting during erection[unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M].

E. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened Pretensioned Slip critical as indicated.

F. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

END OF SECTION

SECTION 05 3100

STEEL DECKING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data Shop Drawings and product certificates.

B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), minimum grade as indicated; shop primed.

C. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G90 zinc coating.

2.2 DECKING

A. Comply with SDI Publication No. 31.

B. Roof Deck: Fabricate panels from galvanized-steel sheet, without top-flange stiffening grooves, to comply with the following:

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

    a. Canam Steel Corporation; Canam Group, Inc.
    b. Epic Metals Corporation.
    c. Nucor Corporation.

2. Deck Profile: Type B, narrow rib.
3. Profile Depth: 1-1/2 inches.
4. Design Uncoated-Steel Thickness: 0.0358 inch.

PART 3 - EXECUTION

3.1 DECK INSTALLATION

A. Place, adjust, align, and bear deck panels on structure. Do not stretch or contract side-lap interlocks.

B. Place deck panels flat and square and mechanically fasten to structure without warp or deflection.

C. Cut, reinforce, and fit deck panels and accessories around openings and projections.

D. Roof Deck Accessories: Install sump pans, sump plates, ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels. Screw to substrate.

E. Floor Pour Stops and Girder Fillers: Weld pour stops and girder fillers to structure.

F. Prepare and repair damaged galvanized coatings on both surfaces with galvanized repair paint according to ASTM A 780.

END OF SECTION

SECTION 05 5000

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Shop Drawings.

B. Related Requirements:
   1. Section 133419 “Metal Building Systems”.

PART 2 - PRODUCTS

2.1 METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Bars for Bar Gratings: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or ASTM A 1018/A 1018M.

C. Wire Rod for Bar Grating Crossbars: ASTM A 510.

D. Rolled Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

E. Steel Tubing: ASTM A 500/A 500M.

F. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), black finish.

G. Slotted Channel Framing: Cold-formed steel channels complying with MFMA-4, 1-5/8 by 1-5/8 inches by 0.067-inch minimum thickness, hot-dip galvanized after fabrication.

H. Cast Iron: ASTM A 48/A 48M or ASTM A 47/A 47M.

I. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.

J. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

K. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

L. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.2 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide stainless-steel fasteners for fastening stainless steel.
3. Provide bronze fasteners for fastening bronze.

2.3 GROUT

A. Nonshrink, Nonmetallic Grout: ASTM C 1107; recommended by manufacturer for exterior applications.

2.4 FABRICATION

A. General: Shear and punch metals cleanly and accurately. Remove burrs and ease exposed edges. Form bent-metal corners to smallest radius possible without impairing work.

B. Welding: Weld corners and seams continuously. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. At exposed connections, finish welds and surfaces smooth, with contour of welded surface matching those adjacent.

C. Comply with AWS for recommended practices in shop brazing. Braze behind finished surfaces without distorting or discoloring exposed side. Clean exposed brazed joints of flux, and dress exposed and contact surfaces.

D. Fabricate pipe bollards from Schedule 80 steel pipe. Cap bollards with 1/4-inch-minimum steel plate.

2.5 STEEL AND IRON FINISHES

A. Hot-dip galvanize steel fabrications at exterior locations.

B. Prepare uncoated ferrous metal surfaces to comply with SSPC-SP 3 and paint with a fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide anchorage devices and fasteners where needed to secure items to in-place construction.

B. Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation, with edges and surfaces level, plumb, true, and free of rack.

C. Fit exposed connections accurately together to form hairline joints or, where indicated, with uniform reveals and spaces for sealants and joint fillers.

D. Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

E. Anchor bollards in concrete.

END OF SECTION

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SECTION 064116

PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

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

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and Installer.

1.5 CLOSEOUT SUBMITTALS

A. Quality Standard Compliance Certificates: certificates.

1.6 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.

B. Installer Qualifications: Manufacturer of products Licensed participant in AWI's Quality Certification Program.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.

B. Architectural Woodwork Standards Grade: Custom.

C. Type of Construction: Frameless.

D. Door and Drawer-Front Style: Flush overlay.

1. Reveal Dimension: As indicated.

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   a. Formica Corporation.
   b. Lamin-Art, Inc.
   c. Wilsonart.

F. Laminate Cladding for Exposed Surfaces:

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

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

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

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

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

1. As selected by Architect from laminate manufacturer's full range in the following categories:

2.2 WOOD MATERIALS

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

1. Wood Moisture Content: 4 to 9 percent.

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087100 "Door Hardware."

B. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 135 degrees of opening, self-closing.

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

D. Catches: Magnetic catches, ANSI/BHMA A156.9, B03141.

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

F. Shelf Rests: ANSI/BHMA A156.9, B04013; metal.

G. Drawer Slides: ANSI/BHMA A156.9.

1. Grade 1 and Grade 2: Side mounted.

a. Type: Full extension.

b. Self closing.
c. Material: Zinc-plated steel with polymer rollers.
2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 2.
4. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide Grade 1.
5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.
6. For computer keyboard shelves, provide Grade 1.
7. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-100.

H. Slides for Sliding Glass Doors: ANSI/BHMA A156.9, B07063; aluminum.

I. Door Locks: ANSI/BHMA A156.11, E07121.

J. Drawer Locks: ANSI/BHMA A156.11, E07041.

K. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.

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

1. Color: Black.

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

1. Satin Stainless Steel: ANSI/BHMA 630.

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

O. Steel wall braces for countertop support: SpeedBrace as manufactured by FastCap®.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

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

C. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.5 FABRICATION

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

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

C. Install glass to comply with applicable requirements in Section 088000 "Glazing" and in GANA's "Glazing Manual."

1. For glass in frames, secure glass with removable stops.
2. For exposed glass edges, polish and grind smooth.

PART 3 - EXECUTION

3.1 INSTALLATION

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

B. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.

C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.

D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.

1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

END OF SECTION

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SECTION 06 6400

PLASTIC PANELING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product data[**and Samples**].

PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING

A. General: Gel-coat-finished, glass-fiber-reinforced plastic panels complying with ASTM D 5319.

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

   a. Crane Composites, Inc.
   b. Marlite.
   c. Nudo Products, Inc.
   d. Parkland Plastics, Inc.

2. Nominal Thickness: Not less than 0.09 inch.
3. Surface Finish: Smooth.

B. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.

C. Adhesive: As recommended by plastic paneling manufacturer.

D. Sealant: Mildew-resistant silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 07 9200 "Joint Sealants."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lay out paneling before installing. Locate panel joints so that trimmed panels at corners are not less than 12 inches wide.

1. Locate trim accessories to allow clearance at panel edges according to manufacturer's written instructions.

B. Install panels in a full spread of adhesive.

C. Install trim accessories with adhesive and nails or staples. Do not fasten through panels.

D. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.

E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

END OF SECTION

SECTION 072100

THERMAL INSULATION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and ICC-ES evaluation reports for foam-plastic insulation.

B. Surface-Burning Characteristics: According to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

C. Related Requirements:
   1. Section 133419 “Metal Building Systems”.

PART 2 - PRODUCTS

2.1 INSULATION PRODUCTS

A. Extruded Polystyrene Board, Type V: ASTM C578, Type V, 100-psi minimum compressive strength; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E84.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Dow Chemical Company (The).
      b. Owens Corning.

B. Glass-Fiber-Board Insulation: ASTM C 612, Type IA; unfaced; nominal density of 2.25 lb/cu. ft., with flame-spread and smoke-developed indexes of 25 and 450, respectively.

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

      a. CertainTeed Corporation.
      b. Johns Manville; a Berkshire Hathaway company.

C. Mineral-Wool Board Insulation: ASTM C 612, unfaced; nominal density of 4 lb/cu. ft., with flame-spread and smoke-developed indexes of 25 and 450, respectively.

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

      a. Fibrex Insulations Inc.
      b. Isolatek International.
      c. Owens Corning.

D. Glass-Fiber-Blanket Insulation: ASTM C 665, Type I, unfaced with flame-spread and smoke-developed indexes of 25 and 450, respectively.

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

a. CertainTeed Corporation.
b. Guardian Building Products, Inc.
c. Johns Manville; a Berkshire Hathaway company.

E. Mineral-Fiber-Blanket Insulation: ASTM C 665, Type I, unfaced with flame-spread index of 25 or less.

2.2 ACCESSORIES

A. Vapor Retarder: Reinforced polyethylene , 12 mils thick.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install extruded polystyrene board insulation in areas and in thicknesses indicated or required to produce R-values indicated. Cut and fit tightly around obstructions and fill voids with insulation.

B. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

C. Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage. Locate seams at framing members, overlap, and seal with tape. Seal joints caused by pipes, conduits, electrical boxes, and similar items with tape.

3.2 INSTALLATION OF SLAB INSULATION

A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

C. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

END OF SECTION

SECTION 072500

WEATHER BARRIERS

1. GENERAL

1.1 SUMMARY

A. Section Includes:

2. Building wrap.

3. Flexible flashing.

4. Drainage material.

B. Related Requirements:

1. Section 133419 “Metal Building Systems”.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.

2. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont Safety and Construction; Tyvek CommercialWrap or a comparable Owner-approved product by one of the following:
   a. Dorken Systems Inc.
   b. Dow Chemical Company (The).
   c. Kingspan Insulation Limited.

3. Water-Vapor Permeance: Not less than 20 perms per ASTM E 96/E 96M, Desiccant Method (Procedure A).

B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.2 FLEXIBLE FLASHING

A. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.030 inch.

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

a. DuPont Safety & Construction.

b. Protecto Wrap Company.

c. Raven Industries, Inc.

d. TYPAR.

5. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

A. Cover sheathing with water-resistive barrier as follows:

6. Cut back barrier 1/2 inch on each side of the break in supporting members at expansion- or control-joint locations.

7. Apply barrier to cover vertical flashing with a minimum 4-inch overlap unless otherwise indicated.

B. Building Wrap: Comply with manufacturer's written instructions and warranty requirements.

8. Seal seams, edges, fasteners, and penetrations with tape.

9. Extend into jambs of openings and seal corners with tape.

3.2 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.

10. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.

11. Lap flashing over water-resistive barrier at bottom and sides of openings.

12. Lap water-resistive barrier over flashing at heads of openings.

END OF SECTION

SECTION 07 4113

METAL ROOF PANELS

1.1 SECTION REQUIREMENTS

A. Summary: Factory-formed metal roof panels, fascia, and trim.

B. Submittals: Product Data, Shop Drawings (including proposed seam locations), and color Samples.

C. Related Requirements:
   1. Section 133419 “Metal Building Systems”.

1.2 WARRANTIES

A. Manufacturer's standard written warranty, signed by manufacturer agreeing to promptly repair or replace products that fail to remain weathertight for the period of 20 years.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

   1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

      a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Energy Performance of Roof Panels: Three-year, aged, solar reflectance not less than 0.55 and emissivity not less than 0.75, or aged, Solar Reflectance Index of not less than 64.

B. Solar Reflectance Index: Not less than 29 when calculated according to ASTM E 1980.

C. Wind-Uplift Resistance of Roof Assemblies: UL 580, Class 90.

2.2 METAL ROOF PANELS

A. Roof Panel Type: standing-seam metal roof panels.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ATAS International, Inc; 15.25 inch wide Field-Lok™panels with plank ribs or a comparable product by one of the following:

    a. AEP Span; A BlueScope Steel Company.
    b. Berridge Manufacturing Company.
    c. Butler Manufacturing Company; a division of BlueScope Buildings North America, Inc.
    d. CENTRIA.
    e. Drexel Metals.
    f. Firestone Metal Products, LLC.
    g. MBCI.
    h. Merchant and Evans.
    i. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.

B. Metallic-Coated Steel Roof Panels: Fabricated from galvanized steel sheet, ASTM A 653/A 653M, G90, or aluminum-zinc alloy-coated steel sheet, ASTM A 792/A 792M, Class AZ50.

1. Nominal Metal Thickness: 0.024 inch .
2. Finish: Manufacturer's standard two-coat fluoropolymer system with color coat containing not less than 70 percent polyvinylidene fluoride (PVDF)resin by weight.
    a. Color to be selected by Architect with Owner's consent from manufacturer's standard range.
3. Seam height: 2 inches.
4. Panel coverage: Nominal 16 inches.

2.3 ACCESSORIES

A. Provide components required for a complete roof panel assembly, including trim, fasciae, clips, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Formed from 0.025-inch nominal thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet. Provide flashing and trim as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal roof panels.

C. Self-Adhering Sheet Underlayment, High Temperature: Butyl or SBS-modified asphalt; slip-resisting-polyethylene surfaced; with release-paper backing; cold applied. Stable after testing at 240 deg F and passes after testing at minus 20 deg F; ASTM D 1970.

1. Self-Adhering Sheet Underlayment, High Temperature: Butyl or SBS-modified asphalt; slip-resisting-polyethylene surfaced; with release-paper backing; cold applied. Stable after testing at 240 deg F and passes after testing at minus 20 deg F; ASTM D 1970/D 1970M.
    a. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
        1) ATAS International, Inc.
        2) Atlas Molded Products; a Division of Atlas Roofing Corporation.
        3) Carlisle WIP Products; a brand of Carlisle Construction Materials.
        4) GAF.
        5) Henry Company.
        6) Owens Corning.

D. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

E. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

1. Apply over the entire roof surface.

B. Apply slip sheet over underlayment before installing metal roof panels.

C. Install flashings to cover underlayment to comply with requirements specified in Section 07 6200 "Sheet Metal Flashing and Trim."

D. Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction. Predrill panels for fasteners.

1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized-steel fasteners for surfaces exposed to the interior.
2. Aluminum Roof Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
3. Provide metal closures at rake edges rake walls and each side of ridge caps.
4. Flash and seal metal roof panels with weather closures at eaves, rakes, and perimeter of all openings.
5. Install ridge caps as metal roof panel work proceeds.

E. Install gaskets, joint fillers, and sealants where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants recommended by metal roof panel manufacturer.

F. Separate dissimilar metals with a bituminous coating or self-adhering sheet underlayment.

G. Coat back side of aluminum panels with bituminous coating where they will contact wood, ferrous metal, or cementitious construction.

END OF SECTION

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SECTION 07 4213

METAL WALL PANELS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data, Shop Drawings, and color Samples.

B. Warranties: Manufacturer's standard written warranty, signed by manufacturer agreeing to promptly repair or replace metal wall panels that show evidence of deterioration of factory-applied finishes for the period of 20 years.

C. Related Requirements:
   1. Section 133419 – “Metal Building Systems”.

PART 2 - PRODUCTS

2.1 METAL WALL PANELS

A. Wall Panel Type: Box-rib-profile, concealed clipless fastener system, lap-seam metal wall panels.

   1. Basis-of-Design Product: Subject to compliance with requirements, provide ATAS International, Inc; Metafor™ MFP120 or a comparable product by one of the following or other unnamed products approved by Architect:

      a. AEP Span; A BlueScope Steel Company.
      b. CENTRIA.
      c. Firestone Metal Products, LLC.
      d. MBCI.
      e. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.

B. Aluminum Wall Panels: Fabricated from aluminum sheet, ASTM B 209, alloy as standard with manufacturer for finish required.

   1. Metal Thickness: 0.040 inch.
   2. Exterior Finish: High-performance organic; two-coat fluoropolymer system complying with AAMA 2604, with finish coats containing at least 70 percent PVDF resin by weight.
      a. Color: ATAS 12 Patina Green from standard colors.
   3. Concealed Finish: Manufacturer's standard white or light-colored acrylic or polyester backer finish.

C. Flashing and Trim: Formed from 0.018-inch nominal thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet. Provide flashing and trim as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal wall panels.

D. Provide components required for a complete wall panel assembly, including trim, copings, fasciae, mullions, sills, corner units, clips, seam covers, flashings, louvers, sealants, gaskets, fillers, closure strips, and similar items.

E. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Anchor panels securely in place, with provisions for thermal and structural movement. Field-cutting exterior panels by torch is not permitted. Install panels with concealed fasteners unless otherwise indicated. Where exposed, use fasteners finished to match wall panels.
   1. Aluminum Wall Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

B. Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of wall panel assemblies. Provide types of gaskets, fillers, and sealants as indicated or as recommended by panel manufacturer.

C. Separate dissimilar metals and metal panels from contact with wood or cementitious materials by painting each metal surface in area of contact with a bituminous coating or by other permanent separation.

END OF SECTION

SECTION 079200

JOINT SEALANTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and color Samples. Obtain color selection approvals for all sealent installations.

B. Environmental Limitations: Do not proceed with installation of joint sealants when ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.

C. Related Requirements:
   1. Section 133419 – “Metal Building Systems”.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS

A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under service and application conditions.

B. Sealant for General Exterior Use Where Another Type Is Not Specified, One of the Following:

   1. Single-component, neutral-curing silicone sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use NT.

      a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

         1) GE Construction Sealants; Momentive Performance Materials Inc.
         2) Pecora Corporation.
         3) Permathane®/Acryl-R®; ITW Polymers Sealants North America.
         4) Polymeric Systems, Inc.
         5) Sherwin-Williams Company (The).

   2. Single-component, nonsag urethane sealant, ASTM C 920, Type S; Grade NS; Class 25; and for Use NT.

      a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

         1) BASF Corporation.

2) Bostik, Inc.
3) Pecora Corporation.
4) Sherwin-Williams Company (The).

3. Single-component, nonsag polysulfide sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use NT.

C. Sealant for Exterior Traffic-Bearing Joints, Where Slope Precludes Use of Pourable Sealant:

1. Single-component, nonsag urethane sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use T.

D. Sealant for Exterior Traffic-Bearing Joints, Where Slope Allows Use of Pourable Sealant:

1. Single-component, pourable urethane sealant, ASTM C 920, Type S; Grade P; Class 25; for Use T.

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) BASF Corporation.
2) Pecora Corporation.

E. Sealant for Use in Interior Joints in Ceramic Tile and Other Hard Surfaces in Kitchens and Toilet Rooms and around Plumbing Fixtures:

1. Single-component, mildew-resistant silicone sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use NT; formulated with fungicide.

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) GE Construction Sealants; Momentive Performance Materials Inc.
2) May National Associates, Inc.; a subsidiary of Sika Corporation.
3) Pecora Corporation.
4) Soudal USA.

F. Sealant for Interior Use at Perimeters of Door and Window Frames:

1. Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Everkem Diversified Products, Inc.
2) Franklin International.
3) May National Associates, Inc.; a subsidiary of Sika Corporation.
4) Pecora Corporation.
5) Sherwin-Williams Company (The).

G. Acoustical Sealant:

1. Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission as demonstrated by testing according to ASTM E 90.

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

1) Franklin International.
2) GE Construction Sealants; Momentive Performance Materials Inc.
3) Grabber Construction Products.
4) Hilti, Inc.
5) Pecora Corporation.
6) Serious Energy Inc.

2.2 MISCELLANEOUS MATERIALS

A. Provide sealant backings of materials 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, of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

D. 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.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with ASTM C 1193.

B. Install sealant backings to support sealants during application and to produce cross-sectional shapes and depths of installed sealants that allow optimum sealant movement capability.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal perimeters, control joints, openings, and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions. Comply with ASTM C 919.

END OF SECTION

SECTION 081113

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 01 Specification Sections, apply to this Section.

B. Related Requirements:
   1. Section 133419 “Metal Building Systems”.

1.2 SUMMARY

A. Section includes:

   1. Interior standard steel doors and frames.
   2. Exterior standard steel doors and frames.

B. Related Requirements:
   1. Section 133419 – “Metal Building Systems”.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include the following:

   1. Elevations of each door type.
   2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
   3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.

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

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Field quality control reports.

1.5 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.6 QUALITY ASSURANCE

A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies shall meet the qualifications set forth in NFPA 80, section 5.2.3.1 and the following:

4. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

5. Ceco Door; ASSA ABLOY.

6. Curries Company; ASSA ABLOY.

7. Deansteel Manufacturing Company, Inc.

8. Gensteel Doors, Inc.

9. Pioneer Industries.

10. Republic Doors and Frames.

11. Security Metal Products; a brand of ASSA ABLOY.

12. Steelcraft; an Allegion brand.

2.2 PERFORMANCE REQUIREMENTS

A. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.40 deg Btu/F x h x sq. ft. when tested according to ASTM C 518.

2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2; SDI A250.4, Level B..

13. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches .
    c. Face: Uncoated steel sheet, minimum thickness of 0.042 inch .
    d. Edge Construction: Model 1, Full Flush.
    e. Core:.
    f. Fire-Rated Core: Manufacturer's standard laminated mineral board core for fire-rated doors.

14. Frames:

    a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch .
    b. Construction: Face welded.

2.4 EXTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3; SDI A250.4, Level A..

15. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches .
    c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch , with minimum A40 coating.
    d. Edge Construction: Model 1, Full Flush.
    e. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
    f. Bottom Edges: Close bottom edges of doors with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
    g. Core: Polyurethane.

16. Frames:

    a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch , with minimum A40 coating.
    b. Construction: Face welded.

2.5 FRAME ANCHORS

A. Jamb Anchors:

17. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.

18. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet .
19. Postinstalled Expansion Anchor: Minimum 3/8-inch-diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

C. Material: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

20. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M; hot-dip galvanized according to ASTM A 153/A 153M, Class B.

2.6 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

G. Glazing: Comply with requirements in Section 088000 "Glazing."

2.7 FABRICATION

A. Door 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 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
21. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
22. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
c. Terminated Stops (Hospital Stops): Terminate stops 6 inches above finish floor with a 45-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.

C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

23. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
24. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

25. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated.
26. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
27. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
28. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
29. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.8 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

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

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

A. Hollow-Metal Frames: Comply with SDI A250.11.

31. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.

    a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
    b. Install frames with removable stops located on secure side of opening.

32. Fire-Rated Openings: Install frames according to NFPA 80.
33. Floor Anchors: Secure with postinstalled expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

34. Solidly pack mineral-fiber insulation inside frames.
35. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch , measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch , measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch , measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch , measured at jambs at floor.

B. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.

36. Non-Fire-Rated Steel Doors: Comply with SDI A250.8.
37. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
38. Smoke-Control Doors: Install doors according to NFPA 105.

C. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

A. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

B. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

C. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 CLEANING AND TOUCHUP

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

B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION

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SECTION 08 1416

FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Samples for factory-finished doors.

PART 2 - PRODUCTS

2.1 FLUSH WOOD DOORS

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

1. Eggers Industries.
2. Graham Wood Doors; ASSA ABLOY Group company.
3. Marshfield DoorSystems, Inc.
4. Mohawk Flush Doors, Inc.
5. Oshkosh Door Company.
6. Poncraft Door Company.
7. VT Industries Inc.

2.2 DOOR CONSTRUCTION, GENERAL

A. Quality Standard: WDMA I.S.1-A.

B. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

C. WDMA I.S.1-A Performance Grade:

1. Extra heavy duty unless otherwise indicated.

D. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.

E. Particleboard-Core Doors: Provide blocking in particleboard cores or provide structural composite lumber cores instead of particleboard cores for doors with exit devices or protection plates.

2.3 FLUSH WOOD DOORS

A. Veneer-Faced Doors for Transparent Finish:

1. Interior Solid-Core Doors: Custom grade, five-ply, particleboard or structural composite lumber cores.

    a. Faces: Grade A plain-sliced red oak.
    b. Veneer Matching: Book and balance match.
    c. Pair matching and set matching.
    d. Continuous matching for doors with transoms.

2.4 LOUVERS AND LIGHT FRAMES

A. Louvers: Primed steel louvers.

B. Light Frames: Wood beads of species compatible with door faces.

2.5 FABRICATION AND FINISHING

A. Factory-fit doors to suit frame-opening sizes indicated and to comply with clearances specified.

B. Factory-machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3.

C. Cut and trim openings to comply with referenced standards.

1. Trim light openings with moldings indicated.
2. Factory-install glazing in doors indicated to be factory finished.
3. Factory-install louvers in prepared openings.

D. Factory-finish doors indicated for transparent finish with stain and manufacturer's standard finish complying with WDMA TR-4, conversion varnish for grade specified for doors.

1. Sheen: Satin.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install doors to comply with manufacturer's written instructions and WDMA I.S.1-A, and as indicated.
1. Install smoke- and draft-control doors according to NFPA 105.

B. Clearances: As follows unless otherwise indicated:

1. 1/8 inch at heads, jambs, and between pairs of doors.
2. 1/8 inch from bottom of door to top of decorative floor finish or covering.
3. 1/4 inch from bottom of door to top of threshold.

END OF SECTION

SECTION 08 3113

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

B. Related Requirements:
   1. Section 133419 “Metal Building Systems”.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing per the following:

   1. Vertical Access Doors: NFPA 252 or UL 10B.
   2. Horizontal Access Doors and Frames: NFPA 288.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

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

   1. Activar Construction Products Group, Inc. - JL Industries.
   2. Babcock-Davis.
   3. Karp Associates, Inc.
   4. Larsens Manufacturing Company.
   5. Milcor; a division of Hart & Cooley, Inc.

B. Flush Access Doors with Exposed Flanges: Prime-painted steel units.

C. Locks: Flush to finished surface, screwdriver operated.

2.3 MATERIALS

A. Steel Sheets: ASTM A 1008/A 1008M or ASTM A 591/A 591M.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install access doors and panels accurately in position. Adjust hardware and door and panels for proper operation.

B. Install fire-rated access doors and panels according to NFPA 80.

END OF SECTION

SECTION 08 3613

SECTIONAL DOORS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data, Shop Drawings, manufacturer's color charts, and maintenance data.

B. Related Requirements:
   1. Section 133419 “Metal Building Systems”.

PART 2 - PRODUCTS

2.1 DOOR ASSEMBLY

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

   1. C.H.I. Overhead Doors, Inc.
   2. Clopay Building Products.
   3. Overhead Door Corporation.
   4. Raynor Garage Doors.
   5. Rite-Hite Corporation.

B. Description: Steel sectional door according to DASMA 102 unless otherwise indicated.

   1. Operation Cycles: Not less than 20,000.
   2. Installed R-Value: 6.0 deg F x h x sq. ft./Btu.

C. Structural Performance, Exterior Doors: Capable of withstanding 20 lbf/sq. ft. wind-loading pressure without requiring temporary installation of reinforcing components.

D. Steel Sections: Galvanized steel with flat face sheets.

   1. Finish: Baked enamel or powder coat.

E. Interior Facing Material: Galvanized steel.

F. Electric Door Operator: Standard- duty operator with control station interior mounted.

   1. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use; moving parts of operator enclosed or guarded if exposed and mounted at 8 feet or lower.
   2. Emergency Manual Operation: Chain type.
   3. Obstruction Detection Device: Automatic photoelectric sensor.

G. Tracks and Supports: Galvanized steel, sized for door size and weight.

H. Hardware: Heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.

I. Locks: Spring-loaded deadbolt and adjustable locking bars to engage through slots in tracks.

J. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

K. Portable, Radio Control: Opens, closes, and stops door; three per operator.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install door, track, and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports.

B. Accessibility: Install doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

C. Power-Operated Doors: Install automatic garage door openers according to UL 325.

D. Test and adjust controls and safeties.

END OF SECTION

SECTION 08 4113

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data, Shop Drawings, and color Samples.

1. For entrance doors, include hardware schedule.

B. Related Requirements:
1. Section 133419 “Metal Building Systems”.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Design, engineer, fabricate, and install aluminum-framed storefronts to withstand structural loads indicated.

1. Limit deflection of framing members normal to wall plane to 1/175 of clear span or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.

2. Limit deflection of framing members parallel to glazing plane to L/360 of clear span or 1/8 inch, whichever is smaller.

B. Structural Testing: Systems tested according to ASTM E 330 at 150 percent of inward and outward wind-load design pressures do not evidence material failures, structural distress, deflection failures, or permanent deformation of main framing members exceeding 0.2 percent of clear span.

C. Air Infiltration: Limited to 0.06 cfm/sq. ft. of fixed framing and glass area when tested according to ASTM E 283 at a static-air-pressure difference of 6.24 lbf/sq. ft..

D. Water Penetration: Systems do not evidence water leakage when tested according to ASTM E 331 at minimum differential pressure of 20 percent of positive wind-load design pressure but not less than 10 lbf/sq. ft..

E. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F as determined according to NFRC 100.

2.2 ALUMINUM-FRAMED STOREFRONTS

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

1. Arcadia, Inc.
2. Kawneer North America, an Arconic company.
3. Oldcastle BuildingEnvelope (OBE); CRH Americas.
4. Pittco Architectural Metals, Inc.
5. Trulite Glass & Aluminum Solutions, LLC.
6. U.S. Aluminum; a brand of C.R. Laurence.

B. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated; ASTM B 209 sheet; ASTM B 221 extrusions.

C. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken.

D. Doors: 1-3/4-inch-thick glazed doors with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods. Provide snap-on, extruded-aluminum glazing stops and preformed gaskets.

1. Door Design: Wide stile; 5-inch nominal width.
2. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.
3. Interior Doors: Provide BHMA A156.16 silencers, three on strike jamb of single-door frames and two on head of double-door frames.
4. Exterior Doors: Provide compression weather stripping at fixed stops. At other locations, provide sliding weather stripping retained in adjustable strip mortised into door edge.
5. Hardware: As specified in Section 08 7100 "Door Hardware."

E. Glazing: Comply with Section 08 8000 "Glazing."

F. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

G. Fasteners and Accessories: Compatible with adjacent materials, corrosion resistant, nonstaining, and nonbleeding. Use concealed fasteners except for application of door hardware.

H. Fabrication: Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide subframes and reinforcing of types indicated or, if not indicated, as required for a

complete system. Factory-assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.

1. Door Framing: Reinforce to support imposed loads. Factory-assemble door and frame units and factory-install hardware to greatest extent possible. Reinforce door and frame units for hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.

