Project Book

SOMPO

SOMPO Finish Out

5107 82nd, Suite 201
Lubbock, Texas

CHA, Inc. Project Number 2505

08.19.2025

ChapmanHarvey
ARCHITECTS, INC.
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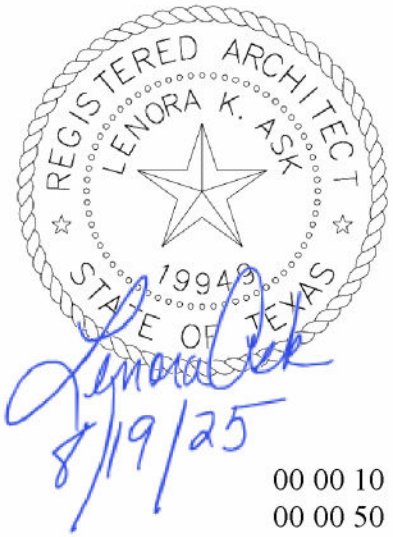
SOMPO Finish Out
5107 82nd St., Suite 201
Lubbock, Texas



August 19, 2025

Chapman Harvey Architects, Inc.
CHA, Inc. Project 2505

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NOTICE TO BIDDERS
REQUEST FOR COMPETITIVE SEALED PROPOSALS
SOMPO FINISH OUT

Endurance Services Limited / SOMPO is requesting sealed bids for the finish out of their lease space located at 5107 82nd Street, Suite 201. Competitive sealed proposals will be accepted until 2:00 PM on September 9, 2025 at 2pm per the instructions to bidders. Proposals may be provided electronically or in person. **Please mark the outside of the envelope or subject line "SOMPO Finish Out _Firm name" Contractors are responsible for confirming successful receipt of electronically delivered proposals.**
Shortlisted proposers will be scheduled for interviews with the client on September 11, 2025. Plans, Project Manuals, and related documents may be examined and acquired by download from PROJECT STATUS | chapmanharveyarch after August 19. Please contact Larissa@chapmanharvey.com to be added to the bidders list to receive addenda notifications. All questions regarding the drawings and specifications shall be made in writing no later than 3 days prior to bid to lenora@chapmanharvey.com.

A MANDATORY PRE-BID MEETING WILL BE HELD WEDNESDAY, August 27 AT 10:00 AM AT THE PROJECT SITE.

ARTICLE 1 METHOD OF SELECTION

1.1 Competitive Sealed Proposal (CSP) Process
General Information
The Owner invites qualified firms to submit a Competitive Sealed Proposal (CSP) for the SOMPO OFFICE FINISH OUT in accordance with these Instructions to Proposers. The Owner will evaluate proposals based on published selection criteria and their relative weights.

1.2 Submission Requirements

1.2.1 Due Date and Time: Proposals must be received at Chapman Harvey Architects, Inc. 612 Broadway, Lubbock, Texas no later than September 9, at 2:00 PM.

1.2.2 Submission Format: One (1) digital copy (PDF on USB drive) PROVIDED BY LINK VIA EMAIL TO LENORA@CHAPMANHARVEY.COM or delivered in person to address above.

1.2.3 Proposals must be sealed in an envelope or subject line clearly marked:
SOMPO: [Firm Name]

1.3 Late Proposals: Proposals received after the deadline may be rejected and returned unopened.

1.4 Questions and Clarifications
All questions regarding this CSP must be submitted in writing to lenora@chapmanharvey.com no later than end of business day Monday, September 8. Responses will be issued as addenda. Oral responses are not binding.

1.5 Proposal Format
Proposals must be organized in the following sections:

1. Cover Letter
2. Firm Qualifications & Experience
3. Project Team & Key Personnel
4. Technical Approach & Understanding of Project
5. Project Schedule
6. Past Performance & References
7. Fee Proposal

1.6 Selection Criteria
Proposals will be evaluated using the criteria listed below. The Owner will select the proposal that offers the best value to the Owner, considering both price and other factors.

Criteria	Description	Weight
1. Price Proposal	Total proposed fee and overall cost structure. Evaluated for reasonableness, competitiveness, and alignment with project budget.	30%
2. Firm Qualifications & Relevant Experience	Demonstrated experience with similar projects in scope, scale, and complexity; history of delivering projects on time and within budget.	20%
3. Project Team & Key Personnel	Qualifications, relevant experience, and availability of key team members; strength of proposed project organization and management structure.	15%
4. Technical Approach & Understanding	Quality and feasibility of the proposed technical approach; demonstrated understanding of the project scope, requirements, and constraints.	15%
5. Project Schedule	Realistic and achievable schedule; evidence of ability to meet or beat Owner's timeline without sacrificing quality.	10%
6. Past Performance & References	Client references, performance evaluations, and record of quality workmanship, cost control, and communication.	10%
Total: 100%		

1.7 Evaluation and Award Process

1.7.1 The Owner's Selection Committee will evaluate and score all responsive proposals based on the above criteria.

1.7.2 The highest-ranked proposers may be invited to an interview or presentation.
1.7.3 The Owner will determine the proposal offering the best value considering the published criteria and weights.
1.7.4 The Owner reserves the right to negotiate with the top-ranked proposer(s) before awarding a contract.