I. Aluminum Finish: Class II, color anodic finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Isolate metal surfaces in contact with incompatible materials, including wood, by painting contact surfaces with bituminous coating or primer or by applying sealant or tape recommended by manufacturer.

B. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 07 9200 "Joint Sealants" to produce weathertight installation.

D. Install framing components true in alignment with established lines and grades to the following tolerances:

1. Variation from Plane: Limit to 1/8 inch in 12 feet; 1/4 inch over total length.

2. Alignment: For surfaces abutting in line, limit offset to 1/16 inch. For surfaces meeting at corners, limit offset to 1/32 inch.

3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

E. Install doors without warp or rack. Adjust doors and hardware to provide tight fit at contact points and smooth operation.

END OF SECTION

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SECTION 08 5113

ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data, Shop Drawings, and color Samples.

B. Related Requirements:
   1. Section 133419 “Metal Building Systems”.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

   1. Graham Architectural Products Corporation.
   2. Kawneer North America, an Arconic company.
   3. Peerless Products Inc.
   4. Quaker Windows Products Co.

2.2 PERFORMANCE REQUIREMENTS

A. Product Standard: AAMA/WDMA/CSA 101/I.S.2/A440.

   1. Window Certification: AMMA certified with label attached to each window.
   2. Performance Class: LC.
   3. Performance Grade: 25.

B. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.30 Btu/sq. ft. x h x deg F.

C. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.40.

2.3 ALUMINUM WINDOWS

A. Window Types: The following types, as indicated on Drawings:
   1. Single hung.
   2. Horizontal sliding.
   3. Fixed.

B. Construction: Provide units with a concealed, thermal break.

C. Finish: Class II, color anodic finish; complying with AAMA 611.

D. Trim: Provide indicated trim, matching material and finish of frame members.

E. Equip units with vinyl-coated, glass-fiber mesh insect screens at operable sashes.

F. Glaze units with clear, low-E-coated, sealed insulating glass, complying with Section 08 8000 "Glazing."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set units level, plumb, and true to line, without warp or rack of frames and panels. Provide proper support and anchor securely in place.

B. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.

C. Set sill members in bed of sealant or with gaskets, as indicated, to provide weathertight construction.

D. Adjust operating panels, screens, and hardware to provide a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

E. Clean glass and aluminum surfaces immediately after installing windows. Remove nonpermanent labels from glass surfaces.

END OF SECTION

SECTION 086200

UNIT SKYLIGHTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Tubular daylighting devices.

B. Related Requirements:
   1. Section 133419 “Metal Building Systems”.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

   1. Include plans, elevations, sections, mounting, and attachment details and methods of structural support.
   2. Include diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each color and finish specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Evaluation reports.

C. Field quality-control reports.

D. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 WARRANTY

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

1. Warranty Period:

a. Products and Accessories: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Performance Standard: Comply with AAMA/WDMA/CSA 101/1.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Minimum Performance Grade: PG 80.
2. Label Requirements: Label each product with names of manufacturer and labeling agency and AAMA/WDMA/CSA 101/1.S.2/A440 product designation, performance grade, and test specimen size equal to or greater than the size of the product.
3. Certification Requirements: Provide AAMA or WDMA certified products, with label attached to each.

B. Provide U-factor and solar heat gain coefficient as indicated on drawings.

C. Plastic Glazing:

1. Self-Ignition Temperature: 650 deg F or more for plastic sheets in thickness indicated when tested in accordance with ASTM D1929.
2. Smoke-Production Characteristics: Smoke-developed index of 450 or less when tested in accordance with ASTM E84, and smoke density of 75 or less when tested in accordance with ASTM D2843.
3. Combustibility Characteristics: Tested in accordance with ASTM D635 and classified for burning rate of nominal thickness of 0.060 inch or thickness of plastic glazing indicated for use as follows:

a. Class CC1: Burning rate of 1 inch per minute or less.
b. Class CC2: Burning rate of 2-1/2 inches per minute or less.

D. Exterior Fire-Test Exposure: Provide products identical to those of assemblies tested for Class B fire resistance in accordance with ASTM E108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 TUBULAR DAYLIGHTING DEVICES

A. Tubular Daylighting Device: Complete with exterior glazed opening, glazing retainers and gaskets, exterior flashing assembly, reflective tube, interior diffuser assembly, and components and accessories required to provide a complete installation.
   a. Products: Subject to compliance with requirements, provide Solatube International, Inc, models as follows:Solatube Model 750 DS-O Open Ceiling Daylighting System.
   b. Solatube Model 750 DS-C Closed Ceiling Daylighting System.

B. Substitutions: Not permitted.

C. Product Type: AAMA/WDMA/CSA 101/1.S.2/A440 TDDCC, tubular daylighting device - closed ceiling and TDDOC, tubular daylighting device - open ceiling as indicated on drawings.

D. Nominal Reflective Tube Diameter: 21 inches.

E. Exterior Glazing: Manufacturer's standard single dome.

   1. Size: As required to coordinate with reflective tube.
   2. Material:
      a. Polycarbonate: Thermoformable, extruded monolithic sheets, UV resistant, burglar-resistance rated in accordance with UL 972; with average impact strength of 12 to 16 ft-lb/in. of width when tested in accordance with ASTM D256, Test Method A (Izod); and Class CC1 based on testing in accordance with ASTM D635.
      b. Minimum Thickness: 0.125 inch.

   3. Seal: Manufacturer's standard.
   4. Exterior Glazing Accessories:

      a. Fire-Protection Band: Dome edge-protection band matching flashing material and finish. Domes installed with fire-protection band pass Class B burning brand tests when tested in accordance with ASTM E108.
      b. Security Grille: Manufacturer's standard stainless steel 1/8-inch-diameter rods formed into guard with maximum 8-inch opening and fastened to curb-cap assembly.
      c. Security Kit: Manufacturer' standard rivets with nylon spacers to replace dome screws.

F. Exterior Flashing: Manufacturer's standard one-piece, self-mounted type.

   1. Size: As required to coordinate with exterior glazing and reflective tube.
   2. Base Pitch: None, flat.
   3. Base Height: 11 inches.
   4. Material: Manufacturer's standard corrosion-resistant metal and finish.
   5. Tube Attachment: Manufacturer's standard receiver attached to top of roof flashing and serving as mounting base for dome assembly; provides thermal break between flashing and reflective tube; configured to channel condensed moisture to the exterior.

      a. Seal: Manufacturer's standard that provides weathertight seal with roof flashing.

   6. Flashing Accessories:

a. Flashing Insulation: Manufacturer's standard thermal isolation material.

G. Reflective Tube:

1. Flexible Tube: Reflective, metalized polyester, fiberglass scrim, and steel-wire spring tube.

a. Length: As required to accommodate installation area.

1) Tube Extensions: Provide manufacturer's standard components as required to accommodate installation areas indicated.

2. Rigid Tube: Light shaft formed from aluminum sheet, ASTM B209, with manufacturer's standard specular interior finish.

a. Thickness: Manufacturer's standard.
b. Length and Configuration: As indicated on Drawings.

1) Tube Extensions: Provide manufacturer's standard components as required to accommodate installation areas indicated.
2) Tube Elbows: Provide angle adaptors adjustable to 30 degrees as required to accommodate installation areas indicated.

c. Color Rendition: When tested in accordance with ASTM E308, minimum L* axis value of 99 and a* (green to red) and b* (blue to yellow) axes values not more than 1 or less than minus 1 in accordance with CIELAB results.
d. Fastening System: Manufacturer's standard that provides tight mating of interconnecting tube component pieces.

3. Tube Accessories:

a. Suspension Wire: Manufacturer's standard to provide bracing of tube to structure as required for a fully supported installation.
b. Ceiling Trim: Manufacturer's standard trim for ceiling opening.
c. Trim Ring: Manufacturer's standard trim that covers the cut edge of the roof deck penetration.

H. Interior Diffuser: Assembly attached to bottom of reflective tube, with high-visible-light-transmittance lens separated by airtight seals providing insulating airspace.

1. Size: As required to coordinate with reflective tube.
2. Lens Type: Round, prismatic lens, acrylic Class CC2 based on testing in accordance with ASTM D635.

a. Metal Trim Finish: White.

2.3 ACCESSORY MATERIALS

A. Fasteners: Same metal as metal being fastened, nonmagnetic stainless steel, or other noncorrosive metal that is compatible with the materials being fastened and as recommended in writing by manufacturer. Finish exposed fasteners to match material being fastened.

1. Where removal of exterior exposed fasteners might allow access to building, provide nonremovable fastener heads.

B. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate installation of products and accessories with installation of substrates, vapor retarders, roof insulation, roofing membrane, and flashing as required to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight.

B. Install products and accessories to comply with recommendations in AAMA 1607 and with manufacturer's written installation instructions.

C. Install products true to line and without distortion.

D. Anchor products securely to supporting substrates.

E. Where metal surfaces of products will contact other metal or corrosive substrates, such as preservative-treated wood, apply bituminous coating on concealed metal surfaces or provide other approved permanent separation recommended in writing by manufacturer.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. After completion of installation and nominal curing of sealant and glazing compounds, but before installation of interior finishes, test for water leaks in accordance with AAMA 501.2.

C. Perform test for total area of each installed product.

D. Work will be considered defective if it does not pass tests and inspections.

E. Additional testing and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

F. Prepare test and inspection reports.

END OF SECTION

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SECTION 08 7100

DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes: Finish Hardware for door openings, except as otherwise specified herein.

1. Door hardware for steel (hollow metal) doors.
2. Door hardware for aluminum doors.
3. Door hardware for wood doors.
4. Door hardware for other doors indicated.
5. Keyed cylinders as indicated.

B. Related Sections:

1. Division 6: Rough Carpentry.
2. Division 8: Aluminum Doors and Frames
3. Division 8: Hollow Metal Doors and Frames.
4. Division 8: Wood Doors.
5. Division 26 Electrical
6. Division 28: Electronic Security

C. References: Comply with applicable requirements of the following standards. Where these standards conflict with other specific requirements, the most restrictive shall govern.

1. Builders Hardware Manufacturing Association (BHMA)
2. NFPA 101 Life Safety Code
3. NFPA 80 -Fire Doors and Windows
4. ANSI-A156.xx- Various Performance Standards for Finish Hardware
5. UL10C – Positive Pressure Fire Test of Door Assemblies
6. ANSI-A117.1 – Accessible and Usable Buildings and Facilities
7. DHI /ANSI A115.IG – Installation Guide for Doors and Hardware
8. ICC – International Building Code Council with reference to International Building Code

D. Intent of Hardware Groups

1. Should items of hardware not definitely specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
2. Where items of hardware aren't definitely or correctly specified, are required for completion of the Work, a written statement of such omission, error, or other discrepancy to be submitted to Architect, prior to date specified for receipt of bids for clarification by addendum; or, furnish such items in the type and quality established by this specification, and appropriate to the service intended.

E. Allowances

1. Refer to Division 1 for allowance amount and procedures.

F. Alternates

1. Refer to Division 1 for Alternates and procedures.

1.2 SUBSTITUTIONS:

A. Comply with Division 1.

1.3 SUBMITTALS:

A. Comply with Division 1.

B. Special Submittal Requirements: Combine submittals of this Section with Sections listed below to ensure the "design intent" of the system/assembly is understood and can be reviewed together.

C. Product Data: Manufacturer's specifications and technical data including the following:

1. Detailed specification of construction and fabrication.
2. Manufacturer's installation instructions.
3. Wiring diagrams for each electric product specified. Coordinate voltage with electrical before submitting.
4. Submit 6 copies of catalog cuts with hardware schedule.
5. Provide 9001-Quality Management and 14001-Environmental Management for products listed in Materials Section 2.2

D. Shop Drawings - Hardware Schedule: Submit 6 complete reproducible copy of detailed hardware schedule in a vertical format.

1. List groups and suffixes in proper sequence.
2. Completely describe door and list architectural door number.
3. Manufacturer, product name, and catalog number.
4. Function, type, and style.
5. Size and finish of each item.
6. Mounting heights.
7. Explanation of abbreviations and symbols used within schedule.
8. Detailed wiring diagrams, specially developed for each opening, indicating all electric hardware, security equipment and access control equipment, and door and frame rough-ins required for specific opening.

E. Templates: Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.

1. Templates, wiring diagrams and "reviewed Hardware Schedule" of electrical terms to electrical for coordination and verification of voltages and locations.

F. Samples: (If requested by the Architect for owner review)

1. 1 sample of Lever and Rose/Escutcheon design, (pair).
2. 3 samples of metal finishes

G. Contract Closeout Submittals: Comply with Division 1 including specific requirements indicated.

1. Operating and maintenance manuals: Submit 3 sets containing the following.

a. Complete information in care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.
b. Catalog pages for each product.
c. Name, address, and phone number of local representative for each manufacturer.
d. Parts list for each product.

2. Copy of final hardware schedule, edited to reflect, "As installed".
3. Copy of final keying schedule
4. As installed “Wiring Diagrams” for each piece of hardware connected to power, both low voltage and 110 volts.
5. One set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

1.4 QUALITY ASSURANCE

A. Comply with Division 1.

1. Statement of qualification for distributor and installers.
2. Statement of compliance with regulatory requirements and single source responsibility.
3. Distributor's Qualifications: Firm with 3 years experience in the distribution of commercial hardware.

    a. Distributor to employ full time Architectural Hardware Consultants (AHC) for the purpose of scheduling and coordinating hardware and establishing keying schedule.
    b. Hardware Schedule shall be prepared and signed by an AHC.

4. Installer's Qualifications: Firm with 3 years experienced in installation of similar hardware to that required for this Project, including specific requirements indicated.
5. Regulatory Label Requirements: Provide testing agency label or stamp on hardware for labeled openings.

    a. Provide UL listed hardware for labeled and 20 minute openings in conformance with requirements for class of opening scheduled.
    b. Underwriters Laboratories requirements have precedence over this specification where conflict exists.

6. Single Source Responsibility: Except where specified in hardware schedule, furnish products of only one manufacturer for each type of hardware.

B. Review Project for extent of finish hardware required to complete the Work. Where there is a conflict between these Specifications and the existing hardware, notify the Architect in writing and furnish hardware in compliance with the Specification unless otherwise directed in writing by the Architect.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Comply with Division 1.

1. Deliver products in original unopened packaging with legible manufacturer's identification.
2. Package hardware to prevent damage during transit and storage.
3. Mark hardware to correspond with "reviewed hardware schedule".
4. Deliver hardware to door and frame manufacturer upon request.

B. Storage and Protection: Comply with manufacturer's recommendations.

1.6 PROJECT CONDITIONS:

A. Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.

B. Review Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

1.7 WARRANTY:

A. Refer to Conditions of the Contract

B. Manufacturer's Warranty:

1. Closers: Lifetime
2. Exit Devices: Five Years
3. Cylindrical Locksets & Cylinders: Ten years
4. Mortise Locksets & Cylinders: Lifetime
5. All other Hardware: Two years.

1.8 OWNER'S INSTRUCTION:

A. Instruct Owner's personnel in operation and maintenance of hardware units.

1.9 MAINTENANCE:

A. Extra Service Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals Section.

1. Special Tools: Provide special wrenches and tools applicable to each different or special hardware component.
2. Maintenance Tools: Provide maintenance tools and accessories supplied by hardware component manufacturer.
3. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra service materials.

B. Maintenance Service: Submit for Owner's consideration maintenance service agreement for electronic products installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. The following manufacturers are approved subject to compliance with requirements of the Contract Documents. Approval of manufacturers other than those listed shall be in accordance with Division 1.

Item:	Manufacturer:
Hinges	Stanley
Continuous Hinges	Stanley
Locksets	Stanley
Cylinders	Platinum
Exit Devices	Precision
Closers	Stanley
Push/Pull Plates	Trimco
Push/Pull Bars	Trimco
Protection Plates	Trimco
Overhead Stops	ABH
Door Stops	Trimco
Flush Bolts	Trimco
Coordinator & Brackets	Trimco
Threshold & Gasketing	National Guard

2.2 MATERIALS:

A. Hinges: Shall be Five Knuckle Ball bearing hinges

1. Template screw hole locations
2. Bearings are to be fully hardened.
3. Bearing shell is to be consistent shape with barrel.
4. Minimum of 2 permanently lubricated non-detachable bearings on standard weight hinge and 4 permanently lubricated bearing on heavy weight hinges.
5. Equip with easily seated, non-rising pins.
6. Non Removable Pin screws shall be slotted stainless steel screws.
7. Hinges shall be full polished, front, back and barrel.
8. Hinge pin is to be fully plated.
9. Bearing assembly is to be installed after plating.
10. Sufficient size to allow 180-degree swing of door
11. Furnish five knuckles with flush ball bearings
12. Provide hinge type as listed in schedule.
13. Furnish 3 hinges per leaf to 7 foot 6 inch height. Add one for each additional 30 inches in height or fraction thereof.
14. Tested and approved by BHMA for all applicable ANSI Standards for type, size, function and finish
15. UL10C listed for Fire rated doors.

B. Geared Continuous Hinges:

1. Tested and approved by BHMA for ANSI A156.26-1996 Grade 1
2. Anti-spinning through fastener
3. Non-handed
4. Lifetime warranty
5. Sufficient size to permit door to swing 180 degrees

C. Cylindrical Grade 2 Type Locks and Latchsets:

1. Certified by BHMA for ANSI A156.3, Series 4000, Operational Grade 2.
2. Fit modified ANSI A115.3 door preparation
3. Locksets and cores to be of the same manufacturer to maintain complete lockset warranty
4. 2-3/4 inch (70mm) backset, or 2 3/8 inch backset as needed
5. 1/2 inch (14mm) throw latchbolt
6. Provide locksets with 7-pin core.
7. Functions and design as indicated in the hardware groups
8. Acceptable manufacturers and/or products:
   a. dormakaba USA Inc. – Stanley QCL200 Series

D. Exit Devices:

1. Exit devices to meet or exceed BHMA for ANSI 156.3, Grade 1.
2. Exit devices to be tested and certified by UL or by a recognized independent laboratory for mechanical operational testing to 10 million cycles minimum with inspection confirming Grade 1 Loaded Forces have been maintained.
3. Exit devices chassis to be investment cast steel, zinc dichromate.
4. Exit devices to have stainless steel deadlocking ¾" through latch bolt.
5. Exit devices to be equipped with sound dampening on touchbar.
6. Non-fire rated exit devices to have cylinder dogging.

7. Non-fire rated exit devices to have ¼" minimum turn hex key dogging.
8. Touchpad to be "T" style constructed of architectural metal with matching metal end caps.
9. Touchbar assembly on wide style exit devices to have a ¼" clearance to allow for vision frames.
10. All exposed exit device components to be of architectural metals and "true" architectural finishes.
11. Provide strikes as required by application.
12. Fire exit hardware to conform to 2018 UBC. UL tested for Accident Hazard.
13. The strike is to be black powder coated finish.
14. Exit devices to have field reversible handing.
15. Provide heavy duty vandal resistant lever trim with heavy duty investment cast stainless steel components and extra strength shock absorbing overload springs. Lever shall not require resetting. Lever design to match locksets and latchsets.
16. Provide 9001-Quality Management and 14001-Environmental Management.
17. Vertical Latch Assemblies to have gravity operation, no springs.
18. Exit Device Intruder Function Visual Indicator is to be used in conjunction with the ANSI "10" Function, which allows the outside lever trim to be locked from the inside while the door remains closed. Rim cylinder on the exterior/trim side retracts the latch from the outside.
    a. Indicator to be actuated by a rim cylinder equipped with a keyed core or thumb-turn.
    b. Directional indicator feature shall have a large status indicator window with directional pointer embossed into the active case cover to indicate key turn direction to lock and unlock outside lever trim. Labels or stickers are not acceptable.
    c. The status indicator window shall be integrated into the housing of the exit device and is to contain bright reflective material that may be seen in low light conditions.
    d. Indicator window to be protected by impact resistant lens cover.
    e. The action to lock down/unlock shall require a quarter turn (90°) of key or thumb turn.
        1) Locked status shall be indicated by a red indicator that will appear under the lens cover with an image of a locked padlock.
        2) Unlocked status shall be indicated by a green indicator that will appear under the lens of the cover with an image of an unlocked padlock.
19. Acceptable manufacturers and/or products:
    a. dormakaba USA Inc. – Precision Apex 2000 Series
    b. No Substitution – Owners Standard

E. Cylinders:

1. Provide the necessary cylinder housings, collars, rings & springs as recommended by the manufacturer for proper installation.
2. Provide the proper cylinder cams or tail piece as required to operate all locksets and other keyed hardware items listed in the hardware sets.
3. Coordinate and provide as required for related sections.
4. Acceptable manufacturers and/or products:
    a. Platinum Cores

F. Door Closers shall:

1. Tested and approved by BHMA for ANSI 156.4, Grade 1
2. UL10C certified
3. Provide 9001-Quality Management and 14001-Environmental Management.
4. Closer shall have extra-duty arms and knuckles
5. Conform to ANSI 117.1
6. Maximum 2 7/16 inch case projection with non-ferrous cover
7. Separate adjusting valves for closing and latching speed, and backcheck
8. Provide adapter plates, shim spacers and blade stop spacers as required by frame and door conditions
9. Full rack and pinion type closer with 1½" minimum bore
10. Mount closers on non-public side of door, unless otherwise noted in specification
11. Closers shall be non-handed, non-sized and multi-sized.

12. Acceptable manufacturers and/or products:
    a. dormakaba USA Inc. – Stanley QDC100 Series
    b. No Substitution – Owners Standard

G. Door Stops: Provide a dome floor or wall stop for every opening as listed in the hardware sets.

1. Wall stop and floor stop shall be wrought bronze, brass or stainless steel.
2. Provide fastener suitable for wall construction.
3. Coordinate reinforcement of walls where wall stop is specified.
4. Provide dome stops where wall stops are not practical. Provide spacers or carpet riser for floor conditions encountered

H. Over Head Stops: Provide a Surface mounted or concealed overhead when a floor or wall stop cannot be used or when listed in the hardware set.

1. Concealed overhead stops shall be heavy duty bronze or stainless steel.
2. Surface overhead stops shall be heavy duty bronze or stainless steel.

I. Push Plates: Provide with four beveled edges ANSI J301, .050 thickness, size as indicated in hardware set. Furnish oval-head countersunk screws to match finish.

J. Pulls with plates: Provide with four beveled edges ANSI J301, .050 thickness Plate s with ANSI J401 Pull as listed in hardware set. Provide proper fasteners for door construction.

K. Push Pull Bars: Provide ANSI J504, .1" Dia. Pull and push bar model and series as listed in hardware set. Provide proper fasteners for door construction.

L. Kickplates: Provide with four beveled edges ANSI J102, 10 inches high by width less 2 inches on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.

M. Mop plates: Provide with four beveled edges ANSI J103, 4 inches high by width less 1 inch on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.

N. Door Bolts: Flush bolts for wood or metal doors.

1. Provide a set of Automatic bolts, Certified ANSI/BHMA 156.3 Type 25 for hollow metal label doors.
2. Provide a set of Automatic bolts, Certified ANSI/BHMA 156.3 Type 27 at wood label doors.
3. Manual flush bolts, Certified ANSI/BHMA 156.16 at openings where allowed local authority.
4. Provide Dust Proof Strike, Certified ANSI/BHMA 156.16 at doors with flush bolts without thresholds.

O. Coordinator and Brackets: Provide a surface mounted coordinator when automatic bolts are used in the hardware set.

1. Coordinator, Certified ANSI/BHMA A1156.3 Type 21A for full width of the opening.
2. Provide mounting brackets for soffit applied hardware.
3. Provide hardware preparation (cutouts) for latches as necessary.

P. Seals: All seals shall be finished to match adjacent frame color. Seals shall be furnished as listed in schedule. Material shall be UL listed for labeled openings.

Q. Weatherstripping: Provide at head and jambs only those units where resilient or flexible seal strip is easily replaceable. Where bar-type weatherstrip is used with parallel arm mounted closers install weatherstrip first.

1. Weatherstrip shall be resilient seal of (Neoprene, Polyurethane, Vinyl, Pile, Nylon Brush, Silicone)

2. UL10C Positive Pressure rated seal set when required.

R. Door Bottoms/Sweeps: Surface mounted or concealed door bottom where listed in the hardware sets.

1. Door seal shall be resilient seal of (Neoprene, Polyurethane, Nylon Brush, Silicone)
2. UL10C Positive Pressure rated seal set when required.

S. Thresholds: Thresholds shall be aluminum beveled type with maximum height of ½" for conformance with ADA requirements. Furnish as specified and per details. Provide fasteners and screws suitable for floor conditions.

2.3 FINISH:

A. Designations used in Schedule of Finish Hardware - 3.05, and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 including coordination with traditional U.S. finishes shown by certain manufacturers for their products

B. Powder coat door closers to match other hardware, unless otherwise noted.

C. Aluminum items shall be finished to match predominant adjacent material. Seals to coordinate with frame color.

2.4 KEYS AND KEYING:

A. Cylinders to be Platinum Cores

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of conditions: Examine doors, frames, related items and conditions under which Work is to be performed and identify conditions detrimental to proper and or timely completion.

1. Do not proceed until unsatisfactory conditions have been corrected.

3.2 HARDWARE LOCATIONS:

A. Mount hardware units at heights indicated in the following publications except as specifically indicated or required to comply with the governing regulations.

1. Recommended Locations for Builder's Hardware for Standard Steel Doors and Frames, by the Door and Hardware Institute (DHI).

2. Recommended locations for Architectural Hardware for flush wood doors (DHI).

3. WDMA Industry Standard I.S.-1A-04, Industry Standard for Architectural wood flush doors.

3.3 INSTALLATION:

A. Install each hardware item per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

B. Conform to local governing agency security ordinance.

C. Install Conforming to ICC/ANSI A117.1 Accessible and Usable Building and Facilities.

1. Adjust door closer sweep periods so that from the open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the landing side of the door.

D. Installed hardware using the manufacturers fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use “Riv-Nuts” or similar products.

3.4 FIELD QUALITY CONTROL AND FINAL ADJUSTMENT

A. Contractor/Installers, Field Services: After installation is complete, contractor shall inspect the completed door openings on site to verify installation of hardware is complete and properly adjusted, in accordance with both the Contract Documents and final shop drawings.

1. Check and adjust closers to ensure proper operation.

2. Check latchset, lockset, and exit devices are properly installed and adjusted to ensure proper operation.

   a. Verify levers are free from binding.
   b. Ensure latchbolts and dead bolts are engaged into strike and hardware is functioning.

3. Report findings, in writing, to architect indicating that all hardware is installed and functioning properly. Include recommendations outlining corrective actions for improperly functioning hardware if required.

3.5 SCHEDULE OF FINISH HARDWARE:

Manufacturer List

Code	Name
AB	ABH Manufacturing Inc.
AD	Adams Rite
BE	Best Access Systems
BY	By Others
DM	Dorma Door Controls
KA	Kaba/Ilco
NA	National Guard
PR	Precision
ST	Stanley
TR	Trimco

Finish List

Code	Description
AL	Aluminum
626	Satin Chromium Plated
628	Satin Aluminum, Clear Anodized
630	Satin Stainless Steel
689	Aluminum Painted
US26D	Chromium Plated, Dull
US32D	Stainless Steel, Dull

Option List

Code	Description

M5	Galvanized Steel Chain
CSK	Counter Sunk Screw Holes
VIB	Double Visual Indictor Option
B4E	Beveled 4 Edges

Hardware Sets

SET #1.0

Doors: 100

2	Pivot Set	OPJ350	626	DM
1	Deadlock	MS1850SN	628	AD
1	Mortise Cylinder	7206 L/C	626	KA
1	Permanent Core	Platinum	626	BY
1	ADA Turn Knob Mortise Cyl.	ADA-7201	626	KA
2	Push/Pull Set	1747-1	628	TR
2	Door Closer - Cush Stop	QDC119	689	ST
2	Door Stop	1209HA	630	TR
1	Two-Point Flushbolt	MS1880	628	AD
2	Spacer Block	P45HD-110	689	ST
2	Angle Bracket	P45HD-112	689	ST
1	Integral Seals	by Door/Frame Mfg.		BY
1	Handicap Threshold	513A	AL	NA

NOTE: Locate floor stop to coincide with door closer arm stop so that doors stop at 90 degrees. Floor stops are used to mitigate door & frame damage from wind and pedestrian traffic.

SET #2.0

Doors: 101C

3	Hinges	FBB179 4 1/2 X 4 1/2 NRP	US26D	ST
1	Lockset - Storeroom	QCL270 E L/C	626	ST
1	Permanent Core	Platinum	626	BY
1	Door Closer - Cush Stop	QDC119	689	ST
1	Kick Plate	K0050 10" x 2" LDW B4E CSK	630	TR
1	Door Stop	1209HA	630	TR
1	Lock Guard	5002	630	TR
1	Weatherstrip	160SA Head & Jambs		NA
1	Door Sweep	200NA		NA
1	Handicap Threshold	513A	AL	NA

NOTE: Locate floor stop to coincide with door closer arm stop so that door stops at 90 degrees. Floor stops are used to mitigate door & frame damage from wind and pedestrian traffic.

SET #3.0

Doors: 112A, 113A

3	Hinges	FBB179 4 1/2 X 4 1/2 NRP	US26D	ST
1	Exit Device	2103 X 4903A	630	PR
1	Rim Cylinder	7076 L/C	626	KA
1	Door Closer - Cush Stop	QDC119	689	ST
1	Kick Plate	K0050 10" x 2" LDW B4E CSK	630	TR
1	Door Stop	1209HA	630	TR
1	Weatherstrip	160SA Head & Jambs		NA
1	Door Sweep	200NA		NA
1	Handicap Threshold	513A	AL	NA

NOTE: Locate floor stop to coincide with door closer arm stop so that door stops at 90 degrees. Floor stops are used to mitigate door & frame damage from wind and pedestrian traffic.

SET #4.0

Doors: 110

3	Hinges	FBB179 4 1/2 X 4 1/2 NRP	US26D	ST
1	Lockset - Storeroom	QCL270 E L/C	626	ST
1	Permanent Core	Platinum	626	BY
1	Overhead Stop	4424	US32D	AB
1	Door Stop	1209HA	630	TR
1	Weatherstrip	160SA Head & Jambs		NA
1	Door Sweep	200NA		NA
1	Handicap Threshold	513A	AL	NA

NOTE: Locate floor stop to coincide with overhead stop so that door stops at 90 degrees. Floor stops are used to mitigate door & frame damage from wind and pedestrian traffic.

SET #5.0

Doors: 112, 113, 114

3	Hinges	FBB179 4 1/2 X 4 1/2	US26D	ST
1	Lockset - Office	QCL250 E L/C	626	ST
1	Permanent Core	Platinum	626	BY
1	Door Closer - Rw/PA	QDC111	689	SH
1	Kick Plate	K0050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CVSV	626	TR
1	Gasketing	5050B Head & Jambs		NA

SET #6.0

Doors: 101

3	Hinges	FBB179 4 1/2 X 4 1/2	US26D	ST
1	Lockset - Storeroom	QCL270 E L/C	626	ST
1	Permanent Core	Platinum	626	BY
1	Door Closer - Rw/PA	QDC111	689	SH
1	Kick Plate	K0050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CVSV	626	TR
1	Gasketing	5050B Head & Jambs		NA

SET #7.0

Doors: 102

6	Hinges	FBB179 4 1/2 X 4 1/2	US26D	ST
1	Flush Bolt	3917-12(top bolt only)	626	TR
1	Lockset - Storeroom	QCL270 E L/C	626	ST
1	Permanent Core	Platinum	626	BY
2	Overhead Stop	4424	US32D	AB
1	Gasketing	5050B Head & Jambs		NA
1	Astragal	158NA		NA

SET #8.0

Doors: 105, 107, 109

3	Hinges	FBB179 4 1/2 X 4 1/2	US26D	ST
1	Lockset - Office	QCL250 E L/C	626	ST
1	Permanent Cores	Platinum	626	BY
1	Wall Bumper	1270CVSV	626	TR
1	Gasketing	5050B Head & Jambs		NA

SET #9.0

Doors: 106, 111

3	Hinges	FBB179 4 1/2 X 4 1/2	US26D	ST
1	Lockset - Storeroom	QCL270 E L/C	626	ST
1	Permanent Core	Platinum	626	BY
1	Wall Bumper	1270CVSV	626	TR
1	Gasketing	5050B Head & Jambs		NA

SET #10.0

Doors: 103, 104

3	Hinges	FBB179 4 1/2 X 4 1/2	US26D	ST
1	Privacy Set	QCL240 E	626	ST
1	Wall Bumper	1270CVSV	626	TR
1	Gasketing	5050B Head & Jambs		NA

SET #11.0

Doors: 101A, 101B

NOTE: All hardware by Overhead Door Mfg.

END OF SECTION

SECTION 08 8000

GLAZING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Samples.

1.2 WARRANTY

A. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.
   1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
   1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

C. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

D. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

2.2 GLASS PRODUCTS

A. Fully Tempered Float Glass: ASTM C 1048, Kind FT; Type I; Quality-Q3.

B. Insulating-Glass Units:
   1. Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.

2. Meet or exceed current International Energy Conservation Code requirements.

C. Plastic Glazing: Polycarbonate sheet; ASTM C1349, Appendix X1, Type I (standard, UV stabilized), with a polished finish.

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

   a. Altuglas International, Division of Arkema Inc.
   b. Amerilux International, LLC.
   c. Covestro LLC.

2. Nominal Thickness: 0.177 inch .
3. Color: As selected by Architect from manufacturer's full range.
4. Combustibility Class: CC1.
5. Flame-Spread Index: 25 or less.

D. Decorative Film Overlay: Translucent, dimensionally stable, cast PVC film, 2-mil-minimum thickness, with pressure-sensitive, clear adhesive back for adhering to glass and releasable protective backing.

1. Basis-of-Design Product: Subject to compliance with requirements, provide 3M; Scotchcal Dusted Crystal or a comparable product by one of the following:

   a. Avery Dennison Graphics.
   b. Eastman Performance Films, LLC.

2.3 GLAZING SEALANTS

A. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

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

   a. Bostik, Inc.
   b. GE Construction Sealants; Momentive Performance Materials Inc.
   c. May National Associates, Inc.; a subsidiary of Sika Corporation.
   d. Sika Corporation.
   e. The Dow Chemical Company.
   f. Tremco Incorporated.

B. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

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

   a. GE Construction Sealants; Momentive Performance Materials Inc.
   b. The Dow Chemical Company.
   c. Tremco Incorporated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with combined recommendations of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are contained in GANA's "Glazing Manual."

B. For fire-protection-rated glazing, use methods approved by testing agencies that listed and labeled products.

C. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

D. Remove nonpermanent labels, and clean surfaces immediately after installation.

3.2 MONOLITHIC-GLASS TYPES

A. Glass Type : Clear fully tempered float glass.

1. Thickness: 6 mm.
2. Safety glazing required.

B. Decorative Film Overlays: Glass with decorative film overlay.

1. Basis-of-Design Product: as indicated.
2. Glass Type: , fully tempered float glass.
3. Glass Thickness: 6.0 mm.

3.3 INSULATING-GLASS TYPES

A. Glass Type : Low-E-coated, clear insulating glass.

1. Overall Unit Thickness: 1 inch.
2. Thickness of Each Glass Lite: 6 mm.
3. Outdoor Lite: Fully tempered float glass.
4. Interspace Content: Argon.
5. Indoor Lite: Fully tempered float glass.
6. Safety glazing required.

END OF SECTION

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SECTION 09 0561.13

MOISTURE VAPOR EMISSION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fluid-applied, resin-based, membrane-forming systems that control the moisture-vapor-emission rate of high-moisture, interior concrete to prepare it for floor covering installation.

1.2 UNIT PRICES

A. Work of this Section is affected by Moisture Vapor Emission Control Unit Price.

1.3 DEFINITIONS

A. MVE: Moisture vapor emission.

B. MVER: Moisture vapor emission rate.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Preinstallation testing reports.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Employs factory-trained personnel who are available for consultation and Project-site inspection.

B. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. MVE-Control System Capabilities: Capable of suppressing MVE without failure where installed on concrete that exhibits the following conditions:
   1. MVER: Maximum 15 lb of water/1000 sq. ft. when tested according to ASTM F 1869.
   2. Relative Humidity: Maximum 100 percent when tested according to ASTM F 2170 using in situ probes.

B. Water-Vapor Transmission: Through MVE-control system, maximum 0.02 perm when tested according to ASTM E 96/E 96M.

C. Tensile Bond Strength: For MVE-control system, greater than 200 psi with failure in the concrete according to ASTM D 7234.

2.2 MVE-CONTROL SYSTEM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Advanced Moisture Control, Inc.
   2. ARDEX Americas.
   3. BASF Corp. - Construction Chemicals.
   4. H.B. Fuller Construction Products Inc. / TEC.
   5. LATICRETE SUPERCAP, LLC.
   6. MAPEI Corporation.
   7. Schönox, HPS North America, Inc.

B. MVE-Control System: ASTM F 3010-qualified, fluid-applied, two-component, epoxy-resin, membrane-forming system; formulated for application on concrete substrates to reduce MVER to level required for installation of floor coverings indicated and acceptable to manufacturers of floor covering products indicated, including adhesives.
   1. Substrate Primer: Provide MVE-control system manufacturer's concrete-substrate primer if required for system indicated by substrate conditions.
   2. Cementitious Underlayment Primer: If required for subsequent installation of cementitious underlayment products, provide MVE-control system manufacturer's primer to ensure adhesion of products to MVE-control system.

2.3 ACCESSORIES

A. Patching and Leveling Material: Moisture-, mildew-, and alkali-resistant product recommended in writing by MVE-control system manufacturer and with minimum of 3000-psi compressive strength after 28 days when tested according to ASTM C 109/C 109M.

B. Crack-Filling Material: Resin-based material recommended in writing by MVE-control system manufacturer for sealing concrete substrate crack repair.

C. Cementitious Underlayment: If required to maintain manufacturer's warranty, provide MVE-control system manufacturer's hydraulic cement-based underlayment.

PART 3 - EXECUTION

3.1 PREPARATION

A. Preinstallation Testing:
   1. Testing Agency: Engage a qualified testing agency to perform tests.
   2. Alkalinity Testing: Perform pH testing according to ASTM F 710. Install MVE-control system in areas where pH readings are less than 7.0 and in areas where pH readings are greater than 8.5.
   3. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
      a. Anhydrous Calcium Chloride Test: ASTM F 1869. Install MVE-control system in locations where concrete substrate MVER exceeds 3 lb of water/1000 sq. ft. in 24 hours.
      b. Internal Relative Humidity Test: Using in situ probes, ASTM F 2170. Install MVE-control system in locations where concrete substrates exhibit relative humidity level greater than 75 percent.

4. Tensile-Bond-Strength Testing: For typical locations indicated to receive installation of MVE-control system, install minimum 100-sq. ft. area of MVE-control system to prepared concrete substrate and test according to ASTM D 7234.
    a. Proceed with installation only where tensile bond strength is greater than 200 psi with failure in the concrete.

B. Concrete Substrates: Prepare and clean substrates according to MVE-control system manufacturer's written instructions to ensure adhesion of system to concrete.

3.2 INSTALLATION

A. General: Install MVE-control system according to ASTM F 3010 and manufacturer's written instructions to produce a uniform, monolithic surface free of surface deficiencies such as pin holes, fish eyes, and voids.
    1. Install primers as required to comply with manufacturer's written instructions.

B. Do not apply MVE-control system across substrate expansion, isolation, and other moving joints.

C. Apply system, including component coats if any, in thickness recommended in writing by MVE-control system manufacturer for MVER indicated by preinstallation testing.

D. After curing, examine MVE-control system for surface deficiencies. Repair surface deficiencies according to manufacturer's written instructions.

E. Install cementitious underlayment over cured membrane if required to maintain manufacturer's warranty and in thickness required to maintain the warranty.

F. Protect MVE-control system from damage, wear, dirt, dust, and other contaminants before floor covering installation. Use protective methods and materials, including temporary coverings, recommended in writing by MVE-control system manufacturer.

G. Do not allow subsequent preinstallation examination and testing for floor covering installation to damage, puncture, or otherwise compromise the MVE-control system membrane.

END OF SECTION

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SECTION 09 2216

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

2.2 METAL FRAMING AND SUPPORTS

A. Steel Framing Members, General: ASTM C 754.

1. Steel Sheet Components: ASTM C 645. Thickness specified is minimum uncoated base-metal thickness.
2. Protective Coating: ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.

B. Framing Systems:

1. Studs and Runners: In depth indicated and 0.033 inch thick unless otherwise indicated.
2. Flat Strap and Backing: 0.033 inch thick.
3. Hat-Shaped, Rigid Furring Channels: In depth indicated and 0.033 inch thick.
4. Resilient Furring Channels: 1/2 inch deep, with single- or double-leg configuration.
5. Cold-Rolled Furring Channels: 0.053 inch thick, 3/4 inch deep.
6. Z-Furring: In depth required by insulation, 1-1/4-inch face flange, 7/8-inch wall-attachment flange, and 0.018 inch thick.

C. Suspension Systems:

1. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch diameter, or double strand of 0.048-inch-diameter wire.
2. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, and 0.162-inch diameter.
3. Carrying Channels: Cold-rolled steel, 0.053 inch thick, 2-1/2 inches deep.

4. Furring Channels: Steel studs, 0.033 inch thick, in depth indicated.
5. Grid Suspension System for Gypsum Board Ceilings: Interlocking, direct-hung system.

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

1) Armstrong World Industries, Inc.
2) Rockfon (Rockwool International).
3) USG Corporation.

2.3 ACCESSORIES

A. General: 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: Asphalt felt or foam gasket.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install steel framing to comply with ASTM C 754."
1. Gypsum Board Assemblies: Also comply with ASTM C 840.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Isolate steel framing from building structure, except at floor, to prevent transfer of loading imposed by structural movement.

1. Where studs are installed directly against exterior walls, install isolation strip between studs and wall.

D. Fire-Resistance-Rated Assemblies: Comply with requirements of listed assemblies.

E. Install suspension systems level to within 1/8 inch in 12 feet.

END OF SECTION

SECTION 092900

GYPSUM BOARD

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

2.2 PANEL PRODUCTS

A. Provide in maximum lengths available to minimize end-to-end butt joints.

B. Interior Gypsum Board: ASTM C 1396/C 1396M, in thickness indicated, with manufacturer's standard edges. Regular type unless otherwise indicated Sag-resistant type for ceiling surfaces.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. American Gypsum.
    b. CertainTeed Corporation.
    c. Continental Building Products, LLC.
    d. Georgia-Pacific Gypsum LLC.
    e. National Gypsum Company.
    f. PABCO Gypsum.
    g. USG Corporation.

C. Glass-Mat, Water-Resistant Gypsum Backing Board at tile: ASTM C 1178/C 1178M, 5/8 inch thick. Type X where required for fire-resistance-rated assemblies and where indicated.

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

    a. CertainTeed Corporation.
    b. Georgia-Pacific Gypsum LLC.

2.3 ACCESSORIES

A. Trim Accessories: ASTM C 1047, formed from galvanized or aluminum-coated steel sheet orrolled zinc.

1. Provide cornerbead at outside corners.
2. Provide LC-bead (J-bead) at exposed panel edges.
3. L-Bead: L-shaped; exposed long flange receives joint compound.
4. Provide control joints where indicated.

B. Joint-Treatment Materials: ASTM C 475/C 475M.

1. Joint Tape: Paper unless otherwise recommended by panel manufacturer.
2. Joint Compounds: Setting-type compounds.

C. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834.

D. Sound-Attenuation Blankets: ASTM C 665, Type I (unfaced).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install gypsum board to comply with ASTM C 840.

1. Isolate gypsum board assemblies from abutting structural and masonry work. Provide edge trim and acoustical sealant.
2. Single-Layer Fastening Methods: Fasten gypsum panels to supports with screws.
3. Multilayer Fastening Methods: Fasten base layers with screws, and face layers to base layers with adhesive and supplementary fasteners.

B. Finishing Gypsum Board: ASTM C 840.

1. Provide control joints according to ASTM C 840.

2. At concealed areas, unless a higher level of finish is required for fire-resistance-rated assemblies, provide Level 1 finish: Embed tape at joints.
3. At substrates for tile, provide Level 2 finish: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges.
4. Unless otherwise indicated, provide Level 4 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges.

C. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

END OF SECTION

SECTION 095113

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for interior ceilings.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

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.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

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: Class A according to ASTM E 1264.
2. Smoke-Developed Index: 50 or less.

2.2 ACOUSTICAL PANELS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product Armstrong Dune or comparable product by one of the following:

1. American Gypsum.
2. CertainTeed Corporation.
3. Tectum Inc.
4. USG Corporation.

B. Acoustical Panel Standard: Manufacturer's standard panels according to ASTM E 1264.

C. Color: As indicated on Drawings.

D. Edge/Joint Detail: Tegular edge.

E. Thickness: As indicated on Drawings.

F. Modular Size: 24 by 24 inches .

2.3 METAL SUSPENSION SYSTEM

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Armstrong World Industries, Inc.
2. CertainTeed Corporation.
3. Rockfon (Rockwool International).
4. USG Corporation.

B. Metal Suspension-System Standard: Manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M.

C. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 15/16-inch- wide metal caps on flanges.

1. Structural Classification: Heavy-duty system.
2. End Condition of Cross Runners: Override (stepped) type.
3. Face Design: Flat, flush.
4. Cap Material: Cold-rolled steel.
5. Cap Finish: Painted to match color of acoustical unit.

2.4 ACCESSORIES

A. 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.

B. Hold-Down Clips: Manufacturer's standard hold-down.

C. Perimeter trim: Armstrong Axiom.

2.5 METAL EDGE MOLDINGS AND TRIM

A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

PART 3 - EXECUTION

3.1 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated.

B. Layout openings for penetrations centered on the penetrating items.

3.2 INSTALLATION

A. Install acoustical panel ceilings according to ASTM C 636/C 636M and manufacturer's written instructions.

B. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
   1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
   2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
   3. Arrange directionally patterned acoustical panels as follows:
      a. As indicated on reflected ceiling plans.
   4. Install hold-down clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.

END OF SECTION

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SECTION 09 6513

RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product data and Samples.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Thermoset Rubber Base: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).

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

    a. Flexco; Roppe Holding Company.
    b. Johnsonite; a Tarkett company.
    c. Roppe Corporation; Roppe Holding Company.

B. Thermoplastic Rubber Base: ASTM F 1861, Type TP (rubber, thermoplastic), Group I (solid, homogeneous) or II (layered).

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

    a. Armstrong World Industries, Inc.
    b. Flexco; Roppe Holding Company.
    c. Johnsonite; a Tarkett company.
    d. Nora Systems, Inc.
    e. Roppe Corporation; Roppe Holding Company.
    f. VPI Corporation.

C. Vinyl Base: ASTM F 1861, Type TV (vinyl, thermoplastic), Group I (solid, homogeneous) or II (layered).

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

    a. Armstrong World Industries, Inc.
    b. Flexco; Roppe Holding Company.
    c. Johnsonite; a Tarkett company.
    d. Roppe Corporation; Roppe Holding Company.
    e. VPI Corporation.

D. Style: Cove (base with toe).

E. Minimum Thickness: 0.125 inch.

F. Height: 4 inches.

G. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard lengths.

H. Outside Corners: preformed.

I. Inside Corners: preformed.

2.2 RESILIENT MOLDING ACCESSORY

A. Rubber Molding Accessories.

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

a. Roppe Corporation; Roppe Holding Company.
b. VPI Corporation.

B. Vinyl Molding Accessories.

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

a. Armstrong World Industries, Inc.
b. Flexco; Roppe Holding Company.
c. Johnsonite; a Tarkett company.
d. Musson Rubber Co.
e. Roppe Corporation; Roppe Holding Company.

C. Description: Nosing for carpet and Transition strips .

2.3 INSTALLATION ACCESSORIES

A. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Prepare horizontal surfaces according to ASTM F 710. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

B. Adhesively install resilient wall base and accessories.

C. Install wall base in maximum lengths possible. Apply to walls, columns, pilasters, casework, and other permanent fixtures in rooms or areas where base is required.

D. Install reducer strips at edges of floor coverings that would otherwise be exposed.

END OF SECTION

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SECTION 09 6813

TILE CARPETING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product data and Samples.

B. Extra Materials: Deliver to Owner carpet tiles equal to 5 percent of each type and color installed, packaged with protective covering for storage.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Manufacutrers and products are listed on drawings.

B. Primary Backing: Manufacturer's standard material.

C. Secondary Backing: Manufacturer's standard material.

D. Size: 24 by 24 inches unless otherwise indicated on drawings.

E. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm per ASTM E 648.

2.2 INSTALLATION ACCESSORIES

A. Carpet Tile Adhesives: Pressure-sensitive type that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for conditions indicated for releasable installation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with CRI 104.

B. Carpet Tile Installation Method: Glue down; releasable, pressure-sensitive adhesive.

END OF SECTION

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SECTION 099113

EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
   1. Steel and iron.
   2. Galvanized metal.
   3. Aluminum (not anodized or otherwise coated).

1.2 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.
   1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.

B. Samples: For each type of paint system and each color and gloss of topcoat.

1.4 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.

    a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
    b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on mockups.

    a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide products by Sherwin Williams; or comparable product by one of the following:

1. Benjamin Moore & Co.
2. Dunn Edwards.
3. PPG Paints.

B. Products: Subject to compliance with requirements, provide one of the products listed in the Exterior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:
1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. Colors: As indicated in a color schedule.

1. Twenty percent of surface area will be painted with deep tones.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Concrete: 12 percent.
   2. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

   1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."

B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

A. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 EXTERIOR PAINTING SCHEDULE

A. Steel and Iron Substrates:

   1. Water-Based Light Industrial Coating System MPI EXT 5.1M:
      a. Prime Coat: Primer, rust inhibitive, water based MPI #107.
      b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.

c. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5), MPI #163.

B. Galvanized-Metal Substrates:

1. Latex System MPI EXT 5.3H:

a. Prime Coat: Primer, galvanized, water based, MPI #134.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5), MPI #11.

C. Aluminum Substrates:

1. Latex System MPI EXT 5.4H:

a. Prime Coat: Primer, quick dry, for aluminum, MPI #95.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5), MPI #11.

END OF SECTION

SECTION 099123

INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on interior substrates.
   1. Steel and iron.
   2. Galvanized metal.
   3. Aluminum (not anodized or otherwise coated).
   4. Gypsum board.
   5. ASJ insulation covering.

1.2 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.
   1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.

B. Samples: For each type of paint system and in each color and gloss of topcoat.

1.4 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.

    a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
    b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on mockups.

    a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide products by Sherwin Williams; or comparable product by one of the following:

1. Benjamin Moore & Co.
2. Dunn Edwards.
3. PPG Paints.

B. Products: Subject to compliance with requirements, provide product provide one of the products listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:
1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. Colors: As indicated in a color schedule.

1. Twenty percent of surface area will be painted with deep tones.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Concrete: 12 percent.
   2. Fiber-Cement Board: 12 percent.
   3. Masonry (Clay and CMUs): 12 percent.
   4. Wood: 15 percent.
   5. Gypsum Board: 12 percent.
   6. Plaster: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

   1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 INTERIOR PAINTING SCHEDULE

A. Steel Substrates:
   1. Institutional Low-Odor/VOC Latex System MPI INT 5.1S:

a. Prime Coat: Primer, rust inhibitive, water based MPI #107.
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #146.

B. Galvanized-Metal Substrates:
1. Institutional Low-Odor/VOC Latex System MPI INT 5.3N:

a. Prime Coat: Primer, galvanized, water based, MPI #134.
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1), MPI #143.
d. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #146.

C. Aluminum (Not Anodized or Otherwise Coated) Substrates:
1. Institutional Low-Odor/VOC Latex System MPI INT 5.4G:

a. Prime Coat: Primer, quick dry, for aluminum, MPI #95.
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1), MPI #143.
d. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #146.

D. Gypsum Board Substrates:
1. Institutional Low-Odor/VOC Latex System MPI INT 9.2M:

a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1), MPI #143.
d. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 2), MPI #144.

E. Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings.

1. Latex System MPI INT 10.1A:

a. Prime Coat: Primer sealer, latex, interior, MPI #50.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior (MPI Gloss Level 3), MPI #52.

END OF SECTION

SECTION 10 2800

TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Underlavatory guards.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: Full size, for each exposed product and for each finish specified.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors 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 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Toilet Tissue (Roll) Dispenser:

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

    a. American Specialties, Inc.
    b. Bobrick Washroom Equipment, Inc.
    c. Bradley Corporation.
2. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset .
3. Mounting: Partition mounted, serving two adjacent toilet compartments Surface mounted.
4. Operation: Noncontrol delivery with standard spindle.
5. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
6. Material and Finish: .

B. Automatic Paper Towel (Roll) Dispenser:

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

    a. American Specialties, Inc.
    b. Bobrick Washroom Equipment, Inc.
    c. Bradley Corporation.
2. Description: Automatic motion sensing mechanism with user-adjustable delay and paper towel length; battery powered.
3. Mounting: Semirecessed.
4. Minimum Capacity: 8-inch-wide, 800-foot-long roll.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
6. Lockset: Tumbler type.

C. Waste Receptacle:

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

    a. American Specialties, Inc.
    b. Bobrick Washroom Equipment, Inc.
    c. Bradley Corporation.
2. Mounting: Freestanding Undercounter.
3. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
4. Liner: Reusable vinyl liner.
5. Lockset: Tumbler type for waste receptacle.

D. Liquid-Soap Dispenser:

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

    a. American Specialties, Inc.
    b. Bobrick Washroom Equipment, Inc.
    c. Bradley Corporation.

2. Description: Designed for dispensing antibacterial soap in liquid or lotion or lather form.
3. Mounting: Deck mounted on vanity or lavatory.
4. Lockset: Tumbler type.
5. Refill Indicator: Window type.

E. Grab Bar:

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

    a. American Specialties, Inc.
    b. Bobrick Washroom Equipment, Inc.
    c. Bradley Corporation.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.

    a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin).

4. Outside Diameter: 1-1/2 inches.
5. Configuration and Length: As indicated on Drawings.

F. Mirror Unit:

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

    a. American Specialties, Inc.
    b. Bobrick Washroom Equipment, Inc.
    c. Bradley Corporation.

2. Frame: Stainless steel channel.

    a. Corners: Manufacturer's standard.
3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.

    a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
    b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

4. Size: As indicated on Drawings.

G. Coat Hook:

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

    a. American Specialties, Inc.
    b. Bobrick Washroom Equipment, Inc.
    c. Bradley Corporation.
2. Description: Double-prong unit.
3. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

H. Facial Tissue Dispenser:

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

   a. American Specialties, Inc.
   b. Bobrick Washroom Equipment, Inc.
   c. Bradley Corporation.

2. Mounting: Wall mounted, recessed.
3. Depth: 2-5/8 inches.
4. Material and Finish:

   a. Dispenser Face: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
   b. Cabinet: Steel with corrosion-resistant finish.

2.3 UNDERLAVATORY GUARDS

A. Underlavatory Guard:

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

   a. Buckaroos, Inc.
   b. Plumberex Specialty Products, Inc.
   c. Truebro by IPS Corporation.

2. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
3. Material and Finish: Antimicrobial, molded plastic, white.

2.4 FABRICATION

A. 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 indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F446.

END OF SECTION

SECTION 10 4400

FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHERS[AND BRACKETS]

A. Portable Fire Extinguishers: NFPA 10, listed and labeled for the type, rating, and classification of extinguisher.

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

    a. Activar Construction Products Group, Inc. - JL Industries.
    b. Ansul; brand of Johnson Controls International plc, Building Solutions North America.
    c. Badger Fire Protection.
    d. Buckeye Fire Equipment Company.
    e. Guardian Fire Equipment, Inc.
    f. Larsens Manufacturing Company.
    g. Nystrom.

2. Multipurpose Dry-Chemical Type: UL-rated 2-A:10-B:C, 5-lb nominal capacity, in enameled-steel or enameled-aluminum container.

B. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for fire extinguishers indicated, with plated or baked-enamel finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install mounting brackets in locations indicated at heights acceptable to authorities having jurisdiction.

B. Install fire extinguishers on mounting brackets where indicated.

END OF SECTION

SECTION 114000

FOODSERVICE EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes equipment for foodservice.
   1. Under Base Bid Owner will furnish and install this equipment.
   2. Under Add Alt 5, if it is accepted, Contractor will furnish and install this equipment.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For fabricated equipment. Include plans, elevations, sections, roughing-in dimensions, fabrication details, utility service requirements, and attachments to other work.

C. Samples for Initial Selection: For units with factory-applied color finishes.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: For foodservice facilities.

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

B. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 WARRANTY

A. Refrigeration Compressor Warranty: Manufacturer agrees to repair or replace compressors that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NSF Standards: Provide equipment that bears NSF Certification Mark or UL Classification Mark certifying compliance with applicable NSF standards.

B. UL Certification: Provide electric and fuel-burning equipment and components that are evaluated by UL for fire, electric shock, and casualty hazards according to applicable safety standards, and that are UL certified for compliance and labeled for intended use.

C. Regulatory Requirements: Install equipment to comply with the following:

1. ASHRAE 15, "Safety Code for Mechanical Refrigeration."
2. NFPA 70, "National Electrical Code."

D. Seismic Restraints: Comply with SMACNA's "Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines," Appendix A, "Seismic Restraint Details," unless otherwise indicated.

2.2 FABRICATED EQUIPMENT

2.3 FOODSERVICE EQUIPMENT

A. Refrigeration Equipment: Refrigerators and Freezers.
1. Refrigerator: Nor-Lake FAST-TRAK Walk-in Cooler (Refer to attached Refrigerated Solutions Group April 13, 2021 Quotation for product features.
2. Freezer: Nor-Lake FINELINE Walk-in Freezer (Refer to attached Refrigerated Solutions Group April 13, 2021 Quotation for product features.

2.4 MISCELLANEOUS MATERIALS

A. Installation Accessories, General: NSF certified for end-use application indicated.

B. Elastomeric Joint Sealant: ASTM C920; silicone. Type S (single component), Grade NS (nonsag), Class 25, Use NT (nontraffic) related to exposure, and Use M, G, A, or O as applicable to joint substrates indicated.

1. Public Health and Safety Requirements:

a. Sealant is certified for compliance with NSF standards for end-use application indicated.
b. Washed and cured sealant complies with the FDA's regulations for use in areas that come in contact with food.

2. Cylindrical Sealant Backing: ASTM C1330, Type C, closed-cell polyethylene, in diameter greater than joint width.

2.5 FINISHES

A. Stainless Steel Finishes: Remove tool and die marks and stretch lines, or blend into finish. Grind and polish surfaces to produce uniform finish, free of cross scratches.

B. Powder-Coat Finishes: Comply with resin manufacturer's written instructions for application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install foodservice equipment level and plumb, according to manufacturer's written instructions.

1. Connect equipment to utilities.
2. Provide cutouts in equipment, neatly formed, where required to run service lines through equipment to make final connections.

B. Complete equipment assembly where field assembly is required.

1. Provide closed butt and contact joints that do not require a filler.
2. Grind field welds on stainless steel equipment until smooth and polish to match adjacent finish.

C. Install equipment with access and maintenance clearances that comply with manufacturer's written installation instructions and with requirements of authorities having jurisdiction.