Reservation of Rights

The Owner reserves the right to:

- Reject any or all proposals.
- Waive any formalities or irregularities.
- Re-advertise the CSP.
- Negotiate contract terms with the selected proposer.

ARTICLE 1 PROPOSER'S REPRESENTATIONS

2.1 The Proposer, by making a Proposal, represents that:

2.1.1 The Proposer has read and understands the Proposal Documents and the Proposal is made in accordance therewith.

2.1.2 The Proposer has visited the site, become familiar with local conditions under which the Work is to be performed and has correlated the Proposer's personal observations with the requirements of the proposed Contract Documents.

2.1.3 The Proposal is based upon the materials, equipment and systems required by the Proposal Documents without exception.

ARTICLE 2 PROPOSAL DOCUMENTS

3.1 COPIES

3.1.1 Proposers may obtain complete sets of the Proposal Documents electronically from the architects website. If hardcopy prints are required they may be procured from the architect for $100/per set non-refundable.

3.1.2 Proposers shall use complete sets of Proposal Documents in preparing Proposals; neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete sets of Proposal Documents.

3.1.3 In making copies of the Proposal Documents available on the above terms, the Owner and the Architect do so only for the purpose of obtaining Proposals on the Work and do not confer a license or grant permission for any other use of the Proposal Documents.

3.2 INTERPRETATION OR CORRECTION OF PROPOSAL DOCUMENTS

3.2.1 The Proposer shall carefully study and compare the Proposal Documents with each other, and with other work being Proposal concurrently or presently under construction to the extent that it relates to the Work for which the Proposal is submitted, shall examine the site and local conditions, and shall at once report to the Architect errors, inconsistencies or ambiguities discovered.

3.2.2 Proposers and Sub-Proposers requiring clarification or interpretation of the Proposal Documents shall make a written request which shall reach the Architect at least seven days prior to the date for receipt of Proposals.

3.2.3 Interpretations, corrections and changes of the Proposal Documents will be made by Addendum. Interpretations, corrections and changes of the Proposal Documents made in another manner will not be binding, and Proposers shall not rely upon them.

3.2.4 Proposal Documents include the Proposal Requirements and the proposed Contract Documents. The Proposal Requirements consist of the Advertisement or Invitation to Proposal, Instructions to Proposers, Supplementary Instructions to Proposers, the Proposal form, and other sample Proposal and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications and all Addenda issued prior to execution of the Contract.

3.2.5 Definitions set forth in the General Conditions of the Contract for Construction, AlA Document A201, or in other Contract Documents are applicable to the Proposal Documents.

3.2.6 Addenda are written or graphic instruments issued by the Architect prior to the execution of the Contract which modify or interpret the Proposal Documents by additions, deletions, clarifications or corrections.

3.2.8 The term Architect shall include the Engineer, Architect and their appointed representatives.

3.2.8 A Proposal is a complete and properly signed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Proposal Documents.

3.2.9 A Unit Price is an amount stated in the Proposal as a price per unit of measurement for materials, equipment or services or a portion of the Work as described in the Proposal Documents. No unit pricing is required on this project.

3.2.10 A Proposer is a person or entity who submits a Proposal.

3.2.11 A Sub-Proposer is a person or entity who submits a Proposal to a Proposer for materials, equipment or labor for a portion of the Work.

3.3 SUBSTITUTIONS

3.3.1 The materials, products and equipment described in the Proposal Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution.

3.3.2 No substitution will be considered prior to receipt of Proposals unless written request for approval has been received by the Architect at least ten days prior to the date for receipt of Proposals. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other material, equipment or other portions of the Work including changes in the work of other contracts that incorporation of the proposed substitution would require shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect decision of approval or disapproval of a proposed substitution shall be final.

3.3.3 If the Architect approves a proposed substitution prior to receipt of Proposals, such approval will be set forth in an Addendum. Proposers shall not rely upon approvals made in any other manner.

3.3.4 Substitutions will be considered after the Contract only as defined in Section 01600 -MATERIAL AND EQUIPMENT.

3.3.5 Owner’s advantage to select substitution submitted by contractor based on either cost and/or quality.

3.4 TIME OF COMPLETION

3.4.1 The contractor shall state in his proposal, the number of calendar days required to complete the work. The date stated will be one of the items for consideration of award of contract. This date, if accepted by the owner, shall become the completion date for the contract.

3.5 LIQUIDATED DAMAGES

3.5.1 $1,000 per day past the contractual project completion date.

3.6 COMMENCING OF WORK

3.6.1 Shortly after the contract is awarded and contracts signed, there will be a pre-construction conference with the Architect, Owner, Contractor and Sub-Contractors to discuss in general the construction of the project.