D. Install cabinets and similar equipment on bases in a bed of sealant.

E. Install closure-trim strips and similar items requiring fasteners in a bed of sealant.

F. Install joint sealant in joints between equipment and abutting surfaces with continuous joint backing unless otherwise indicated. Produce airtight, watertight, vermin-proof, sanitary joints.

3.2 CLEANING AND PROTECTING

A. After completing installation of equipment, repair damaged finishes.

B. Clean and adjust equipment as required to produce ready-for-use condition.

C. Protect equipment from damage during remainder of the construction period.

3.3 DEMONSTRATION

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

END OF SECTION

727 2nd Street
Hudson, Wisconsin 54016
800-955-5253
715-386-2323
715-386-6149 FAX

Quotation

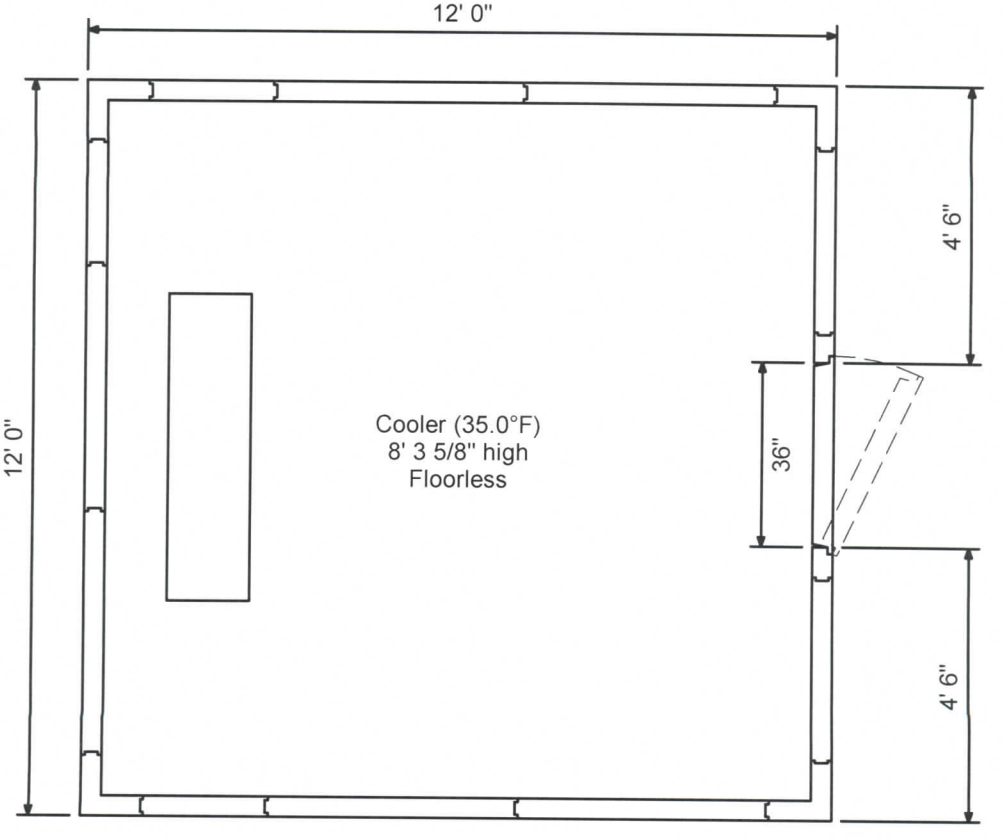
Quote No. NL2116122LH-B
Date : 04/13/2021

Customer 25423	Arizona Restaurant Supply Inc 6077 N Travel Center Drive Marana, AZ 85741
Attention	
Project	Hualapai Tribe (Cooler)
Item Number	
Rep Name	33 - Tom Redditt Sales Agency
Rep Number	33
Sales Specialist	Kris Anderson

Approved by: _____

Refrigerated Solutions Group
(1) Nor-Lake FAST-TRAK Walk-In Cooler
12' 0" long, 12' 0" wide, 8' 3 5/8" high.

Finishes:
26 Gauge Corrosion Resistant Stucco Embossed Coated Steel - Interior wall, Exterior wall, Interior ceiling
1" Vinyl Floor Sealer for (1) Cooler (35.0°F)



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Quotation

Quote No. NL2116122LH-B
Date : 04/13/2021

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	Marana, AZ 85741
Attention	
Project	Hualapai Tribe (Cooler)
Item Number	
Rep Name	33 - Tom Redditt Sales Agency
Rep Number	33
Sales Specialist	Kris Anderson

(1) 36" X 78" Walk-In Door left-hand swing
Includes door closer, cam lift hinges (one spring loaded on 36" wide and smaller doors), NL9800 deadbolt key/padlock handle with inside release, magnetic gasket, heater wire, double sweep gasket, LED vapor proof light, Heated Air Vent (standard on all freezer compartments) and NL508 combination digital thermometer and switch w/pilot light.
(1) 30" Door Plug-Exterior & Interior (1/8 Diamond Aluminum)(1) 36" wide 1/8" aluminum diamond tread exterior kick plate installed (30" high) #127229
(1) 36" wide 1/8" aluminum diamond tread interior kick plate installed (30" high) #127231

(1) (1)E1MD0163A-TA2/(1)MSMD015AC (QTY. 1) 1.5HP Cond Unit 208-230/60/3 R-448A/R-449A, Outdoor Unit Scroll Compressor , Medium Temp 35F., 10821 BTUH System Capacity. With Mounted Timer. Sized for 110 F. Temperature at Condenser. 38" (L) 27" (W) 18" (H) Base: M2 @ 240#. MCA: 19, MOP: 20, RLA: 9, LRA: 58. Connections - Liquid: 0.5", Suction: 0.875".
(QTY. 1) Evap 115/60/1 R-448A/R-449A, Air Defrost Mtd TXV/Temp Ctrl/Sol, Medium Temp 35F., 16300 BTUH Evaporator Capacity. 60" (L) 16" (W) 17" (H) @ 72#. Fan Amps: 2.4.

Calculated load for Cooler (35.0°F) is 8973 BTU's/hour calculated from 110 °F ambient temperature, 0' elevation, 70 °F floor temperature, 16.96 minutes open door time per 24 hrs for(1) 36.00" X 78.00" walk-indoor opening into 110.00 °F ambient, 1.5 Watts per square foot lighting operating 10 hours per day, 0.1 occupants working 10 hours per day. All calculations are based on data supplied by ASHRAE publications.

(1) 4 Year Extended Compressor Warranty, 1.5-3HPS
(1) 18 Month Labor/Service Warranty
Refrigeration is "sized" for holding product only; that is; our calculation is based on product entering at the same temperature as the desired temperature of this walk-in. If you feel that this is insufficient, please advise.

Other Walk-In Accessories:

(2) 48" LED Vapor-proof All Temperature Integrated Light Fixture (Shipped Loose)
(2) 3" x 3" x 8'-7" Angle Trim Strip GA #071075

Construction Approvals: NSF Approved, cULus and CSA Electrical, UL Flame Spread-25 and ULC Flame Spread-50 in accordance with ASTME-84. To comply with the US Energy Independence & Security Act of 2007, all walk-in doors opening into the ambient (indoors or outdoors) are required to have a method for minimizing infiltration when the doors are open. All RSG walk-in doors will include a spring hinge to comply with this standard by 1-1-09, however; to further minimize infiltration, RSG recommends the use of a strip curtain or strip door for all exterior doors. NOTE: Indoor walk-in(s) must be in an environmentally controlled space. Relative Humidity should be kept between 30%-60%, maintaining a Dew Point of 50° F or less.

Quotation is subject to change upon receipt of detailed specifications and/or refrigeration load information. Refrigeration sizing is based on maximum line runs of 100 feet per system. NOTE: Walk-Ins sold into the state of California may require structural engineered drawings for seismic review. If required, RSG can provide the required drawings and structural support. Please contact RSG for lead time and pricing to meet this requirement. Local Codes: Walk-Ins may need engineered drawings or special construction to meet local code approvals for rain, wind, seismic, and snow load approvals. If required, please contact RSG for lead time and pricing to meet these requirements.

Verify all dimensions prior to order.

NOTE: Refrigeration system(s) are subject to change due to ship date and availability.

MSMD015AC
CONDENSING UNIT

Note: Pictures are for illustration only, and may not reflect the listed model.

MADE IN

GENERAL						
REFRIGERANT	**VOLTAGE**	**COMPRESSOR TYPE**	**COMPRESSOR MODEL**	**HP**	**AWEF**	**LISTINGS**
R-448A/R-449A	208-230/60/3	Scroll	ZS11KAE-TF5	1.5	5.61	UL/CUL

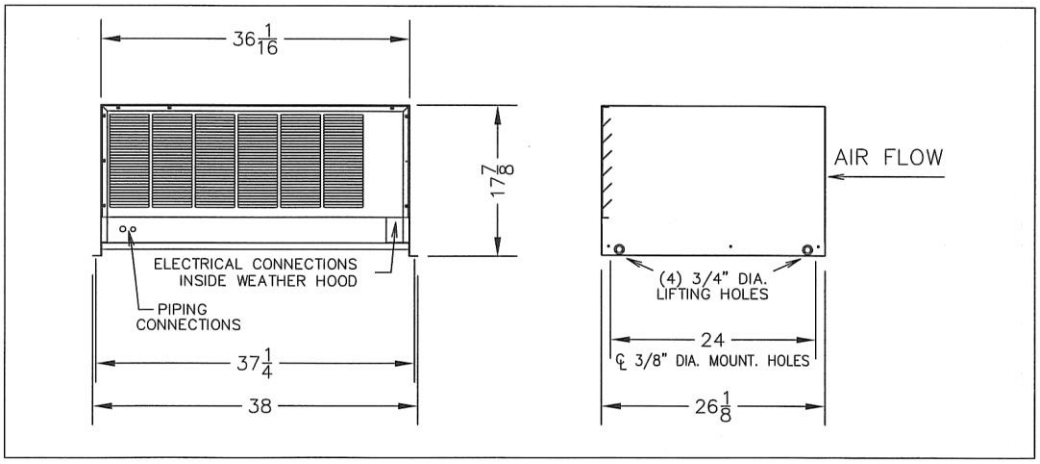
BTUH CAPACITY (At Saturated Suction Temperature (SST) and 90° Ambient at Condenser)							
-30	**-20**	**-10**	**20**	**25**	**30**	**35**	**45**
-	-	-	11,629	12,884	14,252	15,741	19,119

BTUH CAPACITY (At Saturated Suction Temperature (SST) and 100° Ambient at Condenser)							
-30	**-20**	**-10**	**20**	**25**	**30**	**35**	**45**
-	-	-	10,698	11,853	13,111	14,482	17,590

DIMENSIONAL DATA					
OVERALL (to nearest inch)					
L	**W**	**H**	**WT (lbs)**	**BASE SIZE**	**BASE/HOOD**
38	27	18	240	M2	021M

INSTALLATION					
	RECEIVER TANK (lbs)	**CONNECTIONS**			**ESTIMATED TOTAL**
REFRIGERANT	**90%/90˚F**	**LIQUID**	**SUCTION**		**HEAT REJECTION (BTUH)**
R-448A/R-449A	10.1	1/2	7/8		8

ELECTRICAL								
MCA	**MOP**	**COMP VOLTS**	**COMP PHASE**	**COMP HZ**	**COMP RLA**	**COMP LRA**	**OTHER LOAD DATA**	
19	20	208-230	3	60	9.3	58		
					MAX EVAP FAN	**MAX EVAP DEF**	**VOLTS**	208-230
FAN PHASE	**FAN HZ**	**FAN FLA**	**FAN HP**	**FAN QUANTITY**	**AMPS**	**HEATER AMPS**	**PHASE**	1
1	60	0.5	1/20	2	6	15.0	**AMPS**	0.5



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E1MD0163A-TA2
EVAPORATOR UNIT

Note: Pictures are for illustration only, and may not reflect the listed model.

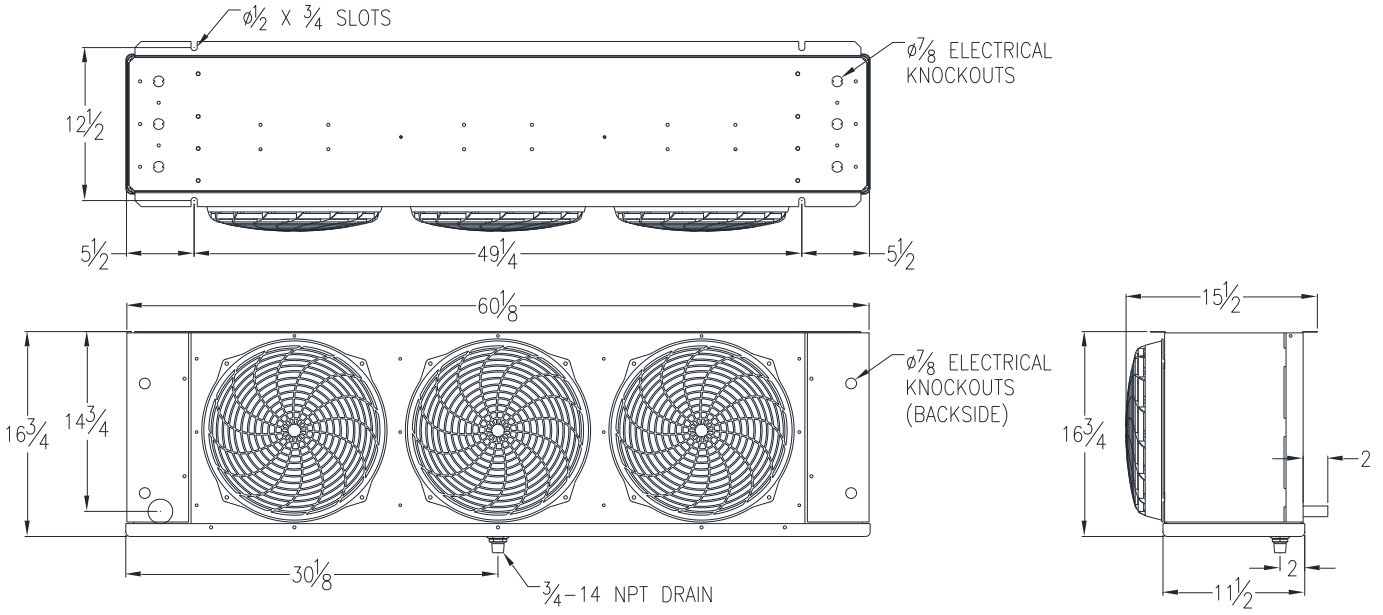
MADE IN

GENERAL					
REFRIGERANT	**VOLTAGE**	**EVAPORATOR MODEL**	**DEFROST SCHEME**	**CONTROLLER**	**LISTINGS**
R-448A/R-449A	115/60/1	WL6A141SDAS	AIR	THERMOSTAT	UL/CUL

BTUH CAPACITY (At Saturated Suction Temperature (SST) with 10^0 TD)							
-30	**-20**	**-10**	**20**	**25**	**30**	**35**	**45**
-	-	-	-	16,300	16,561	16,822	17,346

DIMENSIONAL DATA				INSTALLATION			
OVERALL (inches)				**CONNECTIONS**		**REFRIGERANT**	
L	**W**	**H**	**WT (lbs)**	**LIQUID**	**SUCTION**	**TYPE**	
60.125	15.5	16.75	72	3/8	7/8	R-448A/R-449A	

EVAPORATOR ELECTRICAL DATA				EXPANSION VALVE		DISTRIBUTOR NOZZLE/ORIFICE	
FAN QUANTITY	**FAN AMPS**	**DEFROST AMPS**		**TXV/EEV**			
		1 PHASE	**3 PHASE**	**PART NUMBER**	**MODEL NUMBER**	**PART NUMBER**	**TYPE**
3	2.4	N/A	N/A	09-09346	EBFDE-B-C	-	L, #1/2



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Date published: 10/23/2020

727 2nd Street
Hudson, Wisconsin 54016
800-955-5253
715-386-2323
715-386-6149 FAX

Quotation

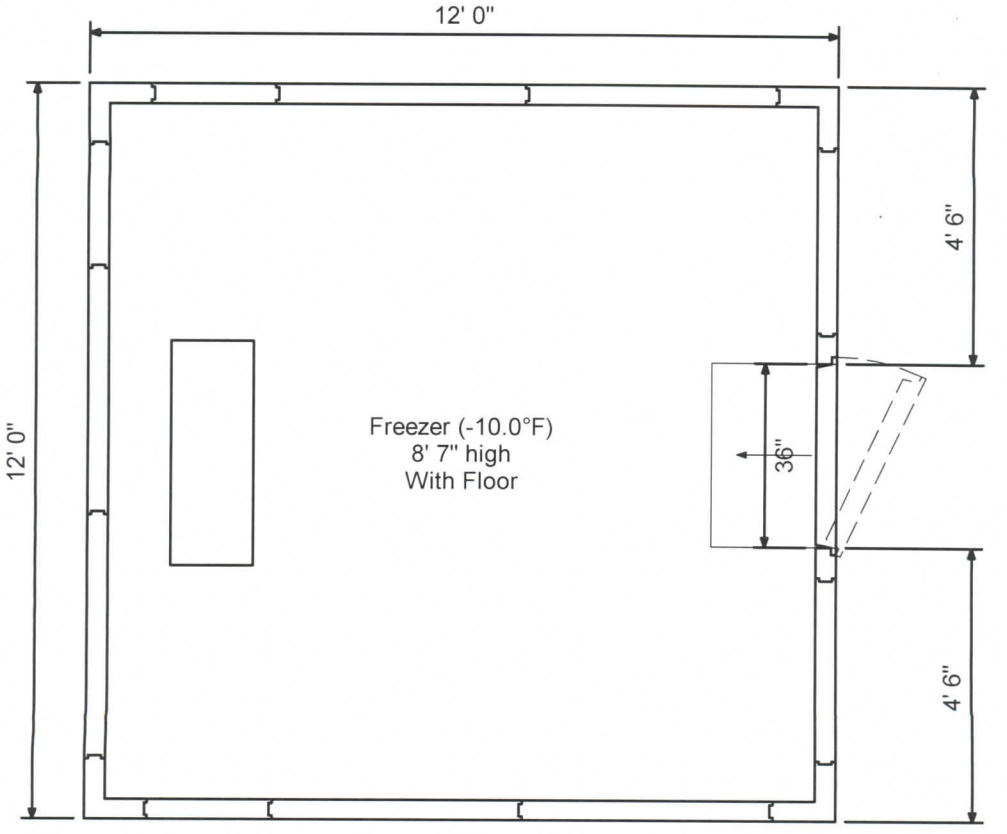
Quote No. NL2115033LH-C
Date : 04/13/2021

Customer 25423	Arizona Restaurant Supply Inc 6077 N Travel Center Drive Marana, AZ 85741
Attention	
Project	Hualapai Tribe (Freezer)
Item Number	
Rep Name	33 - Tom Redditt Sales Agency
Rep Number	33
Sales Specialist	Kris Anderson

Approved by: _____

Refrigerated Solutions Group
(1) Nor-Lake FINELINE Walk-In Freezer
12' 0" long, 12' 0" wide, 8' 7" high.

Finishes:
26 Gauge Corrosion Resistant Stucco Embossed Coated Steel - Interior wall, Exterior wall, Interior ceiling
26 Gauge Smooth Galvanized - Ceiling topside, Floor bottomside
1/8 Diamond Aluminum - Interior floor



Refrigerated Solutions Group

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Quotation

Quote No. NL2115033LH-C
Date : 04/13/2021

Customer	Arizona Restaurant Supply Inc
25423	6077 N Travel Center Drive
	Marana, AZ 85741
Attention	
Project	Hualapai Tribe (Freezer)
Item Number	
Rep Name	33 - Tom Redditt Sales Agency
Rep Number	33
Sales Specialist	Kris Anderson

(1) 36" X 78" Walk-In Door left-hand swing
Includes door closer, cam lift hinges (one spring loaded on 36" wide and smaller doors), NL9800 deadbolt key/padlock handle with inside release, magnetic gasket, heater wire, double sweep gasket, LED vapor proof light, Heated Air Vent (standard on all freezer compartments) and NL508 combination digital thermometer and switch w/pilot light.
(1) Additional Standard Hinge
(1) 30" Door Plug-Exterior & Interior (1/8 Diamond Aluminum)
(1) Norlake 14 x 24 Heated Freezer(1) 36" Interior Ramp With Non-Skid Strips Applied To Top (24" Deep)

Sq. Ft. Of 3/4" CDX Plywood Subfloor for Freezer (-10.0°F)

(1) (1)E1LD0076B-TE2/(1)MSLD030AC (QTY. 1) 3HP Cond Unit 208-230/60/3 R-448A/R-449A, Outdoor Unit Scroll Compressor , Low Temp -10F., 7566 BTUH System Capacity. With Mounted Timer. Sized for 110 F. Temperature at Condenser. 30" (L) 31" (W) 26" (H) Base: M3 @ 250#. MCA: 25, MOP: 30, RLA: 9, LRA: 77. Connections - Liquid: 0.375", Suction: 0.875".
(QTY. 1) Evap 208-230/60/1 R-448A/R-449A, Elec Defrost Mtd TXV/Temp Ctrl/Sol, Low Temp -10F., 7600 BTUH Evaporator Capacity. 44" (L) 16" (W) 17" (H) @ 52#. Fan Amps: 1.0, Defrost Amps: 9.8.

Calculated load for Freezer (-10.0°F) is 7243 BTU's/hour calculated from 110 °F ambient temperature, 0' elevation, 70 °F floor temperature, 7.99 minutes open door time per 24 hrs for(1) 36.00" X 78.00" walk-indoor opening into 110.00 °F ambient, 1.5 Watts per square foot lighting operating 10 hours per day, 0.1 occupants working 10 hours per day. All calculations are based on data supplied by ASHRAE publications.

(1) 4 Year Extended Compressor Warranty, 1.5-3HPS
(1) 18 Month Labor/Service Warranty
Refrigeration is "sized" for holding product only; that is; our calculation is based on product entering at the same temperature as the desired temperature of this walk-in. If you feel that this is insufficient, please advise.

Other Walk-In Accessories:

(2) 48" LED Vapor-proof All Temperature Integrated Light Fixture (Shipped Loose)

Construction Approvals: NSF Approved, cULus and CSA Electrical, UL Flame Spread-25 and ULC Flame Spread-50 in accordance with ASTME-84. To comply with the US Energy Independence & Security Act of 2007, all walk-in doors opening into the ambient (indoors or outdoors) are required to have a method for minimizing infiltration when the doors are open. All RSG walk-in doors will include a spring hinge to comply with this standard by 1-1-09, however; to further minimize infiltration, RSG recommends the use of a strip curtain or strip door for all exterior doors. NOTE: Indoor walk-in(s) must be in an environmentally controlled space. Relative Humidity should be kept between 30%-60%, maintaining a Dew Point of 50° F or less.

Quotation is subject to change upon receipt of detailed specifications and/or refrigeration load information. Refrigeration sizing is based on maximum line runs of 100 feet per system. NOTE: Walk-Ins sold into the state of California may require structural engineered drawings for seismic review. If required, RSG can provide the required drawings and structural support. Please contact RSG for lead time and pricing to meet this requirement. Local Codes: Walk-Ins may need engineered drawings or special construction to meet local code approvals for rain, wind, seismic, and snow load approvals. If required, please contact RSG for lead time and pricing to meet these requirements.

Verify all dimensions prior to order.

NOTE: Refrigeration system(s) are subject to change due to ship date and availability.

MSLD030AC
CONDENSING UNIT

Note: Pictures are for illustration only, and may not reflect the listed model.

MADE IN

GENERAL						
REFRIGERANT	**VOLTAGE**	**COMPRESSOR TYPE**	**COMPRESSOR MODEL**	**HP**	**AWEF**	**LISTINGS**
R-448A/R-449A	208-230/60/3	Scroll	ZF09K4E-TF5	3	-	UL/CUL

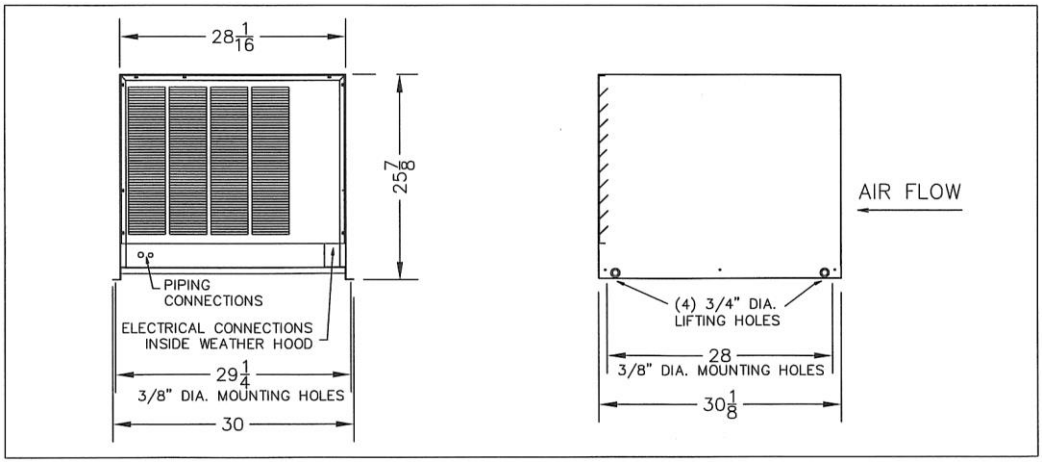
BTUH CAPACITY (At Saturated Suction Temperature (SST) and 90° Ambient at Condenser)							
-30	**-20**	**-10**	**20**	**25**	**30**	**35**	**45**
7,545	9,701	12,267	-	-	-	-	-

BTUH CAPACITY (At Saturated Suction Temperature (SST) and 100° Ambient at Condenser)							
-30	**-20**	**-10**	**20**	**25**	**30**	**35**	**45**
6,489	8,634	10,918	-	-	-	-	-

DIMENSIONAL DATA					
OVERALL (to nearest inch)					
L	**W**	**H**	**WT (lbs)**	**BASE SIZE**	**BASE/HOOD**
30	31	26	250	M3	031M

INSTALLATION					
	RECEIVER TANK (lbs)	**CONNECTIONS**			**ESTIMATED TOTAL**
REFRIGERANT	**90%/90˚F**	**LIQUID**	**SUCTION**		**HEAT REJECTION (BTUH)**
R-448A/R-449A	15.2	3/8	7/8		-

ELECTRICAL								
MCA	**MOP**	**COMP VOLTS**	**COMP PHASE**	**COMP HZ**	**COMP RLA**	**COMP LRA**	**OTHER LOAD DATA**	
25	30	208-230	3	60	8.7	77		
					MAX EVAP FAN	**MAX EVAP DEF**	**VOLTS**	208-230
FAN PHASE	**FAN HZ**	**FAN FLA**	**FAN HP**	**FAN QUANTITY**	**AMPS**	**HEATER AMPS**	**PHASE**	1
1	60	1.6	1/4	1	10	20.0	**AMPS**	0.5



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Date published: 10/23/2020

E1LD0076B-TE2
EVAPORATOR UNIT

Note: Pictures are for illustration only, and may not reflect the listed model.

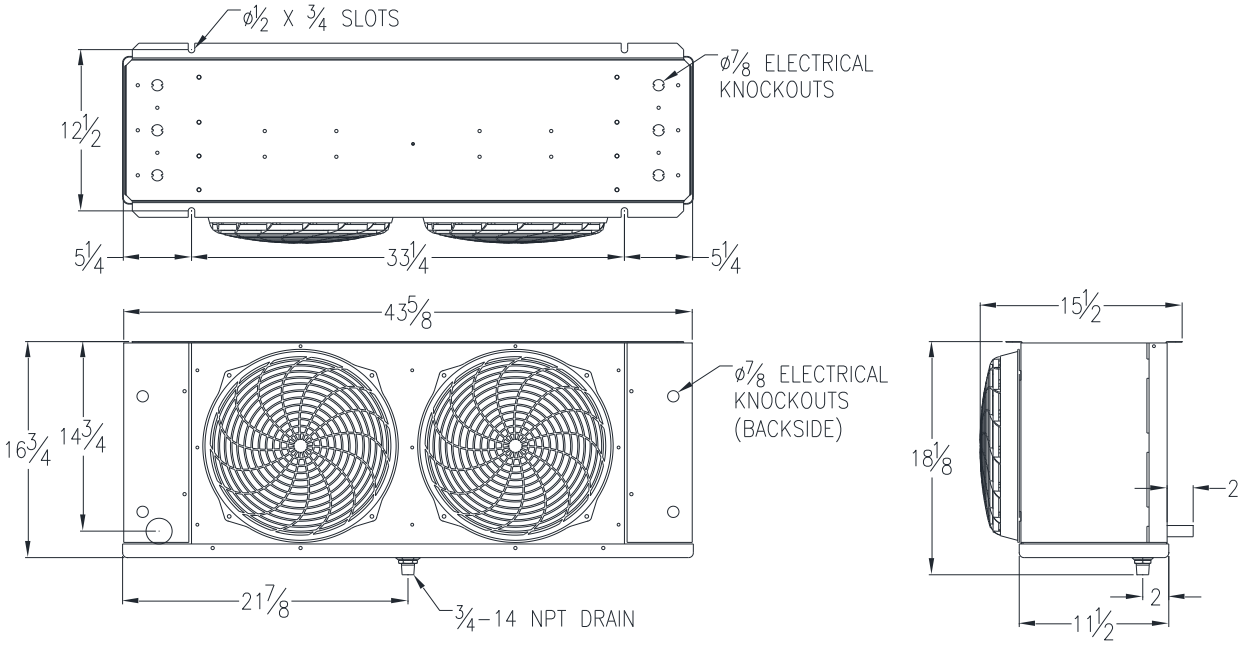
MADE IN

GENERAL					
REFRIGERANT	**VOLTAGE**	**EVAPORATOR MODEL**	**DEFROST SCHEME**	**CONTROLLER**	**LISTINGS**
R-448A/R-449A	208-230/60/1	WL6E066DDAS	ELECTRIC	THERMOSTAT	UL/CUL

BTUH CAPACITY (At Saturated Suction Temperature (SST) with 10^0 TD)							
-30	**-20**	**-10**	**20**	**25**	**30**	**35**	**45**
7,315	7,600	7,885	-	-	-	-	-

DIMENSIONAL DATA				INSTALLATION			
OVERALL (inches)				**CONNECTIONS**		**REFRIGERANT**	
L	**W**	**H**	**WT (lbs)**	**LIQUID**	**SUCTION**	**TYPE**	
43.625	15.5	16.75	52	3/8	7/8	R-448A/R-449A	

EVAPORATOR ELECTRICAL DATA				EXPANSION VALVE		DISTRIBUTOR NOZZLE/ORIFICE	
FAN QUANTITY	**FAN AMPS**	**DEFROST AMPS**		**TXV/EEV**			
		1 PHASE	**3 PHASE**	**PART NUMBER**	**MODEL NUMBER**	**PART NUMBER**	**TYPE**
2	1.0	9.8	N/A	09-10578	EBFDE-A-ZP	-	L, #1



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Date published: 10/23/2020

SECTION 12 3623.13

PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes plastic-laminate-clad countertops.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For plastic-laminate-clad countertops.

1. Apply WI Certified Compliance Program label to Shop Drawings.

C. Samples: Plastic laminates in each type, color, pattern, and surface finish required.

1.3 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Shop Certification: WI's Certified Compliance Program licensee.

B. Installer Qualifications: WI's Certified Compliance Program licensee.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD COUNTERTOPS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-clad countertops indicated for construction, finishes, installation, and other requirements.

B. Grade: Custom.

C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Abet Laminati Inc.
b. Formica Corporation.
c. Lamin-Art, Inc.
d. Nevamar; a Panolam Industries International, Inc. brand.
e. Pionite; a Panolam Industries International, Inc. brand.
f. Wilsonart.

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

1. As indicated by manufacturer's designations.

E. Edge Treatment: Same as laminate cladding on horizontal surfaces.

F. Core Material: Particleboard or MDF.

G. Core Material at Sinks: MDF made with exterior glue or exterior-grade plywood.

H. Core Thickness: 3/4 inch.

1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.

I. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

J. Paper Backing: Provide paper backing on underside of countertop substrate.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.

1. Wood Moisture Content: 4 to 9 percent.

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

1. MDF: Medium-density fiberboard, ANSI A208.2, Grade 130.
2. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
3. Softwood Plywood: DOC PS 1.

2.3 ACCESSORIES

A. Wire-Management Grommets: Circular, molded-plastic grommets and matching plastic caps with slot for wire passage.
1. Outside Diameter: 1-1/4 inch.
2. Color: Black,

2.4 MISCELLANEOUS MATERIALS

A. Adhesive for Bonding Plastic Laminate: Contact cement.

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.5 FABRICATION

A. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Provide radius on top of front edge as indicated.

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

PART 3 - EXECUTION

3.1 INSTALLATION

A. Grade: Install countertops to comply with same grade as item to be installed.

B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.

1. Provide cutouts for 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.
2. Seal edges of cutouts by saturating with varnish.

C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.

1. Secure field joints in countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inchesvariation from a straight, level plane.
2. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.

3. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

F. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION

SECTION 12 4816

ENTRANCE FLOOR GRILLES

PART 1 - GENERAL

1.1 SUMMARY

A. This section applies if Add Alt 6 is accepted and incorporated into the contract.

B. Section Includes:

1. Recessed floor grilles and frames.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Items penetrating floor grilles and frames, including door control devices.
2. Divisions between grille sections.
3. Perimeter floor moldings.

C. Samples: For each exposed product and for each color and texture specified.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide C/S Group; Gridline™ or a comparable product by one of the following:

1. Nystrom.
2. Reese Enterprises, Inc.

2.2 ENTRANCE FLOOR GRILLES, GENERAL

A. Accessibility Standard: Comply with applicable provisions in the DOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1.

2.3 FLOOR GRILLES

A. Stainless Steel Floor Grille: Type 304.

1. Surface Treads: 0.071-by-0.177-inch wire with 0.125-inch- wide openings between wires.
2. Support Rods: Spaced 1 inch o.c., welded to each wire.
3. Pit Grating: 1-1/8 inches deep.
4. Stainless Steel Finish: ASTM A480/A480M No. 4.
5. Grille Size: As indicated.

B. Lockdown: Manufacturer's standard.

2.4 FRAMES

A. Provide manufacturer's standard frames of size and style for grille type.

2.5 SUPPORT SYSTEM

A. Level Bed Applications: Provide manufacturer's standard, vinyl cushion support system.

B. Drainage Pit Applications: Provide manufacturer's special deep-pit frame and support extrusion system with intermediate support beams, sized and spaced as recommended by manufacturer for indicated spans and equipped with vinyl support cushions.

2.6 MATERIALS

A. Stainless Steel Plate Sheet, and Strip: ASTM A240/A240M or ASTM A666, Type 304.

B. Stainless Steel Flat Bars: ASTM A666, Type 304.

C. Stainless Steel Angles: ASTM A276 or ASTM A479/A479M, Type 304.

2.7 FABRICATION

A. Shop fabricate floor grilles to greatest extent possible in sizes as indicated.

B. Fabricate frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install recessed floor grilles and frames to comply with manufacturer's written instructions at locations indicated and with top of floor grilles and frames in relationship to one another and to adjoining finished flooring as recommended by manufacturer. Set floor-grille tops at height for

most effective cleaning action. Coordinate top of floor-grille surfaces with doors that swing across grilles to provide clearance under door.

3.2 PROTECTION

A. After completing frame installations, provide temporary filler of plywood or fiberboard in floor-grille recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION

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SECTION 13 3419

METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural-steel framing.
2. Accessories.

B. Related Requirements:
1. Section 055000 "Metal Fabrications".
2. Section 072100 “Thermal Insulation”.
3. Section 072500 “Weather Barriers”.
4. Section 074113 “Metal Roof Panels”.
5. Section 074213 “Metal Wall Panels”.
6. Section 079200 “Joint Sealants”.
7. Section 081113 “Hollow Metal Doors and Frames”.
8. Section 083113 “Access Doors and Frames”.
9. Section 083613 “Sectional Doors”.
10. Section 084112 “Aluminum-Framed Enterances and Storefronts”.
11. Section 085113 “Aluminum Windows”.
12. Section 086200 “Unit Skylights”.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of metal building system component.

B. Shop Drawings: Indicate components by others. Include full building plan, elevations, sections, details and attachments to other work.

C. Samples: For units with factory-applied finishes.

D. Delegated-Design Submittal: For metal building systems.

1. Include analysis data indicating compliance with performance requirements and design data signed and sealed by the qualified professional engineer responsible for their preparation and licensed in the state where project is located.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Letter of Design Certification: Signed and sealed by a qualified professional engineer licensed in the state where project is located. Include the following:

1. Name and location of Project.
2. Order number.
3. Name of manufacturer.
4. Name of Contractor.
5. Building dimensions including width, length, height, and roof slope.
6. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
7. Governing building code and year of edition.
8. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
9. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
10. Building-Use Category: Indicate category of building use and its effect on load importance factors.

C. Material test reports.

D. Source quality-control reports.

E. Field quality-control reports.

F. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer.

1. Accreditation: Manufacturer's facility accredited according to the International Accreditation Service's AC472, "Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems."
2. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.

B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.7 WARRANTY

A. Special Warranty on Metal Panel Finishes: Manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 20 years from date of Substantial Completion.

B. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Alliance Steel, Inc.
2. Butler Manufacturing Company; a division of BlueScope Buildings North America, Inc.
3. CBC Steel Buildings; a Nucor Company.
4. Ceco Building Systems; an NCI company.
5. Trident Building Systems, Inc.
6. Vulcan Steel Structures, Inc.
7. Star Building Systems.
8. Metallic Building Company.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design metal building system.

B. Structural Performance: Metal building systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."

1. Design Loads: As indicated on Drawings.
2. Deflection and Drift Limits: Design metal building system assemblies to withstand serviceability design loads without exceeding deflections and drift limits recommended in AISC Steel Design Guide No. 3 "Serviceability Design Considerations for Steel Buildings."
3. Deflection and Drift Limits: No greater than the following:

a. Purlins and Rafters: Vertical deflection of 1/240 of the span.
b. Girts: Horizontal deflection of 1/180 of the span.
c. Metal Roof Panels: Vertical deflection of 1/240 of the span.
d. Metal Wall Panels: Horizontal deflection of 1/240 of the span.
e. Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.
f. Lateral Drift: Maximum of 1/100 of the building height.

C. Seismic Performance: Metal building system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing 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, ambient; 180 deg F, material surfaces.

E. Fire-Resistance Ratings: Where assemblies are indicated to have a fire-resistance rating, provide metal panel assemblies identical to those of assemblies tested for fire resistance per ASTM E119 or ASTM E108 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory," FM Global's "Approval Guide," or from the listings of another qualified testing agency.

F. Fire-Rated Door Assemblies: Assemblies 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.

1. 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.

G. Structural Performance for Metal Roof and Wall Panels: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:

1. Wind Loads: As indicated on Drawings.

H. Air Infiltration for Metal Roof Panels: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E1680 or ASTM E283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

I. Air Infiltration for Metal Wall Panels: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

J. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E1646 or ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 2.86 lbf/sq. ft..

K. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

L. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 90.

M. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.

1. Fire/Windstorm Classification: Class 1A- 90.
2. Hail Resistance: MH.

N. Energy Star Listing: Roof panels that are listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.

O. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:

1. Three-year, aged, solar reflectance of not less than 0.55 and emissivity of not less than 0.75.
2. Three-year, aged, Solar Reflectance Index of not less than 64 when calculated according to ASTM E1980.

P. Thermal Performance for Opaque Elements: Provide the maximum U-factors and minimum R-values indicated on drawings when tested according to ASTM C1363 or ASTM C518:

2.3 STRUCTURAL-STEEL FRAMING

A. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings."

B. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts."

C. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.

D. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; Portal Frames (refer to drawing S2); rafters and rake beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.

1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.

a. Slight variations in span and spacing may be acceptable if necessary to comply with manufacturer's standard, as approved by Architect.

E. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating, to comply with the following:

F. Anchor Rods: Headed anchor rods as indicated in Anchor Rod Plan for attachment of metal building to foundation. Refer to structural drawings.

2.4 METAL ROOF PANELS

A. Provide according to Section 074113 Metal Roof Panels.

2.5 METAL WALL PANELS

A. Provide according to Section 074213 Metal Wall Panels.

2.6 THERMAL INSULATION

A. Provide according to Section 072100 - Thermal Insulation.

2.7 PERSONNEL DOORS, FRAMES, AND HARDWARE

A. Proivde as indicated in Sections 081113 - Hollow Metal Doors And Frames, 083613 - Sectional Doors, 087100 Door Hardwarea, and 084113 - Aluminum-Framed Entrances And Storefronts.

2.8 WINDOWS

A. Aluminum Windows: refer to Section 084113 Aluminum-Framed Entrances And Storefronts and Section 085113 – Aluminum Windows.

2.9 ACCESSORIES

A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.

1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers,

closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.

D. Flashing and Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match adjacent metal panels.

E. Roof Curbs: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.048-inch nominal uncoated steel thickness prepainted with coil coating; finished to match metal roof panels; with welded top box and bottom skirt, and integral full-length cricket; capable of withstanding loads of size and height indicated.

F. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

2.10 FABRICATION

A. General: Design components and field connections required for erection to permit easy assembly.

1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.

B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.

C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.

D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll forming or break forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.

E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

2.11 SOURCE QUALITY CONTROL

A. Special Inspection: Owner will engage a qualified special inspector to perform source quality control inspections and to submit reports.

1. Accredited Manufacturers: Special inspections will not be required if fabrication is performed by an IAS AC472-accredited manufacturer approved by authorities having jurisdiction to perform such Work without special inspection.

B. Product will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 ERECTION OF STRUCTURAL FRAMING

A. Erect metal building system according to manufacturer's written instructions and drawings.

B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.

C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

D. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.

F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.

1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt type and joint type specified.

    a. Joint Type: Snug tightened or pretensioned as required by manufacturer.

G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.

1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
2. Locate and space wall girts to suit openings such as doors and windows.
3. Provide supplemental framing at entire perimeter of openings, including doors, windows, ventilators, and other penetrations of roof and walls.

H. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.

1. Tighten rod and cable bracing to avoid sag.
2. Locate interior end-bay bracing only where indicated.

I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

J. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

3.2 METAL PANEL INSTALLATION, GENERAL

A. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.

    a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.

2. Install metal panels perpendicular to structural supports unless otherwise indicated.
3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Locate metal panel splices over structural supports with end laps in alignment.
6. Lap metal flashing over metal panels to allow moisture to run over and off the material.

B. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.

1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Section 07 9200 "Joint Sealants."

3.3 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

C. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform field quality control special inspections and to submit reports.

B. Product will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION

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SECTION 22 0523

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
4. ASME B16.18 for solder-joint connections.

B. NSF Compliance: NSF 61 [**and NSF 372**] for valve materials for potable-water service.

2.2 GENERAL-DUTY VALVES

A. Valve Sizes: Same as upstream piping unless otherwise indicated.

B. Valves in Insulated Piping: With 2-inch stem extensions.

C. Regular Port and Bronze or Brass Trim:

1. Manufacturer: 2” and smaller, NIBCO#S-685-80-LF

a. Standard: MSS SP-110.
b. CWP Rating: 600 psig.
c. Body Design: Two piece.
d. Body Material: Bronze.
e. Ends: Threaded.
f. Seats: PTFE.
g. Stem: Bronze or brass.
h. Ball: Chrome-plated brass.
i. Port: Regular.

D. Class 125, Bronze Swing Check Valves with Bronze Disc:

1. Manufacturer: Horizontal check valve 2” and smaller shall be Milwaukee #UP1509 or NIBCO #S-423-Y-LF with soldered lead free bronze body and bronze disc. Horizontal check valves 2-1/2” and larger shall be Crane #373 or NIBCO F-918 iron body flanged valve with brass trim. Check valves for installation in vertical pipe runs shall be of the “vertical lift” spring loaded design. Vertical check valves 2” and smaller shall be Milwaukee #UP1548T or NIBCO #S-480_Y_LF with soldered lead free bronze body and bronze disc. Vertical check valves #” and larger shall be center guided.

   Description:

   a. Standard: MSS SP-80, Type 3.
   b. CWP Rating: 200 psig.
   c. Body Design: Horizontal flow.
   d. Body Material: ASTM B 62, bronze.
   e. Ends: Threaded or soldered. See valve schedule articles.
   f. Disc: Bronze.

E. Class 125, NRS, Bronze Gate Valves:

1. Manufacturer: Size 2” and smaller shall be NIBCO #S-113_LF non-rising stem, soldered lead free bronze body and parts, with wedge disc.

   Description:

   a. Standard: MSS SP-80, Type 1.
   b. CWP Rating: 200 psig.
   c. Body Material: Bronze with integral seat and screw-in bonnet.
   d. Ends: Threaded or solder joint.
   e. Stem: Bronze.
   f. Disc: Solid wedge; bronze.
   g. Packing: Asbestos free.
   h. Handwheel: Malleable iron, bronze, or aluminum.

F. Class 125, NRS, Iron Gate Valves:

1. Manufacturer: Gate valves 2-1/2” and larger shall be NIBCO #617-0, O.S. & Y., Iron body flanged wedge gate with brass seats and stem.

   Description:

   a. Standard: MSS SP-70, Type I.
   b. CWP Rating: 200 psig.
   c. Body Material: Gray iron with bolted bonnet.
   d. Ends: Flanged.
   e. Trim: Bronze.
   f. Disc: Solid wedge.
   g. Packing and Gasket: Asbestos free.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Use gate and ball valves for shutoff duty; globe and ball for throttling duty.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves for each fixture and item of equipment.

D. Install three-valve bypass around each pressure-reducing valve using throttling-type valves.

E. Install valves in horizontal piping with stem at or above center of pipe.

F. Install valves in a position to allow full stem movement.

G. Install check valves for proper direction of flow in horizontal position with hinge pin level.

END OF SECTION

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SECTION 22 0529

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product.
2. Hangers and Supports:

    a. Shop Drawings: Signed and sealed by a qualified professional engineer.
    b. Welding certificates.
    c. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
    d. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes capable of supporting combined weight of supported systems, and system contents.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

2.2 HANGERS AND SUPPORTS FOR PLUMBING PIPING EQUPMENT

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

C. Fastener Systems:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
2. Mechanical-Expansion Anchors: Insert-wedge-type, **zinc-coated** steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

D. Miscellaneous Materials:

1. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
2. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

    a. Properties: Nonstaining, noncorrosive, and nongaseous.
    b. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 GENERAL PIPING INSTALLATIONS

A. Install piping free of sags and bends.

B. Install fittings for changes in direction and branch connections.

3.2 HANGERS AND SUPPORTS

A. Comply with MSS SP-69 and MSS SP-89. Install building attachments within concrete or to structural steel.

B. Install hangers and supports to allow controlled thermal and seismic movement of piping systems.

C. Install powder-actuated fasteners and mechanical-expansion anchors in concrete after concrete is cured. Do not use in lightweight concrete or in slabs less than 4 inches thick.

D. Load Distribution: Install hangers and supports so piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

E. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.

2. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
3. Adjustable Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
4. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
5. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.

F. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.

END OF SECTION

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SECTION 220533
HEAT TRACING FOR PLUMBING PIPING

PART 1 - GENERAL REQUIREMENTS

1.1 SUMMARY

A. This Section pipe freeze protection system, grease waste temperature maintenance system, and installation instructions.

B. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 22 Section "Plumbing Insulation" for piping insulation and installation requirements.
2. Division 23 Section "Direct-Digital Control for HVAC" for interlock of alarms with facility management system and alarm wiring.
3. Division 26 Section "Common Work Results for Electrical" required electrical devices.
4. Division 26 Sections "Enclosed Switches and Circuit Breakers" for field-installed disconnects.

1.2 SUBMITTALS

A. Refer to Division 1 and Division 22 Section "General Plumbing Requirements" for administrative and procedural requirements for submittals.

B. Product Data: Submit product data on the following items:

1. Pipe Freeze Protection System

1.3 QUALITY ASSURANCE

A. Pipe freeze protection system shall be listed and classified by Underwriter's Laboratories, Inc. as suitable for purpose intended.

PART 2 - PRODUCTS AND MATERIALS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide piping materials and specialties from one of the following:

1. Pipe Freeze Protection System
   a. Chromalox
   b. Nextron
   c. Nelson
   d. Tyco Thermal Controls/Raychem

2.2 PIPE FREEZE PROTECTION SYSTEM

A. Furnish and install a pipe freeze protection system to prevent the following piping from freezing where located in unheated areas:

1. Domestic water piping.
2. Sanitary piping traps.
3. Condensate drain piping.
4. System components shall be factory tested with manufacturers' standard tests to ensure that all devices, components, and systems are in proper working order before shipment.

B. In general the system shall include the following items:

1. Heating cable control panel.
2. Transformer(s).
3. Outdoor ambient thermostat(s). Pipe mounted temperature sensor.
4. Junction boxes.
5. Parallel circuit heating cable.
6. Branch circuit wiring and conduit.
7. Other items necessary for a complete system.

C. Heating Cable and Accessories:

1. Parallel circuit, jacketed cable, self-limiting, designed to operate on voltage as specified on the

drawings. Cable shall consist of two nickel-copper bus wires embedded in parallel in a self regulating polymer core. Cable shall be capable of varying its output along its length. Provide wattage as required for piping and insulation involved per manufacturer's recommendations.
2. Heating cable shall be covered by a polyolefin dielectric jacket.
3. Heating cable shall be grounded with a braid of tinned copper.
4. Where indicated on the drawings, heating cable shall have polyolefin outer jacket for protection against aqueous inorganic chemicals. Where indicated on the drawings, heating cable shall have fluoropolymer outer jacket for protection against organic chemicals or corrosives.
5. Termination fittings for direct connection to junction boxes.
6. Junction Boxes: Junction boxes shall be NEMA 5 Watertight, even where located indoors.

D. Control Panel:

1. NEMA 4X Fiberglass Reinforced Plastic enclosure for outdoor installation with hinged access door with window and furnished with the following:
2. Microprocessor based controller with LED display with keypad interface and non-volatile memory.
3. Ground fault circuit protection capable of checking heating cable circuit faults
4. LED Indicator Lights: Current mode, heater on, alarm conditions and receive / transmit data.
5. Alarm Conditions: RTD failure, high/low temperature, high/low current, hi/low resistance and high/low voltage, ground fault alarm, trip, loss of programmed values and electromechanical relay failure.
6. Alarm Contacts: One single pole single throw rated at 0.75 amp 120 to 277 volt relay and one dry pilot duty only relay rated at 48 VAC / DC 50 miliamps, 10VA maximum resistive switching
7. Power strip for connecting 277 volt single phase at 30 amps maximum.
8. Temperature Control Sensors: Total of two three wire 100 Ohm RTD's with 10 foot long stainless steel sheath, ambient temperature range of –76°F to 1058°F with an accuracy of ±3°F and a repeatability of ±3°F.

E. Temperature Control Sensor

1. Provide outdoor ambient thermostat with adjustable contacts set to close on decreasing temperature.
2. Provide pipe mounted sensor with adjustable setpoint set to close on decreasing temperature.

PART 3 - EXECUTION

3.1 PIPE FREEZE PROTECTION SYSTEM INSTALLATION

A. Installation:

1. Cut cable to length as required to suit pipe lengths and watt per foot requirements.
2. Install and test heating cable after pipe is pressure tested and before pipe is insulated.
3. Secure cable to pipe with cable ties or belts and install according to manufacturer's instructions.
4. Install cable on piping in accordance with manufacturer's recommendations for a minimum ambient temperature of minus 20 degrees F.
5. Install junction boxes where necessary.
6. Install control panels at the locations indicated.
7. For plastic piping, apply heating cable using aluminum tape.

B. Connections:

1. Electrical wiring and connections are specified in Division 26 Section "Common Work Results for Electrical".
2. Coordinate interlock of heat trace system control panel alarm conditions with the facility management system. Alarm wiring and alarm interlock with the facility management system are specified in Division 23 Section "Direct-Digital Control for HVAC".

C. Insulation:

1. Install and test electric heat trace prior to installation of insulation. Insulation is specified in Division 22 section "Plumbing Insulation".

D. Factory Tests:
   1. Conduct manufacturers' standard tests on all system components to assure that all devices, components, and systems are in proper working order before shipment.

E. Field Tests:
   1. Before and after installation of the thermal insulation, test heating cable with megohmeter between the heating cable bus wires and metallic braid. Minimum insulation resistance shall be 20 megohms regardless of length.
   2. Submit test report of megohmeter readings to the Owner.

END OF SECTION 220533

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SECTION 22 0548

VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each product indicated, include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Delegated-Design Submittal: For vibration isolation calculations and details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
3. Welding certificates.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

B. Seismic-Restraint Loading:

1. Site Class as Defined in the IBC:**B**
2. Assigned Seismic Use Group or Building Category as Defined in the IBC: **II**

    a. Component Importance Factor: **1.0**
    b. Component Response Modification Factor: **1.5**
    c. Component Amplification Factor: **1.0**

3. Design Spectral Response Acceleration at Short Periods (0.2 Second): 0.115
4. Design Spectral Response Acceleration at 1-Second Period: 0.036
5. Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.

    a. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they are subjected.

2.2 VIBRATION CONTROLS

A. Elastomeric Isolation Pads:

1. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
2. Size: Factory or field cut to match requirements of supported equipment.
3. Pad Material: Oil and water resistant with elastomeric properties **infused nonwoven cotton or synthetic fibers**.
4. Surface Pattern: **Smooth** pattern.
5. Load-bearing metal plates adhered to pads.

B. Double-Deflection, Elastomeric Isolation Mounts:

1. Mounting Plates:

   a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded **with threaded studs or bolts**.
   b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.

2. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

C. Restrained Elastomeric Isolation Mounts:

1. Description: All-directional isolator with seismic restraints containing two separate and opposing elastomeric elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.

   a. Housing: Cast-ductile iron or welded steel.
   b. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

D. Freestanding, Laterally Stable, Open-Spring Isolators:

1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
5. Baseplates: Factory-drilled steel plate for bolting to structure with an elastomeric isolator pad attached to the underside. Baseplates shall limit floor load to 500 psig.
6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

E. Freestanding, Laterally Stable, Open-Spring Isolators with Vertical-Limit Stop Restraint:

1. Housing: Steel housing with vertical-limit stops to prevent spring extension due to weight being removed.

   a. Base with holes for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
   b. Top plate with **elastomeric pad**.
   c. Internal leveling bolt that acts as blocking during installation.

2. Restraint: Limit stop as required for equipment and authorities having jurisdiction.

3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

F. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods:

1. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
2. Dampening Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel-to-steel contact.

G. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:

1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
7. Self-centering hanger-rod cap to ensure concentricity between hanger rod and support spring coil.

2.3 Mechanical Anchor Bolts

A. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

PART 3 - EXECUTION

3.1 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Equipment Restraints:

1. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inches.
2. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.

B. Piping Restraints:

1. Comply with requirements in MSS SP-127.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.

E. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

F. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

G. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Set anchors to manufacturer's recommended torque, using a torque wrench.
5. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Remove and replace malfunctioning units and retest as specified above.

C. Prepare test and inspection reports.

3.3 ADJUSTING

A. Adjust isolators after piping system is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Adjust active height of spring isolators.

D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION

SECTION 22 0553

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product.

a. Samples: For color, letter style, and graphic representation required for each identification material and device.

PART 2 - PRODUCTS

2.1 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: White

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

G. Fasteners: Stainless-steel [rivets] [rivets or self-tapping screws] [self-tapping screws].

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information plus emergency notification instructions.

2.2 VALVE TAGS

A. Provide manufacturer's standard pre-printed, semi-rigid snap-on or permanent adhesive, pressure-sensitive vinyl pipe markers. Pipe markers shall be color-coded complying with ANSI A13.1.

B. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch stamped holes for attachment hardware.
2. Fasteners: Brass wire-link chain

C. Valve-tag schedule shall be included in operation and maintenance data.

2.3 WARNING TAGS

A. Description: Preprinted or partially preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.

1. Size: 3 by 5-1/4 inches minimum.
2. Fasteners: [**Brass grommet and wire**] [**Reinforced grommet and wire or string**].
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Safety yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

a. Cold Water: 1-1/2 inches, round.
b. Hot Water: 1-1/2 inches, round.

2. Valve-Tag Colors:

a. Cold Water: Natural.
b. Hot Water: Natural.

3. Letter Colors:

a. Cold Water: White.
b. Hot Water: White.

3.3 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION

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SECTION 22 0700

PLUMBING INSULATION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product.
2. For adhesives and sealants, documentation including printed statement of VOC content and chemical components.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less according to ASTM E 84.

B. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less according to ASTM E 84.

2.2 INSULATION MATERIALS

A. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

B. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

C. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

D. Mineral-Fiber, Preformed Pipe Insulation:

E. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied **ASJ**complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

F. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials and Type II, Grade 1 for sheet materials.

2.3 ADHESIVES

A. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. For indoor applications, adhesive shall have a VOC content of 80 g/L or less.

C. ASJ Adhesive,: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less.

2.4 MASTICS

A. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less.
2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

B. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F.
3. Solids Content: 60 percent by volume and 66 percent by weight.
4. Color: White.

2.5 SEALANTS

A. Joint Sealants for Cellular-Glass Products:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 100 to plus 300 deg F.
4. Color: White or gray.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less.

B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: White.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less.

2.6 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2.7 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Width: 3 inches.
2. Thickness: 11.5 mils.
3. Adhesion: 90 ounces force/inch in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch in width.
6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

PART 3 - EXECUTION

3.1 PIPE INSULATION INSTALLATION

A. Comply with requirements of the Midwest Insulation Contractors Association's "National Commercial & Industrial Insulation Standards" for insulation installation on pipes and equipment.

B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

C. Mineral-Fiber Insulation Installation:

1. Insulation Installation on Straight Pipes and Tubes: Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
2. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
3. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

D. Interior Piping System Applications: Insulate the following piping systems:

1. Domestic hot water.
2. Recirculated domestic hot water.
3. Roof drain bodies and horizontal rainwater leaders of storm water piping.
4. Exposed water supplies and sanitary drains of fixtures for people with disabilities.

E. Do not apply insulation to the following systems, materials, and equipment:

1. Flexible connectors.

2. Sanitary drainage and vent piping.
3. Drainage piping located in crawlspaces unless otherwise indicated.
4. Chrome-plated pipes and fittings, except for plumbing fixtures for people with disabilities.
5. Piping specialties, including air chambers, unions, strainers, check valves, plug valves, and flow regulators.

3.2 EQUIPMENT INSULATION SCHEDULE

A. Domestic water and domestic hot-water hydropneumatic tank insulation shall bethe following:
1. Mineral-Fiber Blanket: **1 inch**thick and **2-lb/cu. ft.** nominal density.

B. Domestic hot-water storage tank insulation shall bethe following:

1. Mineral-Fiber Pipe and Tank: **4 inches**thick.

C. Domestic water storage tank insulation shall bethe following:
1. Mineral-Fiber Pipe and Tank: **1 inch**thick.

3.3 INDOOR PIPING INSULATION SCHEDULE

A. Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawlspaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

B. Domestic Cold Water:

1. **NPS 1**and Smaller: Insulation shall be the following:
   a. Mineral-Fiber, Preformed Pipe Insulation, Type I: **1/2 inch**] thick.

2. [**NPS 1-1/4** and Larger: Insulation shall be[**one of**] the following:
   a. Mineral-Fiber, Preformed Pipe Insulation, Type I: **1 inch** thick.

C. Domestic Hot and Recirculated Hot Water:

1. **NPS 1-1/4**and Smaller: Insulation shall be the following:

   a.
   b. Mineral-Fiber, Preformed Pipe Insulation, Type I: [**1/2 inch**] thick.

2. **NPS 1-1/2** and Larger: Insulation shall be the following:
   a. Mineral-Fiber, Preformed Pipe Insulation, Type I: **1 inch** thick.

D. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:

1. All Pipe Sizes: Insulation shall be the following:
   a. Mineral-Fiber, Preformed Pipe Insulation, Type I: **1/2 inch** thick.

END OF SECTION

SECTION 22 1116

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data:

a. For transition fittings and dielectric fittings.
b. For solvent cements and adhesive primers, documentation including printed statement of VOC content.

PART 2 - PRODUCTS

2.1 PREFORMANCE REQUIREMENTS

A. Potable-water piping and components shall comply with NSF 14 and NSF 61. Plastic piping components shall be marked with "NSF-pw."

2.2 PIPE AND FITTINGS

A. Hard Copper Tubing (Domestic Water Piping Installed above the Floor Slab): ASTM B 88, Types L, water tube, drawn temper with wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.

1. Copper Unions: Cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
2. Joining Materials: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder.

B. Soft Copper Tubing (Underground Domestic Water Piping 2” and Smaller): ASTM B 88, Types K and L, water tube, annealed temper with copper pressure fittings, cast-copper-alloy or wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.

1. Joining Materials: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder.

C. Galvanized-Steel Piping: ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe, with ASME B16.4, Class 125, galvanized, standard pattern gray-iron, threaded fittings.

D. CPVC Piping: ASTM F 441/F 441M, Schedule 40 pipe with ASTM F 438, CPVC Schedule 40 socket-type fittings.

E. PEX Tube and Fittings: ASTM F 877, SDR 9 PEX tubing and ASTM F 1807, metal insert-type fittings with copper or stainless-steel crimp rings.
   1. Manifold: ASTM F 877 plastic or corrosion-resistant-metal assembly, with a plastic or corrosion-resistant-metal valve for each outlet.

F. PVC Piping: ASTM D 1785, Schedule 40 pipe with ASTM D 2466, Schedule 40, socket-type fittings.

G. Special-Duty Valves:

   1. Comply with requirements in Section 22 0523 "General-Duty Valves for Plumbing Piping" for general-duty metal valves.
   2. Comply with requirements in Section 22 1119 "Domestic Water Piping Specialties" for balancing valves, drain valves, backflow preventers, and vacuum breakers.
   3. **CPVC** Union Ball Valves: MSS SP-122, with full-port ball, **socket** detachable end connectors, and pressure rating not less than **125 psig** at **73 deg F**] <**Insert value**>.
   4. [**CPVC**] [**and**] [**PVC**] Non-Union Ball Valves: MSS SP-122, with full- or reduced-port ball, socket or threaded ends, and pressure rating not less than [**125 psig**] [**150 psig**] <**Insert value**> at [**73 deg F**.
   5. **CPVC**] Butterfly Valves: With lever handle and pressure rating not less than **150 psig at 73 deg F**
   6. **CPVC** Check Valves: Swing or ball-check design and pressure rating not less than **150 psig at 73 deg F**

H. Transition Fittings: Manufactured piping coupling or specified piping system fitting. Same size as pipes to be joined and pressure rating at least equal to pipes to be joined.

   1. Plastic-to-Metal Transition Fittings:
      a. Description:

         1) [**CPVC**] [**or**] [**PVC**] one-piece fitting with manufacturer's Schedule 80 equivalent dimensions.
         2) One end with threaded brass insert and one solvent-cement-socket[**or threaded**] end.

   2. Plastic-to-Metal Transition Unions:
      a. Description:

         1) **CPVC** four-part union.
         2) Brass threaded end.
         3) Solvent-cement-joint plastic end.
         4) Rubber O-ring.
         5) Union nut.

I. Flexible Connectors: **Bronze**, corrugated-metal tubing with wire-braid covering. Working-pressure rating a minimum of **200 psig**.

2.3 PRESSURE GAGES AND TEST PLUGS

A. Direct-Mounted, Plastic-Case, Dial-Type Pressure Gages:
   1. Standard: ASME B40.100.
   2. Case: **Sealed** type; **plastic**; **4-1/2-inch** nominal diameter.

3. Movement: Mechanical, with link to pressure element and connection to pointer.
4. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
5. Pointer: Dark-colored metal.
6. Window: Plastic.
7. Accuracy: **Grade A, plus or minus 1 percent of middle half of** scale range.

B. Test Plug: Corrosion-resistant brass or stainless-steel body with two self-sealing rubber core inserts and gasketed and threaded cap, with extended stem for units to be installed in insulated piping. Minimum pressure and temperature rating 500 psig at 200 deg F.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install piping free of sags and bends.

B. Install fittings for changes in direction and branch connections.

C. Install unions at final connection to each piece of equipment.

D. Install dielectric unions and flanges to connect piping materials of dissimilar metals in gas piping.

E. Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals in water piping.

F. Soldered Joints: Comply with procedures in ASTM B 828 unless otherwise indicated.

G. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Section 22 1119 "Domestic Water Piping Specialties" for drain valves and strainers.

H. Install domestic water piping **with 0.25 percent slope downward toward drain** for horizontal piping and plumb for vertical piping.

I. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

J. Comply with requirements in Section 22 0529 "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.

1. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

a. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
b. NPS 1-1/2: 108 inches with 3/8-inch rod.
c. NPS 2: 10 feet with 3/8-inch rod.
d. NPS 2-1/2: 11 feet with 1/2-inch rod.
e. Support vertical piping at each floor.

2. Install vinyl-coated hangers for CPVC piping with the following maximum horizontal spacing and minimum rod diameters:

    a. NPS 1 and Smaller: 36 inches with 3/8-inch rod.
    b. NPS 1-1/4 to NPS 2: 48 inches with 3/8-inch rod.
    c. NPS 2-1/2 to NPS 3-1/2: 48 inches with 1/2-inch rod.
    d. Install supports for vertical CPVC piping every 60 inches for NPS 1 and smaller, and every 72 inches for NPS 1-1/4 and larger.

3. Install vinyl-coated hangers for PEX piping with the following maximum horizontal spacing and minimum rod diameters:

    a. NPS 1 and Smaller: 32 inches with 3/8-inch rod.
    b. Install hangers for vertical PEX piping every 48 inches.

K. Install flexible connectors in suction and discharge piping connections to each domestic water pump.

3.2 INSPECTING AND CLEANING

A. Inspect and test piping systems as follows:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.

B. Clean and disinfect potable domestic water piping by filling system with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.

3.3 PIPING SCHEDULE

A. Underground, Service Entrance Piping: **Soft copper tubing**.

B. Aboveground Distribution Piping: **Type L**, hard copper tubing.

3.4 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use bronze ball or gate valves for piping NPS 2 and smaller. Use cast-iron butterfly or gate valves with flanged ends for piping NPS 2-1/2 and larger.
2. Throttling Duty: Use bronze ball or globe valves for piping NPS 2 and smaller. Use cast-iron butterfly valves with flanged ends for piping NPS 2-1/2 and larger.
3. Hot-Water-Piping, Balancing Duty: **Calibrated** balancing valves.
4. Drain Duty: Hose-end drain valves.

B. Install gate valves close to main on each branch and riser serving two or more plumbing fixtures or equipment connections and where indicated.

C. Install gate or ball valves on inlet to each plumbing equipment item, on each supply to each plumbing fixture not having stops on supplies, and elsewhere as indicated.

D. **CPVC** ball, butterfly, and check valves may be used in matching piping materials.

E. Install drain valve at base of each riser, at low points of horizontal runs, and where required to drain water distribution piping system.

F. Install swing check valve on discharge side of each pump and elsewhere as indicated.

G. Install ball valves in each hot-water circulating loop and discharge side of each pump.

END OF SECTION

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SECTION 22 1119

DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product.
2. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: **125 psig** unless otherwise indicated.

2.3 MANUFACTURED UNITS

A. Reduced-Pressure-Principle Backflow Preventers:
1. Standard: ASSE 1013.
2. Operation: Continuous-pressure applications.
3. Pressure Loss: **12 psig** maximum, through middle third of flow range.
4. Body: Bronze for NPS 2 and smaller; **cast iron with interior lining that complies with AWWA C550 or that is FDA approved** for NPS 2-1/2 and larger.
5. End Connections: Threaded for NPS 2 and smaller; **flanged** for NPS 2-1/2 and larger.
6. Configuration: Designed for **horizontal, straight-through** flow.
7. Accessories:

    a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
    b. Valves NPS 2-1/2 and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.
    c. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

B. Water Regulators
1. Standard: ASSE 1003.
2. Pressure Rating: Initial working pressure of 150 psig.

3. Body: Bronze **with chrome-plated finish** for NPS 2 and smaller; cast iron **with interior lining that complies with AWWA C550 or that is FDA approved** for NPS 2-1/2 and NPS 3.
4. Valves for Booster Heater Water Supply: Include integral bypass.
5. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and NPS 3.

C. Memory-Stop Balancing Valves
1. Standard: MSS SP-110 for two-piece, copper-alloy ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 2 or smaller.
4. Body: Copper alloy.
5. Port: Standard or full port.
6. Ball: Chrome-plated brass.
7. Seats and Seals: Replaceable.
8. End Connections: Solder joint or threaded.
9. Handle: Vinyl-covered steel with memory-setting device.

D. Primary Thermostatic, Water Mixing Valves
1. Standard: ASSE 1017.
2. Pressure Rating: 125 psig minimum unless otherwise indicated.
3. Type: **Exposed-mounted,** thermostatically controlled, water mixing valve.
4. Body: Bronze with corrosion-resistant interior components.
5. Connections: Threaded inlets and outlet.
6. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
7. Tempered-Water Setting: **120 deg F**
8. Valve Finish: **Chrome plated**
9. Piping Finish: **Chrome plated**

E. Y-Pattern Strainers

1. Pressure Rating: 125 psig minimum unless otherwise indicated.
2. Body: Bronze for NPS 2 and smaller; cast iron **with interior lining that complies with AWWA C550 or that is FDA approved, epoxy coated and** for NPS 2-1/2 and larger.
3. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
4. Screen: Stainless steel with round perforations unless otherwise indicated.
5. Perforation Size:

    a. Strainers NPS 2 and Smaller: **0.020 inch**

6. Drain: **Pipe plug**

F. Clothes Washer Outlet Boxes
1. Mounting: Recessed.
2. Material and Finish: **Enameled-steel or epoxy-painted-steel** box and faceplate.
3. Faucet: Combination valved fitting or separate hot- and cold-water valved fittings complying with ASME A112.18.1. Include garden-hose thread complying with ASME B1.20.7 on outlets.
4. Supply Shutoff Fittings: NPS 1/2 gate, globe, or ball valves and NPS 1/2 copper, water tubing.
5. Drain: **NPS 2** standpipe and P-trap for direct waste connection to drainage piping.
6. Inlet Hoses: Two 60-inch-long, rubber household clothes washer inlet hoses with female, garden-hose-thread couplings. Include rubber washers.

7. Drain Hose: One 48-inch-long, rubber household clothes washer drain hose with hooked end.

G. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 3/4.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7.

H. Stop-and-Waste Drain Valves:

1. Standard: MSS SP-110 for ball valves or MSS SP-80 for gate valves.
2. Pressure Rating: 200-psig minimum CWP or Class 125.
3. Size: NPS 3/4.
4. Body: Copper alloy or ASTM B 62 bronze.
5. Drain: NPS 1/8 side outlet with cap.

I. Water-Hammer Arresters:
1. Standard: ASSE 1010 or PDI-WH 201.
2. Type: **Metal bellows**.
3. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

J. Supply-Type, Trap-Seal Primer Device:
1. Standard: ASSE 1018.
2. Pressure Rating: 125 psig minimum.
3. Body: Bronze.
4. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
5. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
6. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

K. Drainage-Type, Trap-Seal Primer Device
1. Standard: ASSE 1044, lavatory P-trap with NPS 3/8 minimum, trap makeup connection.
2. Size: NPS 1-1/4 minimum.
3. Body: Chrome-plated, cast brass.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

B. Install water regulators with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.

C. Install balancing valves in locations where they can easily be adjusted.

D. Install temperature-actuated, water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.

E. Install Y-pattern strainers for water on supply side of each **control valve**.

F. Set nonfreeze, nondraining-type post hydrants in concrete or pavement.

G. Set freeze-resistant yard hydrants with riser pipe in concrete or pavement. Do not encase canister in concrete.

H. Install water-hammer arresters in water piping according to PDI-WH 201.

I. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

J. Install drainage-type, trap-seal primer valves as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test each **backflow preventer** according to authorities having jurisdiction and the device's reference standard.
2. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.
3. Prepare test and inspection reports.

END OF SECTION

SECTION 22 1123

DOMESTIC WATER PUMPS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data. For each type of product.

a. Include certified performance curves with operating points plotted on curves, operating characteristics, electrical characteristics, and furnished specialties and accessories.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIRMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 778 for motor-operated water pumps.

2.2 DOMESTIC WATER PUMPS

A. In-Line, Sealless Centrifugal Pumps:

1. Description: Factory-assembled and -tested, in-line, close-coupled, canned-motor, sealless, overhung-impeller centrifugal pumps. Hermetically sealed, replaceable-cartridge type with motor and impeller on common shaft and designed for installation with pump and motor shaft horizontally mounted; rated for 125-psig minimum working pressure and minimum continuous water temperature of 225 deg F.
2. Casing: Bronze, with threaded or companion-flange connections.
3. Impeller: Plastic.

B. Horizontally Mounted, In-Line, Separately Coupled Centrifugal Pumps:

C. Description: Factory-assembled and -tested, in-line, single-stage, separately coupled, overhung-impeller centrifugal pumps designed for installation with pump and motor shafts horizontally mounted. Rated for 125-psig minimum working pressure and minimum continuous water temperature of 225 deg F.

1. Casing: Radially split, bronze, with threaded companion-flange connections.
2. Impeller: Statically and dynamically balanced, closed, and keyed to shaft.
3. Impeller Material: ASTM B 584, cast bronze or stainless steel.

4. Shaft and Shaft Sleeve: Steel shaft with copper-alloy shaft sleeve.
5. Seal: Mechanical; with carbon-steel rotating ring, stainless-steel spring, ceramic seat, and rubber bellows and gasket.
6. Bearings: Oil lubricated; bronze-journal or ball type.
7. Motor: Resiliently mounted to pump casing.

2.3 MOTORS

A. Comply with NEMA MG 1 unless otherwise indicated.

1. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

B. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

C. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Section 26 2913 "Enclosed Controllers."

2.4 CONTROLS

A. Thermostats: Electric; adjustable for control of **hot-water circulation** pump.

1. Type: Water-immersion temperature sensor, for installation in piping.
2. Settings: Start pump at **105 deg F** and stop pump at **120 deg F**

B. Timers: Electric, for control of **hot-water circulation** pump.

1. Type: Programmable, **seven-day** clock with manual override on-off switch.
2. Programmable Sequence of Operation: **Up to two on-off cycles each day for seven days**

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with HI 1.4.

B. Install pumps with access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.

C. Support pumps and piping so weight of piping is not supported by pump volute.

D. Install electrical connections for power, controls, and devices.

E. Suspend in-line pumps independent from piping. Use continuous-thread hanger rods and vibration isolation hangers. Fabricate brackets or supports as required for pumps.

F. Install vertical in-line pumps on concrete bases.

G. Connect piping with valves that are at least the same size as piping connecting to pumps.

H. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.

I. Install shutoff valve and strainer on suction side of pumps.

J. Install nonslam check valve and throttling valve on discharge side of pumps.

K. Install thermostats in hot-water return piping.

L. Install **pressure gages** on suction and discharge of each pump. Install at integral pressure gage tappings where provided.

END OF SECTION

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SECTION 22 1316

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product.
2. For solvent cements and adhesive primers, documentation including printed statement of VOC content.
3. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

1.2 FIELD CONDITIONS

A. Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify **Architect** no fewer than **two** days in advance of proposed interruption of sanitary waste service and do not proceed without written permission.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: **10-foot head of water**
2. Waste, Force-Main Piping: **100 psig**

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to **ASCE/SEI 7**

C. Piping materials shall bear label, stamp, or other markings of specified testing agency.

D. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components.

2.2 PIPES AND FITTINGS

A. Copper Drainage Tube and Fittings: ASTM B 306, Type DWV drawn temper with ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

1. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.

a. Flange Gasket Materials: ASME B16.21, full-face, flat, nonmetallic, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
b. Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

2. Solder: ASTM B 32, lead free with ASTM B 813, water-flushable flux.

B. Hub-and-Spigot Cast-Iron Soil Pipe and Fittings: ASTM A 74, Service class; ASTM C 564 rubber gaskets.

C. Hubless Cast-Iron Soil Pipe and Fittings: ASTM A 888 or CISPI 301.

D. Cast-Iron, Hubless-Piping Couplings:

1. Standard: ASTM C 1277.
2. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

E. CISPI, Hubless-Piping Couplings:

1. Standards: ASTM C 1277 and CISPI 310.
2. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

F. PVC Plastic, DWV Pipe and Fittings: ASTM D 2665, Schedule 40, plain ends with PVC socket-type, DWV pipe fittings.

1. Adhesive Primer: ASTM F 656.

a. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Solvent Cement: ASTM D 2564.

a. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Comply with requirements in Section 22 1113 "Facility Water Distribution Piping" for basic piping installation requirements.

B. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

C. Install wall penetration system at each pipe penetration through foundation wall. Make installation watertight. Comply with requirements in Section 22 1113 "Facility Water Distribution Piping" for wall penetration systems.

1. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.

D. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

E. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

F. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

G. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.

H. Install underground PVC soil and waste drainage piping according to ASTM D 2321.

I. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

J. Comply with requirements in Section 22 1113 "Facility Water Distribution Piping" for basic piping joint construction.

K. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure unless otherwise indicated.

L. Comply with requirements in Section 22 0529 "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.

3.2 PIPE SCHEDULE

A. Aboveground Applications: Hubless, cast-iron soil pipe and fittings or Hub-and-spigot, cast-iron soil pipe and fittings or PVC schedule 40 plastic, DWV pipe and fittings with solvent-cemented joints.

B. Belowground Applications: Hub-and-spigot, cast-iron soil pipe and fittings or PVC schedule 40 plastic, DWV pipe and drainage-pattern fittings with cemented joints.

END OF SECTION

SECTION 22 1319

SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product.

a. Include rated capacities, operating characteristics, and accessories for grease interceptors.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

2.2 BACKWATER VALVES

A. Horizontal, Cast-Iron Backwater Valves

1. ASME A112.14.1, gray-iron body with bronze seat.
2. Extension: ASTM A 74, Service class; full-size, cast-iron, soil-pipe extension to field-installed cleanout at floor; replaces backwater valve cover.

B. Horizontal, Plastic Backwater Valves

1. Horizontal type; with PVC body, PVC removable cover, and PVC swing check valve.

2.3 CLEANOUTS

A. Exposed Metal Cleanouts

1. ASME A112.36.2M, Cast-Iron Cleanouts:

a. Material: **Hub-and-spigot, cast-iron soil pipe T-branch** or **Hubless, cast-iron soil pipe test tee** as required to match connected piping.
b. Closure: **Countersunk or raised-head**, **brass** plug.
c. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

2. ASME A112.3.1, Stainless-Steel Cleanouts

    a. Body Material: **Stainless-steel tee with side cleanout** as required to match connected piping.
    b. Closure: **Countersunk or raised-head**, **brass** plug.
    c. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

B. Metal Floor Cleanouts

1. ASME A112.36.2M, Cast-Iron Cleanouts:

    a. Type: **Adjustable housing**
    b. Clamping Device: **Required**.
    c. Outlet Connection: **Threaded**
    d. Closure: **Brass plug with straight threads and gasket**

2. ASME A112.36.2M, Stainless-Steel Cleanouts

    a. Type: **Adjustable housing**
    b. Clamping Device: **Required**
    c. Outlet Connection: **Threaded**
    d. Closure: **Brass plug with straight threads and gasket**

3. ASME A112.3.1, Stainless-Steel Cleanouts

    a. Type: **Adjustable housing**
    b. Clamping Device: **Required**
    c. Outlet Connection: **Threaded**
    d. Closure: **Brass plug with straight threads and gasket**

C. Cast-Iron Wall Cleanouts

1. Standard: ASME A112.36.2M. Include wall access.
2. Closure: **Countersunk or raised-head**, **brass** plug.
3. Wall Access: Round, **flat, chrome-plated brass or stainless-steel** cover plate with screw.
4. Wall Access: **Round**, **nickel-bronze, copper-alloy, or stainless-steel** wall-installation frame and cover.

D. Plastic Floor Cleanouts

1. Size: Same as connected branch.
2. Body: PVC.
3. Closure Plug: PVC.
4. Riser: Drainage pipe fitting and riser to cleanout of same material as drainage piping.

2.4 FLOOR DRAINS

A. Cast-Iron Floor Drains

1. Standard: ASME A112.6.3
2. Pattern: **Floor Sanitary** drain.

3. Body Material: **Gray iron**]
4. Seepage Flange: **Required**
5. Clamping Device: **Required**
6. Outlet: **Bottom**
7. Backwater Valve: **Drain-outlet**
8. Coating on Interior and Exposed Exterior Surfaces: **Acid-resistant enamel**
9. Sediment Bucket: Per Plans
10. Top or Strainer Material: **Nickel bronze**
11. Top of Body and Strainer Finish: **Nickel bronze**
12. Top Shape: **Round**
13. Dimensions of Top or Strainer: Per plans
14. Top Loading Classification: **Light Duty** or **Medium Duty** as indicated on plans.
15. Funnel: **Not required**
16. Inlet Fitting: Per Plans
17. Trap Material: **Cast iron**
18. Trap Pattern: **Standard P-trap**
19. Trap Features: **Cleanout**

2.5 ROOF FLASHING ASSEMBLIES

A. Roof Flashing Assemblies

1. Description: Manufactured assembly made of **4.0-lb/sq. ft., 0.0625-inch** thick, lead flashing collar and skirt extending at least **6 inches** from pipe, with galvanized-steel boot reinforcement and counterflashing fitting.

    a. Open-Top Vent Cap: Without cap.
    b. Low-Silhouette Vent Cap: With vandal-proof vent cap.
    c. Extended Vent Cap: With field-installed, vandal-proof vent cap.

2.6 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Air-Gap Fittings: ASME A112.1.2, chrome-plated brass cover.

B. Vent Caps

1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
2. Size: Same as connected stack vent or vent stack.

C. Frost-Resistant Vent Terminals

1. Description: Manufactured or shop-fabricated assembly constructed of copper, lead-coated copper, or galvanized steel.
2. Design: To provide 1-inch enclosed air space between outside of pipe and inside of flashing collar extension, with counterflashing.

D. Expansion Joints: ASME A112.21.2M, cast iron with bronze sleeve, packing, and gland.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install backwater valves in building drain piping. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.

B. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

C. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor unless otherwise indicated.

1. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
2. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

D. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.

E. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

F. Install grease removal devices on floor. Install trap, vent, and flow-control fitting according to authorities having jurisdiction. Install control panel adjacent to unit, unless otherwise indicated.

G. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain grease removal devices.

END OF SECTION

SECTION 22 3300

ELECTRIC, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type and size of domestic-water heater.
2. Documentation indicating that units comply with applicable requirements in ASHRAE/IESNA 90.1, Section 7, "Service Water Heating."

    a. Seismic Qualification Certificates: For commercial domestic-water heaters, accessories, and components, from manufacturer.

3. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

B. Warranties: Submit a written warranty executed by manufacturer agreeing to repair or replace water heaters that fail in materials or workmanship within **five** years from date of Substantial Completion. Failures include, but are not limited to, tanks and elements.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Commercial domestic-water heaters shall withstand the effects of earthquake motions determined according to **ASCE/SEI 7**

B. Comply with requirements of applicable NSF, AWWA, or FDA and EPA regulatory standards for tasteless and odorless, potable-water-tank linings.

C. Comply with performance efficiencies prescribed in ASHRAE 90.2, "Energy Efficient Design of New Low-Rise Residential Buildings."

2.2 WATER HEATERS, GENERAL

A. Insulation: Suitable for operating temperature and required insulating value. Include insulation material that surrounds entire tank except connections and controls.

B. Anode Rods: Factory installed, magnesium.

C. Combination Temperature and Pressure Relief Valve: ASME rated and stamped and complying with ASME PTC 25.3. Include relieving capacity at least as great as heat input and pressure

setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into tank.

D. Drain Valve: Factory or field installed.

2.3 ELECTRIC WATER HEATERS

A. Light-Commercial, Storage, Electric Water Heaters:

B. Standard UL 174 but listed by manufacturer for commercial applications; **50-gal.** capacity. Steel tank with 150-psig working-pressure rating. Multiple electric, screw-in, immersion-type heating elements with adjustable thermostat for each element and wiring arrangement for simultaneous operation with maximum 60-A circuit.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install temperature and pressure relief valves and extend to closest floor drain.

B. Install vacuum relief valves in cold-water-inlet piping.

C. Install shutoff valves and unions at hot- and cold-water piping connections.

D. Make piping connections with dielectric fittings where dissimilar piping materials are joined.

E. Electrically ground units according to authorities having jurisdiction.

END OF SECTION

SECTION 22 4000

PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data for each type of plumbing fixture, including trim, fittings, accessories, appliances, appurtenances, equipment, and supports.
2. Documentation indicating flow and water consumption requirements.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"**; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"** for plumbing fixtures for people with disabilities.

B. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

C. NSF Standard: Comply with NSF 61, "Drinking Water System Components - Health Effects," for fixture materials that will be in contact with potable water.

2.2 WATER CLOSETS

A. Water Closets: Floor-mounted, floor-outlet, close-coupled (gravity tank), vitreous china. **"WC"**
1. Standards: ASME A112.19.2/CSA B45.1, ASME A112.19.5, and ASSE 1037. **Elongated** rim contour, siphon-jet bowl type, **close-coupled gravity tank,** floor-mounted, **floor** outlet

2.3 TOILET SEATS

A. Standard: IAPMO/ANSI Z124.5. Elongated, solid plastic open front without cover with bumpers and hardware, Commercial class.

2.4 LAVATORIES

A. Lavatories, Wall Mounted **See plans for specifications "LV" on sheet P0.1**
1. Standard: ASME A112.19.1/CSA B45.2 for enameled lavatories.

2. Shape: **Rectangular**

2.5 LAVATORY FAUCETS

A. General-Duty Faucets **See plumbing specification "LV" on sheet P0.1**
   1. Standard: ASME A112.18.1/CSA B125.1;
   2. Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.
   3. Maximum Flow Rate: **0.5 gpm**
   4. Trap: **Chrome plated** with slip-joint inlet and wall flange.
   5. Supply and Drain Insulation: Soft-plastic covering; removable at stops.

2.6 UTILITY SINKS

A. Utility Sinks: Stainless steel, freestanding. **See "SK-2" on sheet P0.1**

2.7 SINKS

A. Breakroom Sink **See "SK-1" on sheet P0.1**:

2.8 SINK FAUCETS

A. Commercial Faucets **See "SK-1" on sheet P0.1**:

2.9 DISPOSERS

A. Batch-Feed Disposers
   1. Standards: ASSE 1008 and UL 430, listed and labeled as defined in NFPA 70. **1/3**

B. Continuous-Feed Disposers
   1. Standards: ASSE 1008 and UL 430, listed and labeled as defined in NFPA 70. **1/3** hp with overload protection.

2.10 SERVICE SINKS OR BASINS

A. Service Basins: Terrazzo, floor mounted. **See "MS" on sheet P0.1**:

2.11 DISHWASHER AIR-GAP FITTINGS

A. Dishwasher Air-Gap Fittings
   1. ASSE 1021, Hose Connections: 5/8-inch-ID inlet and 7/8-inch-ID outlet.
   2. Capacity: At least 5 gpm; at inlet pressure of at least 5 psig and at temperature of at least 140 deg F, with deck mounting.

2.12 FITTINGS

A. Supply Fittings:

1. Standards: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water. ASME A112.18.1/CSA B125.1.
2. Supply Piping: Chrome-plated-brass pipe or chrome-plated-copper tube matching water-supply piping size. Include chrome-plated wall flange.
3. Stops: Chrome-plated brass, one-quarter-turn, ball-type or compression stop with inlet connection matching water-supply piping type and size.
4. Risers: **Chrome-plated, soft-copper flexible tube**

B. WASTE FITTINGS

1. Standard: ASME A112.18.2/CSA B125.2.
2. Drain: Grid type with NPS 1-1/2 straight tailpiece for standard **sinks**
3. Trap Sizes: **NPS 1-1/2**
4. Material: Chrome-plated, **two-piece, cast-brass trap and swivel elbow with 0.032-inch-thick brass tube to wall**; and chrome-plated-brass or -steel wall flange or **Stainless-steel, two-piece trap and swivel elbow with 0.012-inch-thick stainless-steel tube to wall; and stainless-steel wall flange.**

2.13 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

1. Characteristics: Nonshrink; recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fitting insulation kits on fixtures for people with disabilities.

B. Install fixtures with flanges and gasket seals.

C. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.

D. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

E. Fasten wall-hanging plumbing fixtures securely to supports attached to building substrate when supports are specified and to building wall construction where no support is indicated.

F. Fasten floor-mounted fixtures to substrate. Fasten fixtures having holes for securing fixture to wall construction to reinforcement built into walls.

G. Fasten wall-mounted fittings to reinforcement built into walls.

H. Fasten counter-mounting plumbing fixtures to casework.

I. Secure supplies to supports or substrate within pipe space behind fixture.

J. Set shower receptors and mop basins in leveling bed of cement grout.

K. Install individual supply inlets, supply stops, supply risers, and tubular brass traps with cleanouts at fixture.

L. Install water-supply stop valves in accessible locations.

M. Install traps on fixture outlets. Omit traps on fixtures having integral traps. Omit traps on indirect wastes unless otherwise indicated.

N. Install disposers in sink outlets. Install switch where indicated or in wall adjacent to sink if location is not indicated.

O. Install dishwasher air-gap fitting at each sink indicated to have air-gap fitting. Install **in sink deck**. Connect inlet hose to dishwasher and outlet hose to disposer.

P. Install hot-water dispensers in back top surface of sink or in counter with spout over sink.

Q. Install escutcheons at wall, floor, and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons where required to conceal protruding pipe fittings.

R. Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color.

S. Install piping connections between plumbing fixtures and piping systems and plumbing equipment. Install insulation on supplies and drains of fixtures for people with disabilities.

T. Ground equipment.

END OF SECTION

SECTION 23 0517

SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

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

PART 2 - PRODUCTS

2.1 SLEEVES

A. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

B. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

C. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 STACK-SLEEVE FITTINGS

A. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: ethylene-propylene-diene-monomer-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel
3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating**,** of length required to secure pressure plates to sealing elements.

2.4 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement nonshrink grout; recommended for interior and exterior applications.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

C. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Comply with requirements for flashing specified in Section 07 6200 "Sheet Metal Flashing and Trim."
2. Using grout, seal the space around outside of stack-sleeve fittings.

D. Fire-Barrier Penetrations: Comply with requirements for firestopping specified in Section 07 8413 "Penetration Firestopping."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand, and make a watertight seal.

END OF SECTION

SECTION 23 0523

GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of valve indicated.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.

2. ASME B16.1 for flanges on iron valves.

3. ASME B16.5 for flanges on steel valves.

4. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.

5. ASME B16.18 for solder-joint connections.

6. ASME B31.1 for power piping valves.

7. ASME B31.9 for building services piping valves.

2.2 GENERAL-DUTY VALVES

A. Two-Piece, Brass Ball Valves with Full Port and Brass Trim:

1. Standard: MSS SP-110.

2. SWP Rating: 150 psig and CWP Rating: 600 psig.

3. Seats: PTFE.

B. Two-Piece, Bronze Ball Valves with Full Port and Bronze or Brass Trim:

1. Standard: MSS SP-110.

2. SWP Rating: 150 psig and CWP Rating: 600 psig.

3. Seats: PTFE.

C. with Bronze Disc:

1. Standard: MSS SP-80, Type 3.

2. CWP Rating: 200 psig.

D. Class 125, Bronze Swing Check Valves with Nonmetallic Disc:

1. Standard: MSS SP-80, Type 4.

2. CWP Rating: 200 psig.

E. Class 125, NRS, Bronze Gate Valves:

1. Standard: MSS SP-80, Type 1.

2. CWP Rating: 200 psig.

3. Handwheel: Malleable iron[**, bronze, or aluminum**].

F. Class 125, RS, Bronze Gate Valves:

1. Standard: MSS SP-80, Type 2.

2. CWP Rating: 200 psig.

3. Handwheel: Malleable iron, bronze, or aluminum.

G. Class 125, NRS, Iron Gate Valves:

1. Standard: MSS SP-70, Type I.

2. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.

3. Body Material: ASTM A 126, gray iron with bolted bonnet.

H. Class 125, OS&Y, Iron Gate Valves:

1. Standard: MSS SP-70, Type I.

2. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.

3. Body Material: ASTM A 126, gray iron with bolted bonnet.

I. Class 125, Bronze Globe Valves:

1. Standard: MSS SP-80, Type 1.

2. CWP Rating: 200 psig.

3. Stem and Disc: [**Bronze**] [**PTFE**].

PART 3 - EXECUTION

3.1 INSTALLATION

A. Valve Sizes: Same as upstream piping unless otherwise indicated.

B. Valves in Insulated Piping: With 2-inch stem extensions.

C. Use gate and ball valves for shutoff duty; globe and ball for throttling duty.

D. Locate valves for easy access and provide separate support where necessary.

E. Install valves for each fixture and item of equipment.

F. Install three-valve bypass around each pressure-reducing valve using throttling-type valves.

G. Install valves in horizontal piping with stem at or above center of pipe.

H. Install valves in a position to allow full stem movement.

I. Install check valves for proper direction of flow in horizontal position with hinge pin level.

END OF SECTION

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SECTION 23 0529

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product indicated.
2. Hangers and Supports:

    a. Shop Drawings: Signed and sealed by a qualified professional engineer.
    b. Welding certificates.
    c. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
    d. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Hangers and Supports for Plumbing Piping Equipment:

1. Structural Performance: Hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

    a. Design supports for multiple pipes capable of supporting combined weight of supported systems and system contents.
    b. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
    c. Design seismic-restraint hangers and supports for piping and equipment, and obtain approval from authorities having jurisdiction.

2.2 HANGERS AND SUPPORTS FOR HVAC

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

C. Fastener Systems:

1. Verify suitability of fasteners in this article for use in lightweight concrete or concrete slabs less than 4 inches thick.
2. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pullout, tension, and shear capacities appropriate for supported loads and building materials where used.
3. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pullout, tension, and shear capacities appropriate for supported loads and building materials where used.

D. Miscellaneous Materials:

1. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
2. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

a. Properties: Nonstaining, noncorrosive, and nongaseous.
b. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 GENERAL PIPING INSTALLATIONS

A. Install piping free of sags and bends.

B. Install fittings for changes in direction and branch connections.

3.2 HANGERS AND SUPPORTS

A. Comply with MSS SP-69 and MSS SP-89. Install building attachments within concrete or to structural steel.

B. Install hangers and supports to allow controlled thermal and seismic movement of piping systems.

C. Install powder-actuated fasteners and mechanical-expansion anchors in concrete after concrete is cured. Do not use in lightweight concrete or in slabs less than 4 inches thick.

D. Load Distribution: Install hangers and supports so piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

E. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
2. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4 to allow off-center closure for hanger installation before pipe erection.
3. Adjustable Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
4. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
5. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.

F. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.

END OF SECTION

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SECTION 23 0548

VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each product indicated.
2. Delegated-Design Submittal: For vibration isolation and seismic-restraint calculations and details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
3. Welding certificates.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Wind-Restraint Loading:

1. Basic Wind Speed: 115 mph.
2. Building Classification Category: **II**.
3. Minimum 10 lb/sq. ft. multiplied by the maximum area of the HVAC component projected on a vertical plane that is normal to the wind direction and 45 degrees either side of normal.

B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

C. Seismic-Restraint Loading:

1. Site Class as Defined in the IBC: **B**.
2. Assigned Seismic Use Group or Building Category as Defined in the IBC: [**I**] [**II**] [**III**].

    a. Component Importance Factor: **1.0** >.
    b. Component Response Modification Factor: **1.5**.
    c. Component Amplification Factor: **1.0**.

3. Design Spectral Response Acceleration at Short Periods (0.2 Second): .
4. Design Spectral Response Acceleration at 1-Second Period: 0.036

D. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

2.2 VIBRATION ISOLATORS

A. Elastomeric Isolation Pads:

1. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
2. Size: Factory- or field-cut to match requirements of supported equipment.
3. Pad Material: Oil and water resistant with elastomeric properties**, infused, nonwoven cotton or synthetic fibers**.
4. Surface Pattern: **Smooth** pattern.
5. Load-bearing metal plates adhered to pads.

B. Double-Deflection, Elastomeric Isolation Mounts:

1. Mounting Plates:

   a. Top Plate: Encapsulated-steel, load-transfer top plates, factory drilled and threaded **with threaded studs or bolts**.
   b. Baseplate: Encapsulated-steel bottom plates with holes provided for anchoring to support structure.

2. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

C. Restrained Elastomeric Isolation Mounts:

1. Description: All-directional isolator with seismic restraints containing two separate and opposing elastomeric elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.

   a. Housing: Cast-ductile iron or welded steel.
   b. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

D. Freestanding, Laterally Stable, Open-Spring Isolators:

1. Baseplates: Factory-drilled steel plate for bolting to structure with an elastomeric isolator pad attached to the underside. Baseplates shall limit floor load to 500 psig.
2. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

E. Freestanding, Laterally Stable, Open-Spring Isolators with Vertical-Limit Stop Restraint:

1. Steel housing with vertical-limit stops to prevent spring extension due to weight being removed. Base with holes for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig. Top plate with [**threaded mounting holes**] [**elastomeric pad**]. Limit stop restraint as required for equipment and authorities having jurisdiction.

F. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods:

1. Steel fabricated with an upper threaded hanger rod and a maximum of 30 degrees of angular lower hanger-rod misalignment. Molded, oil-resistant rubber, neoprene, or other

elastomeric material dampening element. Color-code or otherwise identify to indicate capacity range.

G. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:

1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
7. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

H. Pipe Riser Resilient Support <**Insert drawing designation**>: All-directional, acoustical pipe anchor consisting of two steel tubes separated by a minimum of 1/2-inch-thick neoprene. Include steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions. Design support for a maximum load on the isolation material of 500 psig and for equal resistance in all directions.

2.3 MECHANICAL ANCHOR BOLTS

A. Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

PART 3 - EXECUTION

3.1 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Equipment Restraints:

1. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
2. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.

B. Piping Restraints:

1. Comply with requirements in MSS SP-127.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

E. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

F. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Set anchors to manufacturer's recommended torque, using a torque wrench.
5. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Remove and replace malfunctioning units and retest as specified above.

C. Prepare test and inspection reports.

3.3 ADJUSTING

A. Adjust isolators after piping system is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Adjust active height of spring isolators.

D. Adjust restraints to permit free movement of equipment within normal mode of operation.

3.4 HVAC VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE SCHEDULE

A. Supported or Suspended Equipment:

1. Equipment Location:
2. Pads:

a. Material: **Neoprene**.
b. Thickness: <**Insert inches**>.1”
c. Number of Pads: <**Insert number**> thick.

3. Isolator Type: 3/8” diameter threaded rod hanger.
4. Minimum Deflection: 0.5”
5. Component Importance Factor: **1.0**
6. Component Response Modification Factor: **1.5**
7. Component Amplification Factor: **1.0**

END OF SECTION

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SECTION 23 0593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Certified TAB reports.
2. Documentation of work performed per ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
3. Documentation of work performed per ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

B. TAB Firm Qualifications: AABC or TABB certified.

C. TAB Report Forms: Standard TAB contractor's forms approved by Architect.

D. Perform TAB after leakage and pressure tests on air distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

B. Examine the approved submittals for HVAC systems and equipment.

C. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.

D. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

E. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

F. Examine automatic temperature system components to verify the following:

1. Dampers, valves, and other controlled devices are operated by the intended controller.

2. Dampers and valves are in the position indicated by the controller.
3. Integrity of dampers and valves for free and full operation and for tightness of fully closed and fully open positions.
4. Automatic modulating and shutoff valves, including two-way valves and three-way mixing and diverting valves, are properly connected.
5. Thermostats are located to avoid adverse effects of sunlight, drafts, and cold walls.
6. Sensors are located to sense only the intended conditions.
7. Sequence of operation for control modes is according to the Contract Documents.
8. Controller set points are set at indicated values.
9. Interlocked systems are operating.
10. Changeover from heating to cooling mode occurs according to indicated values.

G. Report deficiencies discovered before and during performance of test and balance procedures.

3.2 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in [AABC's "National Standards for Total System Balance"] [ASHRAE 111] [NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems"] [SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing"] and in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish.

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.3 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare schematic diagrams of systems' "as-built" duct layouts.

B. Determine the best locations in main and branch ducts for accurate duct airflow measurements.

C. Verify that motor starters are equipped with properly sized thermal protection.

D. Check for airflow blockages.

E. Check condensate drains for proper connections and functioning.

F. Check for proper sealing of air-handling unit components.

G. Check for proper sealing of air duct system.

3.4 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Prepare test reports with pertinent design data; number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against approved pump flow rate.

B. Prepare schematic diagrams of systems' "as-built" piping layouts.

C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:

1. Open all manual valves for maximum flow.
2. Check liquid level in expansion tank.
3. Check makeup-water-station pressure gage for adequate pressure for highest vent.
4. Set system controls so automatic valves are wide open to heat exchangers.
5. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.

3.5 TOLERANCES

A. Set HVAC system airflow and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.
3. Heating-Water Flow Rate: Plus or minus 10 percent.
4. Cooling-Water Flow Rate: Plus or minus 10 percent.

END OF SECTION

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SECTION 23 0700

HVAC INSULATION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product indicated.
2. For adhesives and sealants, documentation including printed statement of VOC content.

B. Quality Assurance: Labeled with maximum flame-spread index of 25 and maximum smoke-developed index of 50 according to ASTM E 84.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics:

1. Indoor Insulation and Related Materials: To be factory-labeled designating maximum flame-spread index of 25 or less and smoke-developed index of 50 or less according to ASTM E 84.
2. Outdoor Insulation and Related Materials: To be factory labeled designating maximum flame-spread index of 75 or less and smoke-developed index of 150 or less according to ASTM E 84.

2.2 INSULATION MATERIALS

A. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

B. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

C. Mineral-Fiber Blanket Insulation: Comply with ASTM C 553, Type II and ASTM C 1290, Type I.

D. Mineral-Fiber Board Insulation: Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied ASJ.

E. Polyolefin Insulation: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials and Type II, Grade 1 for sheet materials.

F. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

G. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

H. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.

1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
2. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.

I. Factory-Applied Jackets: When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

J. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

2.3 INSULATION INSTALLATION

A. Comply with requirements of the Midwest Insulation Contractors Association's "National Commercial & Industrial Insulation Standards" for insulation installation on pipes and equipment.

B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

C. Insulation Installation at Fire-Rated Wall, Partition, and Floor Penetrations: Install insulation continuously through penetrations. Seal penetrations. Comply with requirements in Section 07 8413 "Penetration Firestopping."

D. Mineral-Fiber Insulation Installation:

1. Insulation Installation on Straight Pipes and Tubes: Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
2. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
3. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
4. Blanket and Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
5. For ducts and plenums with surface temperatures below ambient, install a continuous, unbroken vapor barrier.

E. Plenums and Ducts Requiring Insulation:

1. Concealed and exposed supply and outdoor air.
2. Concealed and exposed return air located in nonconditioned space.
3. Concealed and exposed exhaust between isolation damper and penetration of building exterior.

F. Plenums and Ducts Not Insulated:

1. Metal ducts with duct liner.
2. Factory-insulated plenums and casings.
3. Flexible connectors.
4. Vibration-control devices.
5. Factory-insulated access panels and doors.

2.4 DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed duct insulation shall be the following:
1. Mineral-Fiber Blanket: 1-1/2 inches thick and 1.5-lb/cu. ft. nominal density.

B. Exposed duct insulation shall be the following:
1. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft..

2.5 HVAC PIPING INSULATION SCHEDULE

1. .

B. Refrigerant Suction and Hot-Gas Piping: Insulation shall be[**one of**] the following:

1. Flexible Elastomeric: **Insert dimension** thick.
2. Mineral-Fiber, Preformed Pipe Insulation, Type I: **1 inch**] thick.
3. Polyolefin: **1 inch** thick.

C. Refrigerant Suction and Hot-Gas Flexible Tubing: Insulation shall be **one of** the following:

1. Flexible Elastomeric: **1 inch** thick.
2. Polyolefin: **1 inch** thick.

END OF SECTION

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SECTION 23 2300

REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop based on manufacturer's test data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIRMENTS

A. Line-Test Pressure for Refrigerant R-410A:

1. Suction Lines for Air-Conditioning Applications: 300 psig.
2. Suction Lines for Heat-Pump Applications: 535 psig.
3. Hot-Gas and Liquid Lines: 535 psig.

B. Comply with ASME B31.5, "Refrigerant Piping," and with ASHRAE 15, "Safety Code for Mechanical Refrigeration."

2.2 TUBES AND FITTINGS

A. Copper Tube: ASTM B 88, Types K and L and ASTM B 280, Type ACR.

B. Wrought-Copper Fittings and Unions: ASME B16.22.

C. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.

D. Brazing Filler Metals: AWS A5.8/A5.8M.

2.3 VALVES AND SPECIALTIES

A. Thermostatic Expansion Valve: Comply with ARI 750.
1. Forged brass or steel body, stainless-steel internal parts, copper tubing filled with refrigerant charge for **40 deg F**suction temperature; **700-psig** working pressure, and 240 deg F operating temperature.

B. Solenoid Valves: Comply with AHRI 760 and UL 429; listed and labeled by a Nationally Recognized Testing Laboratory.
   1. Plated steel body and bonnet, 240 deg F temperature rating, 400-psig working pressure, 240 deg F operating temperature; and 24-V, normally closed holding coil.

C. Straight-Type Strainers:
   1. Welded steel with corrosion-resistant coating and 100-mesh, stainless-steel screen with socket ends; 500-psig working pressure and 275 deg F working temperature.

D. Moisture/Liquid Indicators:
   1. Forged brass body, 500-psig operating pressure, 240 deg F operating temperature; with replaceable, polished, optical viewing window and color-coded moisture indicator.

E. Replaceable-Core Filter Dryers: Comply with AHRI 730.
   1. Steel shell with ductile-iron cover; 500-psig operating pressure; 240 deg F operating temperature.

F. Permanent Filter Dryers: Comply with AHRI 730.
   1. Steel shell with ductile-iron cover; 500-psig operating pressure; 240 deg F operating temperature.

G. Welded steel with corrosion-resistant coating and socket ends; 500-psig operating pressure; 275 deg F operating temperature.

2.4 REFRIGERANTS

A. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wall penetration system at each pipe penetration through foundation wall. Make installation watertight.

B. Install refrigerant piping and charge with refrigerant according to ASHRAE 15.

C. Belowground, install copper tubing in PVC conduit. Vent conduit outdoors.

D. Insulate suction lines to comply with Section 23 0700 "HVAC Insulation."

E. Slope refrigerant piping as follows:

   1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
   2. Install horizontal suction lines with a uniform slope downward to compressor.
   3. Install traps and double risers to entrain oil in vertical runs.
   4. Liquid lines may be installed level.

F. Install solenoid valves upstream from each thermostatic expansion valve. Install solenoid valves in horizontal lines with coil at top.

G. Install thermostatic expansion valves as close as possible to distributors on evaporator coils.

H. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.

I. Install strainers upstream from and adjacent to solenoid valves, thermostatic expansion valves, and compressors unless they are furnished as an integral assembly for device being protected.

J. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

3.2 PIPING APPLICATIONS FOR REFRIGERANT R-410A

A. Suction Lines: Copper, **Type ACR**, annealed- or drawn-temper tubing and wrought-copper fittings with [**brazed**] [**or**] [**soldered**] joints.

B. Hot-Gas and Liquid Lines: Copper, **Type ACR**, annealed- or drawn-temper tubing and wrought-copper fittings with **brazed** joints.

END OF SECTION

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SECTION 23 3100

HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product indicated.
2. Documentation indicating that duct systems and accessories comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
3. Documentation indicating that duct systems comply with ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air Conditioning" and Section 6.4.4 - "HVAC System Construction and Insulation."
4. Documentation of work performed for compliance with ASHRAE 62.1, Section 7.2.4 - "Ventilation System Start-up."
5. For adhesives and sealants, documentation including printed statement of VOC content.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Structural Performance: Duct hangers and supports **and seismic restraints** shall withstand the effects of gravity **and seismic** loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" **and ASCE/SEI 7. SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."**

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

D. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

E. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

F. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems" and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

G. Comply with NFPA 96 for ducts connected to commercial kitchen hoods.

H. Comply with UL 181 for ducts and closures.

2.2 DUCTS

A. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip galvanized coating.

1. Galvanized Coating Designation: **G60G90**.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

B. Carbon-Steel Sheets: ASTM A 1008/A 1008M; with oiled, matte finish for exposed ducts.

C. Joint and Seam Tape, and Sealant: Comply with UL 181A.

D. Rectangular Metal Duct Fabrication: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 ACCESSORIES

A. Volume Dampers and Control Dampers: Single-blade and multiple opposed-blade dampers, standard leakage rating, and suitable for horizontal or vertical applications; factory fabricated and complete with required hardware and accessories.

B. 555. Provide factory-fabricated units complete with required hardware and accessories.

C. Flexible Connectors: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

D. Flexible Ducts: [Spiral-wound steel spring with flameproof vinyl sheathing] [Corrugated aluminum] [Factory-fabricated, insulated, round duct, with an outer jacket enclosing **1-inch-** thick, glass-fiber insulation around a continuous inner liner] complying with UL 181, Class 1.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Outdoor, Supply-Air Ducts: Seal Class A.
2. Outdoor, Exhaust Ducts: Seal Class C.
3. Outdoor, Return-Air Ducts: Seal Class C.
4. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
5. Unconditioned Space, Exhaust Ducts: Seal Class C.
6. Unconditioned Space, Return-Air Ducts: Seal Class B.
7. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
8. Conditioned Space, Exhaust Ducts: Seal Class B.
9. Conditioned Space, Return-Air Ducts: Seal Class C.

C. Conceal ducts from view in finished and occupied spaces.

D. Avoid passing through electrical equipment spaces and enclosures.

E. Support ducts to comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 4, "Hangers and Supports."

F. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

G. Install volume and control dampers in lined duct with methods to avoid damage to liner and erosion of duct liner.

H. Clean **new** duct system(s) before testing, adjusting, and balancing.

3.2 TESTING, ADJUSTING, AND BALANCING

A. Balance airflow within distribution systems, including submains, branches, and terminals, to indicated quantities.

END OF SECTION

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SECTION 23 3423

HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Products shall be licensed to use the AMCA-Certified Ratings Seal.

B. Power ventilators shall comply with UL 705.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 CENTRIFUGAL WALL VENTILATORS

A. Manufacturers and model numbers are listed on mechanical schedules for reference as to quality and features required for the the control devices. Provide devices by Carrier, Honeywell, Johnson Controls, Trane or White Rodgers with quality and features as indicated.

2.3 CEILING-MOUNTED VENTILATORS

A. Manufacturers and model numbers are listed on mechanical schedules for reference as to quality and features required for the the control devices. Provide devices by Carrier, Honeywell, Johnson Controls, Trane or White Rodgers with quality and features as indicated.

B. Housing: Steel, lined with acoustical insulation.

C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.

D. Grille: **Plastic**, louvered or egg-crate grille with flange on intake and thumbscrew attachment to fan housing.

E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.

F. Accessories:
   1. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light.
   2. Filter: Washable aluminum to fit between fan and grille.
   3. Isolation: Rubber-in-shear vibration isolators.

G. Capacities and Characteristics:
   1. Electrical Characteristics:

      a. Volts: **120**.
      b. Phase: **Single**.
      c. Hertz: 60.

2.4 MOTORS

A. Motors to be totally enclosed, fan cooled, and minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

   1. Comply with NEMA MG 1 unless otherwise indicated by authorities having jurisdiction. Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units with clearances for service and maintenance.

B. Roof-Mounted Units: Install roof curb on roof structure, according to [ARI Guideline B.] [NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts."] Install and secure roof-mounted fans on curbs, and coordinate roof penetrations and flashing with roof construction.

C. In-Line Centrifugal Fans: Suspend units from structural-steel support frame using threaded steel rods and vibration isolation springs.

D. Ceiling-Mounted Units: Suspend units from structure using steel wire or metal straps.

E. Ground power ventilators.

END OF SECTION

SECTION 23 3713

DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

Submittals:

1. Product Data: For each type of product indicated, including color charts for factory finishes.

PART 2 - PRODUCTS

2.1 DIFFUSERS

Rectangular and Square Ceiling Diffusers: Manufacturers and model numbers are listed on mechanical schedules as to quality and features required.

1. Material: **Steel**.
2. Finish: Baked enamel, color selected by Architect .
3. Mounting: Surfaceand T-bar.

Perforated Diffuser <Insert Drawing designation>:

Manufacturers and model numbers are listed on mechanical schedules as to quality and features required.

4. Material: **Steel**.
5. Finish: Baked enamel, color selected by Architect.
6. MountingT-bar.

2.2 REGISTERS AND GRILLES

Adjustable Bar Grille

Manufacturers and model numbers are listed on mechanical schedules as to quality and features required.

1. Material: **Steel**.

2. Finish: Baked enamel, color selected by Architect.

3. Mounting: Countersunk screw.

PART 3 - EXECUTION

3.1 INSTALLATION

Install diffusers, registers, and grilles level and plumb.

Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel unless otherwise indicated. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION

SECTION 23 6313

AIR-COOLED REFRIGERANT CONDENSERS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:
   1. Product Data: For each type of product indicated.
   2. Documentation indicating that units comply with applicable requirements in ASHRAE/IESNA 90.1.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Rate air-cooled refrigerant condensers according to ARI 460.

B. Factory-test sound-power-level ratings according to ARI 270.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Fabricate and label refrigeration system according to ASHRAE 15, "Safety Standard for Refrigeration Systems."

E. Seismic Performance: Air-cooled refrigerant condensers will remain in place without separation of any parts from the device when subjected to the effects of earthquake motions determined according to **ASCE/SEI 7**.

2.2 AIR-COOLED REFRIGERANT CONDENSERS

A. Manufacturers and model numbers are listed on mechanical schedules for reference as to quality and features required.

B. Description: Factory assembled and tested; consisting of casing, condenser coils, condenser fans and motors, and unit controls for **outdoor** R-410A refrigerant.

C. Condenser Coil: Copper tubing with aluminum or steel coil fins, factory tested at 425 psig.

D. Condenser Fans and Drives: **Propeller** fans for [**vertical**] air discharge. Motors to comply with NEMA MG 1.

E. Operating and Safety Controls: Condenser fan motor thermal and overload cutouts; magnetic contactors for condenser fan motors and factory-mounted and -wired disconnect switch for single external electrical power connection.

1. Fan Cycling Control: Head pressure switches.

F. CAPACITIES AND CHARACTERISTICS
1. Refer to mechanical heat pump condensing unit schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb, firmly anchored in locations indicated; maintain recommended clearances.

B. Equipment Mounting:
1. Install air-cooled condenser refrigerant condensers on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in **Section 03 3000 "Cast-in-Place Concrete."**
2. Comply with requirements for vibration isolation and seismic control devices specified in Section 23 0548 Vibration and Seismic Controls for HVAC.

C. Loose Components: Install electrical components, devices, and accessories that are not factory mounted.
1. Install electrical devices according to NFPA 70.

D. Piping installation requirements are specified in Section 23 2113 "Hydronic Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

E. Install piping adjacent to machine to allow service and maintenance.

F. Refrigerant Piping: Connect piping to unit with pressure relief, service valve, filter-dryer, and moisture indicator on each refrigerant-circuit liquid line. Refrigerant piping and specialties are specified in Section 23 2300 "Refrigerant Piping."

3.2 DEMONSTRATION

A. **Engage a factory-authorized service representative to train** Owner's maintenance personnel to adjust, operate, and maintain air-cooled refrigerant condensers.

END OF SECTION

SECTION 23 8219

FAN COIL UNITS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:
   1. Product Data: Include rated capacities, operating characteristics, furnished specialties, accessories, and color charts for cabinet finishes.
   2. Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."

B. Sample Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of condensing units that fail in materials or workmanship within [**five**] <**Insert number**> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

2.2 DUCTLESS FAN COIL UNITS

A. Manufacturers and model numbers are listed on mechanical schedules as to quality and features required. Fan coil units need to be paired with outdoor units from the same manufacturer. Check with manufacturers for the compatibility between fan coil units and outdoor units.

B. Description: Factory-packaged and -tested units rated according to AHRI 440, ASHRAE 33, and UL 1995.

C. Coil Section Insulation: **1-inch**thick, **coated** glass fiber complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.

1. Surface-Burning Characteristics: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
2. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

D. Main and Auxiliary Drain Pans: [**Plastic**] [**Insulated galvanized steel with plastic liner**] formed to slope from all directions to the drain connection as required by ASHRAE 62.1.

E. Chassis: Galvanized steel where exposed to moisture. Floor-mounting units shall have leveling screws.

F. Cabinet: Steel with baked-enamel finish in manufacturer's standard paint color.
1. Supply-Air Plenum: Sheet metal plenum finished and insulated to match the chassis.
2. Return-Air Plenum: Sheet metal plenum finished to match the chassis.
3. Mixing Plenum: Sheet metal plenum finished and insulated to match the chassis with outdoor- and return-air, formed-steel dampers.
4. Dampers: Galvanized steel with extruded-vinyl blade seals, flexible-metal jamb seals, and interlocking linkage.

G. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch, rated for a minimum working pressure of 200 psig and a maximum entering-water temperature of 220 deg F. Include manual air vent and drain.

H. Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in galvanized-steel housing; with fuses in terminal box for overcurrent protection and limit controls for high-temperature protection. Terminate elements in stainless-steel machine-staked terminals secured with stainless-steel hardware.

I. Direct-Driven Fans: Double width, forward curved, centrifugal; with permanently lubricated, multispeed motor resiliently mounted in the fan inlet. Aluminum or painted-steel wheels and painted-steel or galvanized-steel fan scrolls.
1. Motor to comply with NEMA MG 1 unless otherwise indicated. Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

J. Belt-Driven Fans: Double width, forward curved, centrifugal; with permanently lubricated, single-speed motor installed on an adjustable fan base resiliently mounted in the cabinet. Aluminum or painted-steel wheels and painted-steel or galvanized-steel fan scrolls.
1. Motor to comply with NEMA MG 1 unless otherwise indicated. Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

K. Accessories:
1. Aluminum wall boxes with integral eliminators and insect screen.
2. Steel subbase, height as indicated.
3. Permanently lubricated, multispeed motor, resiliently mounted on motor board.
4. Steel recessing flanges for recessing fan-coil units into ceiling or wall.
5. Filters: 1-inch-thick, throwaway filters in fiberboard frames with a MERV rating of <**Insert number**>.
6. Dampers: Galvanized-steel blades with edge and end seals and nylon bearings; with **two-position** actuators.

L. Basic Unit Controls:
1. Control voltage transformer.
2. **Wall-mounting** thermostat with the following features:

a. Heat-cool-off switch.
b. Fan on-auto switch.
c. Fan-speed switch.
d. **Manual** changeover.
e. Adjustable deadband.
f. **Concealed** set point.
g. **Concealed** indication.
h. **Degree F** indication.

3. Unoccupied-period-override push button.

M. Capacities and Characteristics:
1. Refer to mechanical heat pump fan coil unit schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fan-coil units to comply with NFPA 90A.

B. Install units level and plumb and firmly anchored.

C. Connect to supply and return piping with shutoff valve and union at each connection.

D. Connect units to wiring systems and to ground.

END OF SECTION

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SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70.

2.2 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Manufacturers:
1. American Bare Conductor
2. Belden Inc.
3. Encore Wire Corporation
4. Service Wire Co.
5. Southwire Company, LLC
6. Or equal

C. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.

D. Conductor Insulation:
1. Type USE-2 and Type SE: Comply with UL 854.
2. Type THHN and Type THWN-2: Comply with UL 83.

2.3 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

B. Connectors and Splices shall be in accordance with NEC and UL.

PART 3 - EXECUTION

3.1 WIRING METHODS

A. Feeders and Branch Circuits: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Service Entrance: Type SE or USE multiconductor cable.

C. Exposed Feeders, Branch Circuits, and Class 1 Control Circuits, Including in Crawlspaces: Type THHN/THWN, single conductors in raceway.

D. Feeders and Branch Circuits Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN, single conductors in raceway.

E. Feeders and Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN, single conductors in raceway.

F. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, and strain-relief device at terminations to suit application.

G. Class 2 Control Circuits: Type THHN/THWN, in raceway.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

A. Complete raceway installation between conductor and cable termination points according to Section 26 0533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

B. Support cables according to Section 26 0529 "Hangers and Supports for Electrical Systems."

C. Complete cable tray systems installation according to Section 26 0536 "Cable Trays for Electrical Systems" prior to installing conductors and cables.

D. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 0544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

E. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 07 8413 "Penetration Firestopping."

F. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

G. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway. Use manufacturer-approved pulling compound or lubricant where necessary.

H. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

I. Make splices, terminations, and taps that are compatible with conductor material. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors**.** Install conductor at each outlet, with at least 6 inchesof slack.

J. Identify conductors and cables according to Section 26 0553 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Contractor will engage a qualified testing agency to perform tests and inspections.
   1. After installing conductors and cables and before electrical circuitry has been energized, test **service entrance and feeder conductors**] [**and**] [**conductors feeding all critical equipment and services** for compliance with requirements.
   2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters. Cables will be considered defective if they do not pass tests and inspections.

B. Test and Inspection Reports: Prepare a written report showing procedures used, results complying with requirements, and corrective action taken to achieve compliance.

END OF SECTION

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SECTION 26 0526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data for each type of product indicated.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 GROUNDING MATERIALS

A. Conductors: Solid for No. 8 AWG and smaller; stranded for No. 6 AWG and larger unless otherwise indicated.

1. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable code or authorities having jurisdiction.
2. Bare, Solid-Copper Conductors: Comply with ASTM B 3.
3. Bare, Stranded-Copper Conductors: Comply with ASTM B 8.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Ground Rods: Copper-clad steel, sectional type; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Underground Grounding Conductors: Install bare copper conductor, No. 1/0 AWG minimum. Bury at least 24 inches below grade.

B. Pipe and Equipment Grounding-Conductor Terminations: Bolted.

C. Underground Connections: Welded.

D. Connections to Structural Steel: Bolted.

E. Install grounding conductors routed along shortest and straightest paths possible unless otherwise indicated or required by code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

F. Install ground rods driven into ground until tops are 2 inches below final grade or 4 inches above finished floor slab unless otherwise indicated.

G. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape.

H. Make connections without exposing steel or damaging coating if any.

I. Install bonding straps and jumpers in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.

J. Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.

K. Bond to equipment mounted on vibration isolation hangers and supports so vibration is not transmitted to rigidly mounted equipment.

L. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding-conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

M. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells.

1. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
2. Perform tests by fall-of-potential method according to IEEE 81.
3. Report measured ground resistances that exceed 10ohms.
4. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION

SECTION 26 0533

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Shop Drawings for custom enclosures and cabinets.

B. Seismic qualification certificates for enclosures, cabinets, conduit racks, and mounting provisions.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Galvanized Rigid Conduit (GRC): Comply with ANSI C80.1 and UL 6.

C. Intermediate Metal Conduit (IMC): Comply with ANSI C80.6 and UL 1242.

D. Electrical Metallic Tubing (EMT): Comply with ANSI C80.3 and UL 797.

E. Flexible Metal Conduit (FMC): Comply with UL 1; zinc-coated steel or aluminum.

F. Liquidtight Flexible Metal Conduit (LFMC): Flexible steel conduit with PVC jacket, complying with UL 360.

G. Raceway Fittings: Compression type.

2.2 NONMETALLIC CONDUITS AND FITTINGS

A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Electrical Nonmetallic Tubing (ENT): Comply with NEMA TC 13 and UL 1653.

C. Rigid Nonmetallic Conduit (RNC): Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

D. Raceway Fittings: Specifically designed for raceway type used in Project.

2.3 BOXES, ENCLOSURES, AND CABINETS

A. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

B. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

C. Metal Floor Boxes:

1. Material: Cast metal or sheet metal.
2. Type: Fully adjustable.
3. Shape: Rectangular.
4. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Outdoor Raceways Applications:

1. Exposed or Concealed: GRC.
2. Underground, Single Run: RNC.
3. Connection to Vibrating Equipment: LFMC.
4. Boxes and Enclosures: Metallic, NEMA 250, Type 3R or Type 4.

B. Indoor Raceways Applications:

1. Exposed or Concealed: EMT.
2. Underslab: RNC.
3. Connection to Vibrating Equipment: FMC; in wet or damp locations, use LFMC.
4. Damp or Wet Locations: IMC.
5. Boxes and Enclosures: Metallic, NEMA 250, Type 1, unless otherwise indicated.

C. Conceal raceways and cables, unless otherwise indicated, within finished walls, ceilings, and floors.

D. Install raceways and cables at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Locate horizontal raceway runs above water and steam piping.

E. Install raceways embedded in slabs in middle third of slab thickness where practical, and leave at least 1-inch-thick concrete cover.

1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
2. Space raceways laterally to prevent voids in concrete.
3. Install conduit larger than 1-inch trade size, parallel to or at right angles to main reinforcement. Where conduit is at right angles to reinforcement, place conduit close to slab support.
4. Transition from RNC to Schedule 80 GRC before rising above floor.

F. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.

G. Install pull wires in empty raceways.

H. Connect motors and equipment subject to vibration, noise transmission, or movement with a 72-inch maximum length of flexible conduit.

I. Install raceways and cables concealed within finished walls, ceilings, and floors unless otherwise indicated.

J. Install raceways and cables at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Locate horizontal raceway runs above water and steam piping.

K. Installation of Hangers and Supports:

1. Comply with NECA 1 and NECA 101 for installation requirements, except as specified in this article.
2. Separate dissimilar metals and metal products from contact with wood or cementitious materials by painting each metal surface in area of contact with a bituminous coating or by other permanent separation.
3. Raceway Support Methods: In addition to methods described in NECA 1, EMT may be supported by openings through structure members, as permitted in NFPA 70.
4. Multiple Raceways or Cables: Install on trapeze-type supports fabricated with steel slotted channel.
5. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
6. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods, unless otherwise indicated or required by Code:

    a. To Wood: Fasten with lag screws or through bolts.
    b. To New Concrete: Bolt to concrete inserts.
    c. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
    d. To Existing Concrete: Expansion anchor fasteners.
    e. To Steel: Welded, threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
    f. To Light Steel: Sheet metal screws.
    g. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount on slotted-channel racks attached to substrate.

7. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.2 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 0544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.3 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 07 8413 "Penetration Firestopping."

END OF SECTION

SECTION 26 0923

LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 TIME SWITCHES

A. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.

1. Contact Configuration: DPDT.
2. Contact Rating: 20-A ballast load, 120/240 V ac.
3. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program.
4. Astronomical time dial.
5. Eight-Day Program: Uniquely programmable for each weekday and holiday.
6. Skip-a-day mode.
7. Wound-spring reserve carryover mechanism to keep time during power failures, minimum of 24 hours.

2.3 OUTDOOR PHOTOELECTRIC SWITCHES

A. Solid state, with SPST dry contacts rated for 1800-VA inductive, to operate connected relay, contactor coils, and microprocessor input; complying with UL 773A, and compatible with ballasts and LED lamps.

1. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range.
2. Time Delay: 15-second minimum.
3. Surge Protection: Metal oxide varistor.

2.4 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

A. Manufacturer noted on drawings.

B. Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.

1. Type: Dual technology (passive infrared and ultrasonic**)**.
2. Voltage: 120/277 V.
3. Switch Rating: Not less than 800-VA ballast or LED load at 120 V.
4. Time Delay: Adjustable up to 30 minutes.
5. Field of View: 180 degrees.
6. Minimum Coverage Area: 900 sq. ft..

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install and aim sensors in locations to achieve at least 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

B. Install field-mounting transient voltage suppressors for lighting control devices in Category A locations that do not have integral line-voltage surge protection.

C. Label time switches and contactors with a unique designation.

D. Verify actuation of each sensor and adjust time delays.

END OF SECTION

SECTION 26 2413

SWITCHBOARDS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each product indicated.
2. Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA PB 2.

C. Comply with NFPA 70.

D. Comply with UL 891.

E. Seismic Performance: Switchboards shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 .

2.2 SWITCHBOARDS

A. Manufacturer Basis of Design is Eaton (Cutler-Hammer).Source Limitations: Obtain switchboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

B. Front-Connected, Front-Accessible Switchboard: Fixed, individually mounted main device, panel-mounted branches, and rear-aligned sections.

C. Nominal System Voltage: 208Y/120.

D. Main-Bus Continuous: 400.

E. Fabricate and test switchboards according to IEEE 344 to withstand seismic forces defined in Section 26 0548.16 "Seismic Controls for Electrical Systems."

F. Enclosures: Steel, NEMA 250, Type 3R.

G. Enclosure Finish: Manufacturer's standard gray finish.

H. Utility Metering Compartment: Fabricated barrier compartment and section complying with utility company's requirements. If separate vertical section is required for utility metering, match and align with basic switchboard. Provide service entrance label and necessary applicable service entrance features.

I. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard.

J. Phase and Neutral Buses and Connections: Three phase, four wires unless otherwise indicated.

1. Ground Bus: 1/4-by-2-inch minimum size, copper.
2. Neutral Buses: **100** percent of the ampacity of phase buses.

K. Future Devices: With mounting brackets, supports, bus connections, at full rating of compartment.

2.3 SURGE- PROTECTIVE DEVICES

A. Integrally mounted, complying with UL 1449 Type 1, surge-protection device.

2.4 OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. Electronic trip circuit breakers with root-mean-square sensing, field-replaceable rating plug or field-replicable electronic trip, and the following field-adjustable settings:

    a. Instantaneous trip.
    b. Long- and short-time pickup levels.
    c. Long- and short-time time adjustments.
    d. Ground-fault pickup level, time delay, and I squared t response.

3. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.

B. MCCB Features and Accessories: Standard frame sizes, trip ratings, and number of poles.

1. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor material.
2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.

2.5 INSTRUMENTATION

A. Instrument Transformers: NEMA EI 21.1 and the following:

1. Current Transformers: IEEE C57.13; 5 A, 60 Hz, secondary and secondary shorting device. Burden and accuracy shall be consistent with connected metering and relay devices.

B. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems, to include the following:

1. Phase Currents, Each Phase: Plus or minus 1 percent.
2. Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent.
3. Phase-to-Neutral Voltages, Three Phase: Plus or minus 1 percent.
4. Megawatts: Plus or minus 2 percent.
5. Megavars: Plus or minus 2 percent.
6. Power Factor: Plus or minus 2 percent.
7. Frequency: Plus or minus 0.5 percent.
8. Megawatt Demand: Plus or minus 2 percent; demand interval programmable from 5 to 60 minutes.
9. Accumulated Energy, Megawatt Hours: Plus or minus 2 percent. Accumulated values unaffected by power outages up to 72 hours.
10. Communications Interface: Comply with ASHRAE 135. The communication interface shall enable the BAS operator to remotely select, monitor, and record metered values.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Receive, inspect, handle, store, and install switchboards and accessories according to NEMA PB 2.1.

B. Install and anchor switchboards level on concrete bases, 4-inch nominal thickness.

1. For switchboards, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.

C. Comply with mounting and anchoring requirements specified in Section 26 0548.16 "Seismic Controls for Electrical Systems."

D. Set field-adjustable switches and circuit-breaker trip ranges.

3.2 IDENTIFICATION

A. Switchboard Nameplates: Label each switchboard compartment.

3.3 FIELD QUALITY CONTROL

A. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

B. Acceptance Tests:

1. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

END OF SECTION

SECTION 26 2416

PANELBOARDS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA PB 1.

C. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

2.2 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Seismic-Restraint Loading: Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Section 26 0548.16 "Seismic Controls for Electrical Systems."

B. Enclosures: Surface-mounted cabinets; NEMA 250, Type 1.

C. Service Equipment Label: Nationally Recognized Testing Laboratory (NRTL) labeled for use as service equipment for panelboards with one or more main service disconnecting and overcurrent protective devices.

D. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

E. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include size and type of allowable upstream and branch devices; listed and labeled for series-connected short-circuit rating by an NRTL.

F. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

B. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

C. Mains: Lugs only.

D. Branch Overcurrent Protective Devices: circuit breakers located in Service Entrance Section (SES).

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
2. Ground-Fault Circuit-Interrupter Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).

B. Fused Switch: NEMA KS 1, Type HID; clips to accommodate specified fuses; lockable handle.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Receive, inspect, handle, store, and install panelboards and accessories according to NEMA PB 1.1.

B. Comply with mounting and anchoring requirements specified in Section 26 0548.16 "Seismic Controls for Electrical Systems."

C. Mount top of trim 72 inchesabove finished floor unless otherwise indicated.

D. Arrange conductors into groups; bundle and wrap with wire ties.

E. Create a directory to indicate installed circuit loads and incorporating Owner's final room designations. Obtain approval before installing.

END OF SECTION

SECTION 26 2713

ELECTRICITY METERING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Shop Drawings.

B. Coordinate with utility companies for services and components they furnish.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 UTILITY METERING INFRASTRUCTURE

A. Meters will be furnished by utility company.

B. Current-Transformer Cabinets: Comply with requirements of electrical power utility company.

C. Meter Sockets: Comply with requirements of electrical power utility company.

D. Meter Sockets: Steady-state and short-circuit current ratings shall meet indicated circuit ratings.

1. Meter Socket: Rating coordinated with indicated tenant feeder circuit rating.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with equipment installation requirements in NECA 1.

B. Install meters furnished by utility company. Install raceways and equipment according to utility company's written instructions. Provide empty conduits for metering leads and extend grounding connections as required by utility company.

C. Install modular meter center according to switchboard installation requirements in NECA 400.

END OF SECTION

SECTION 26 2726

WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

2.2 COMMERCIAL-GRADE DEVICES

A. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

B. Device Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architectunless otherwise indicated or required by NFPA 70 or device listing.

C. Duplex Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, and UL 498.

D. Duplex Ground-Fault Circuit-Interrupter (GFCI) Convenience Receptacles: 125-V, 20-A, straight blade, non-feed-through type. NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.

E. Single Pole Toggle Switches: 120/277 V, 20 A. Comply with NEMA WD 1 and UL 20.

2.3 DECORATOR-STYLE DEVICES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.

B. Convenience Receptacles: 125 V, 15 A; square face; NEMA WD 6 Configuration 5-15R. Comply with NEMA WD 1 and UL 498.

C. GFCI, Non-Feed-Through-Type Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6, Configuration 5-15R, UL 498, and UL 943 Class A.

D. Toggle Switches, Square Face, 120/277 V, 15 A: Comply with NEMA WD 1, UL 20, and FS W-S-896.

2.4 WALL-BOX DIMMERS

A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.

B. Control: Continuously digital step adjustable push button; with single-pole or three-way switching. Comply with UL 1472.

C. LED Lamp Dimmer Switches: Modular; compatible with LED lamps; trim potentiometer to adjust low-end dimming; capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.5 WALL PLATES

A. Wall Plates, Finished Areas: Smooth, high-impact thermoplastic,fastened with metal screws having heads matching plate color.

B. Wall Plates, Unfinished Areas: Smooth, high-impact thermoplastic with metal screws.

C. Wall Plates, Damp Locations: Thermoplasticwith spring-loaded lift cover, and listed and labeled for use in wet locations.

2.6 FLOOR SERVICE FITTINGS

A. Modular, flush-type, dual-service units suitable for wiring method used.

B. Compartments: Barrier separates power from voice and data communication cabling.

C. Service Plate: Rectangular, die-cast aluminumwith satin finish.

D. Power Receptacle: NEMA WD 6, Configuration 5-20R, gray finish, unless otherwise indicated.

E. Data Communication Outlet: Blank cover with bushed cable opening.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.

B. Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

C. Select device colors and wall plates as follows:

1. For plastic covers, match device color.
2. In dark-paneled walls, use brown devices.
3. Above kitchen counters, use white devices with stainless-steel wall plates.
4. <**Insert other**>.

D. Install unshared neutral conductors on line and load side of dimmers.

E. Mount devices flush, with long dimension vertical, and grounding terminal of receptacles on top unless otherwise indicated. Group adjacent devices under single, multigang wall plates.

END OF SECTION

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SECTION 26 2816

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data with labels for each specific piece of equipment.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMNTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 FUSIBLE AND NONFUSIBLE SWITCHES

A. Fusible Switches, 600 A and Smaller: UL 98 and NEMA KS 1, Type HD, that accommodate specified fuses, and with lockable handle interlocked with cover in closed position.
   1. Double throw.
   2. Threepole.
   3. 240V ac.
   4. 200 A and smaller.
   5. UL 98 and NEMA KS 1, horsepower rated.

B. Nonfusible Switches, 600 A and Smaller: UL 98 and NEMA KS 1, Type GD, with lockable handle interlocked with cover in closed position.
   1. Double throw.
   2. Three pole.
   3. 240-V ac.
   4. 200 A and smaller.
   5. UL 98 and NEMA KS 1, horsepower rated.

2.3 MOLDED-CASE CIRCUIT BREAKERS

A. Description: Comply with UL 489 and NEMA AB 3, with interrupting capacity to meet available fault currents.

   1. Thermal-Magnetic Circuit Breakers: Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
   2. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with field-adjustable instantaneous trip settings.
   3. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller and let-through ratings less than NEMA FU 1, RK-5.

4. GFCI Circuit Breakers: Single- and two-pole configurations with 5-mA trip sensitivity.
5. GFEP Circuit Breakers: Single- and two-pole configurations with 5-mA trip sensitivity.

B. Features and Accessories:

1. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
2. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.

2.4 ENCLOSURES

A. UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

2.5 SUPPORT AND ANCHORAGE COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly, and provide finish suitable for the environment in which installed.

1. Channel Dimensions: Selected for structural loading and applicable seismic forces.

B. Raceway and Cable Supports: As described in NECA 1.

C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and fittings.

D. Mounting, Anchoring, and Attachment Components:

1. Powder-Actuated Fasteners: Threaded-steel stud.
2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete.
3. Concrete Inserts: Steel or malleable-iron, slotted-support-system units similar to MSS Type 18; complying with MFMA-3 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, high strength; complying with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.
8. Bushings for Floor-Mounted Equipment Anchors: Neoprene units designed for seismically rated rigid equipment mountings and matched to type and size of anchor bolts and studs used.
9. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for seismically rated rigid equipment mountings and matched to type and size of attachment devices used.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

C. Install electrical equipment to allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.

D. Install electrical equipment to provide for ease of disconnecting the equipment with minimum interference to other installations.

E. Install electrical equipment to allow right of way for piping and conduit installed at required slope.

F. Install electrical equipment to ensure that connecting raceways, cables, wireways, cable trays, and busways are clear of obstructions and of the working and access space of other equipment.

G. Install required supporting devices in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

H. Install fuses in fusible devices.

3.2 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections, and prepare test reports:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

END OF SECTION

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SECTION 26 4313

SURGE PROTECTION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 - GENERAL

1.1 GENERAL SPD REQUIREMENTS

A. SPD with Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Comply with UL 1449.

D. MCOV of the SPD shall be the nominal system voltage.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 SERVICE ENTRANCE SUPPRESSORS

A.

B. Surge Protective Devices (SPD): Integrally mounted, complying with UL 1449 Type 1.

1. The minimum single-pulse surge current withstand rating per phase shall not be less than 100 kA. Non-modular type with the following features and accessories:

    a. Integral disconnect switch.
    b. LED indicator lights for power and protection status.

C. Protection modes and UL 1449 voltage protection rating (VPR) for grounded wye circuits with 208Y/120 V, three-phase, four-wire circuits shall be as follows:

1. Line to Neutral: 600 V for 208Y/120 V.
2. Line to Ground: 1000 V for 208Y/120 V.
3. Line to Line: 1000 V for 208Y/120 V.

D. Protection modes and UL 1449 VPR for 240/120 V, single-phase, three-wire circuits shall be as follows:

1. Line to Neutral: 700 V.
2. Line to Ground: 1000 V.
3. Line to Line: 1000 V.

2.3 ENCLOSURES

A. Indoor Enclosures: NEMA 250, Type 1.

B. Outdoor Enclosures: NEMA 250, Type 3R.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Do not energize or connect service entrance equipment to their sources until transient-voltage surge-suppression devices are installed and connected.

END OF SECTION

SECTION 26 5000

LIGHTING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data for each luminaire, including lamps.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fixtures, Emergency Lighting Units, Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

B. Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.

C. Exterior Luminaires: Comply with UL 1598, and listed and labeled for installation in wet locations by a Nationally Recognized Testing Laboratory acceptable to authorities having jurisdiction.

D. Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

E. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

2.3 BALLASTS

A. Ballasts for Compact Fluorescent Lamps: Electronic programmed rapid-start type, complying with ANSI C 82.11.

1. Lamp end-of-life detection and shutdown circuit.
2. Automatic lamp starting after lamp replacement.
3. Sound Rating: A.
4. BF: 0.95 or higher unless otherwise indicated.
5. Power Factor: 0.95or higher.

B. Internal-Type Emergency Fluorescent Power Unit: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast. Comply with UL 924.

1. Emergency Connection: Operate **two** fluorescent lamp(s) continuously at an output of 1100 lumens each. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
2. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
3. Battery: Sealed, maintenance-free, nickel-cadmium type.
4. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.

2.4 EXIT SIGNS

A. Internally Lighted Signs: Comply with UL 924; for sign colors and lettering size, comply with authorities having jurisdiction.

1. Lamps for AC Operation: Fluorescent, two for each fixture, 20,000 hours of rated lamp life.
2. Lamps for AC Operation: LEDs, 70,000 hours minimum of rated lamp life.

2.5 LAMPS

A. T8 rapid-start lamps, rated 17 W maximum, nominal length of 24 inches, 1300 initial lumens (minimum), CRI 75 (minimum), color temperature 3500 K, and average rated life of 20,000 hours unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate ceiling-mounted luminaires with ceiling construction, mechanical work, and security and fire-prevention features mounted in ceiling space and on ceiling.

B. Lighting Fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

C. Comply with NFPA 70 for minimum fixture supports.

D. Seismic Protection: Luminaire attachments to building walls and ceilings shall comply with seismic criteria in Section 26 0500 "Common Work Results for Electrical."

E. Suspended Lighting Fixture Support:

1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.

F. Air-Handling Fixtures: Install with dampers closed and ready for adjustment.

G. Adjust aimable lighting fixtures to provide required light intensities.

END OF SECTION

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SECTION 311000

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Removing existing vegetation.
2. Clearing and grubbing.
3. Removing above- and below-grade site improvements.
4. Disconnecting, capping, or sealing site utilities.
5. Temporary erosion and sedimentation control.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 MATERIAL OWNERSHIP

A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.4 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.

B. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

C. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Protect existing site improvements to remain from damage during construction.

2. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.3 EXISTING UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.

1. Arrange with utility companies to shut off indicated utilities.

B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect and Owner not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

3.4 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Grind down stumps and remove roots larger than 3 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
2. Use only hand methods or air spade for grubbing within protection zones.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.5 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

3.6 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

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SECTION 312000

EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for slabs-on-grade walks pavements turf and grasses and plants.
3. Excavating and backfilling for buildings and structures.
4. Subbase course and base course for asphalt paving.
5. Excavating and backfilling trenches for utilities and pits for buried utility structures.

1.2 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.3 PREINSTALLATION MEETINGS

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

1.4 INFORMATIONAL SUBMITTALS

A. Material test reports.

1.5 FIELD CONDITIONS

A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth-moving operations.

B. Do not commence earth-moving operations until plant-protection measures specified in Section 015639 "Temporary Tree and Plant Protection" are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil as indicated

C. Unsatisfactory Soils: Soil Classification: as indicated.

D. Subbase Material: as indicated .

E. Base Course: as indicated .

F. Engineered Fill: as indicated.

G. Bedding Course: as indicated .

H. Drainage Course: as indicated .

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored to comply with local practice or requirements of authorities having jurisdiction.

B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored to comply with local practice or requirements of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.

B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

2. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: As indicated.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.6 SUBGRADE INSPECTION

A. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.8 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Initial Backfill: Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

D. Final Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.

E. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill.

3.11 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 10 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

C. Compact soil materials to not less than the percentages indicated of maximum dry unit weight according to ASTM D 698 unless a higher compaction is indicated on Civil Drawings.:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Soil and aggregate base below slabs: Compact to 95 percent.
3. Soil and aggregate base below pavement: Compact to 100 percent.
4. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 90 percent.
5. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at **90** percent.
6. For utility trenches, compact each layer of initial and final backfill soil material at **95** percent.

3.13 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.14 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

3.15 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 the indicated percent of maximum dry unit weight according to ASTM D 698.

3.16 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified geotechnical engineering testing agency to perform tests and inspections.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.17 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 313116

TERMITE CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Soil treatment.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include the EPA-Registered Label for termiticide products.

1.4 INFORMATIONAL SUBMITTALS

A. Soil Treatment Application Report: Include the following:

2. Date and time of application.
3. Moisture content of soil before application.
4. Termiticide brand name and manufacturer.
5. Quantity of undiluted termiticide used.
6. Dilutions, methods, volumes used, and rates of application.
7. Areas of application.
8. Water source for application.

B. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located and who employs workers trained and approved by manufacturer to install manufacturer's products.

1.6 WARRANTY

A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work consisting of applied soil termiticide treatment will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

9. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

A. Termiticide: EPA-Registered termiticide acceptable to authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation.

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

    a. BASF Corporation.

    b. Bayer Environmental Science.

    c. Ensystex, Inc.

    d. Syngenta.

11. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove extraneous sources of wood cellulose and other edible materials, such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated.

3.2 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Distribute treatment uniformly. Apply treatment at the product's EPA-Registered Label volume and rate for maximum specified concentration of termiticide to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction.

12. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
13. Foundations: Soil adjacent to and along the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers, piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing.
14. Penetrations: At expansion joints, control joints, and areas where slabs and below-grade walls will be penetrated.

B. Post warning signs in areas of application.

C. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION

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SECTION 321313

CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes Concrete Paving.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of product, ingredient, or admixture requiring color selection.

C. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.3 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.2 STEEL REINFORCEMENT

A. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet.

C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.

D. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.

E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified.

2.3 CONCRETE MATERIALS

A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:
   1. Portland Cement: ASTM C 150/C 150M, gray portland cement Type as indicated.
   2. Fly Ash: ASTM C 618, as indicated.
   3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33/C 33M, Class as indicated, uniformly graded. Provide aggregates from a single source.

C. Water: Potable and complying with ASTM C 94/C 94M.

2.4 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry or cotton mats.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

2.5 RELATED MATERIALS

A. Joint Fillers: in preformed strips as indicated.

B. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

B. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
   1. Air Content: percent as indicated plus or minus 1-1/2 percent.

C. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

D. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

E. Concrete Mixtures: Normal-weight concrete.
   1. Compressive Strength (28 Days): as indicated.
   2. Maximum W/C Ratio at Point of Placement: as indicated.
   3. Slump Limit: as indicated.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT INSTALLATION

A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness:

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes.

3.6 CONCRETE PLACEMENT

A. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

B. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

C. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

D. Screed paving surface with a straightedge and strike off.

E. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
   1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
   2. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.

C. Slip-Resistive Aggregate Finish: Before final floating, spread slip-resistive aggregate finish on paving surface according to manufacturer's written instructions.
   1. Cure concrete with curing compound recommended by slip-resistive aggregate manufacturer. Apply curing compound immediately after final finishing.
   2. After curing, lightly work surface with a steel-wire brush or abrasive stone and water to expose nonslip aggregate.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing moisture-retaining-cover curing or a combination of these.

3.9 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:
   1. Elevation: 3/4 inch.
   2. Thickness: Plus 3/8 inch, minus 1/4 inch.
   3. Surface: Gap below 10-feet- long; unleveled straightedge not to exceed 1/2 inch.
   4. Joint Spacing: 3 inches.
   5. Contraction Joint Depth: Plus 1/4 inch, no minus.
   6. Joint Width: Plus 1/8 inch, no minus.

3.10 REPAIR AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

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