3.6.2 The work of this contract shall follow the following dates and events unless changed by addendum before project Proposals or by change order after project is awarded.

3.7 RECORD OF DRAWINGS

3.7.1 The contractor shall maintain one copy of all drawings and specifications in good order and marked to record all changes during construction. This “as built “set of drawings and specifications shall be given to the architect at the end of the project and before final payment.

3.8 DATE OF SUBSTANTIAL COMPLETION OF WORK

3.8.1 See Article 9.8 of the A.I.A. Document A201, 1987. A Certificate of Substantial Completion, A.I.A. Document G704, will be used and after written acceptance by the Architect, Contractor, and Owner, it will establish the date of substantial completion. No liquidated damages will be assessed after this date.

3.9 ADDENDA

3.9.1 Addenda will be mailed or delivered to all who are known by the issuing office to have received a complete set of Proposal Documents.

3.9.2 Copies of Addenda will be made available for inspection wherever Proposal Documents are on file for that purpose.

3.9.3 No Addenda will be issued later than three days prior to the date for receipt of Proposals except an Addendum withdrawing the request for Proposals or one which includes postponement of the date for receipt of Proposals.

3.9.4 Each Proposer shall ascertain, prior to submitting a Proposal that the Proposer has received all Addenda issued, and the Proposer shall acknowledge their receipt in the Proposal.

ARTICLE 3 PROPOSAL PROCEDURES

4.1 FORM AND STYLE OF PROPOSALS

4.1.1 Proposals shall be submitted on the Proposal form included with the Proposal Documents.

4.1.2 All blanks on the Proposal form shall be filled in by typewriter or manually, in ink.

4.1.3 Interlineation, alterations and erasures must be initialed by the signer of the Proposal.

4.1.4 Where two or more Proposals for designated portions of the Work have been requested, the Proposer may, without forfeiture of the Proposal security, state the Proposer's refusal to accept award of less than the combination of Proposals stipulated by the Proposer. The Proposer shall make no additional stipulations on the Proposal form nor qualify the Proposal in any other manner.

4.1.5 A Proposal submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Proposer.

4.2 PROPOSAL SECURITY

4.2.1 A bid bond or cashier's check payable to the owner in the amount not less than (5%) of the largest possible total for the proposal submitted, must accompany each proposal. MONEY ORDERS OR CASH ARE NOT ACCEPTABLE SECURITY.

4.2.2 Proposal security received by the Owner will be returned within ten (10) days for all responses rejected by the Owner. Proposal security for a vendor's response under consideration by the Owner will be returned within ninety (90) days following the receiving deadline if the vendor's response is not accepted by the Owner.

4.2.3 If a vendor's response is accepted by the Owner and a contract is offered pursuant to the terms of the invitation, but the vendor does not execute a contract within ten (10) days from the date of offer of a contract, the Owner may declare such vendor's proposal security forfeited to the Owner.

4.3 SUBMISSION OF PROPOSALS

4.3.1 All copies of the Proposal, the Proposal security, and other documents required to be submitted with the Proposal shall be enclosed in a sealed opaque envelope. The envelope shall be addressed as indicated in the Invitation to Proposers and shall be identified with the Project name, the Proposer's name and address and the designated portion of the Work for which the Proposal is submitted. If the Proposal is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED PROPOSAL ENCLOSED" on the face thereof.

4.3.2 Proposals shall be deposited at the designated location prior to the time and date for receipt of Proposals. Proposals received after the time and date for receipt of Proposals will be returned unopened.

4.3.3 The Proposer shall assume full responsibility for timely delivery at the location designated for receipt of Proposals.

4.3.4 Oral, telephonic, telegraphic, facsimile or electronic email Proposals are invalid and will not receive consideration.

4.4 MODIFICATION OR WITHDRAWAL OF PROPOSAL

4.4.1 A Proposal may not be modified, withdrawn or canceled by the Proposer after Proposal date and time.

4.4.2 Prior to the time and date designated for receipt of Proposals, a Proposal submitted may be modified or withdrawn by notice to the party receiving Proposals at the place designated for receipt of Proposals. Such notice shall be in writing over the signature of the Proposer or by telegram; if by telegram, written confirmation over the signature of the Proposer shall be mailed and postmarked on or before the date and time set for receipt of Proposals. A change shall be so worded as not to reveal the amount of the original Proposal.

4.4.3 Withdrawn Proposals may be resubmitted up to the date and time designated for the receipt of Proposals provided that they are then fully in conformance with these Instructions to Proposers.

ARTICLE 4 CONSIDERATION OF PROPOSALS

5.1 OPENING OF PROPOSALS

5.1.1 As stated in the Invitation to Proposal, the properly identified Proposals received on time will be opened and evaluated privately.

5.2 REJECTION OF PROPOSALS

5.2.1 The owner shall have the right to reject any, or all Proposals, reject a Proposal not accompanied by a required Proposal security, or by other data required by the Proposal Documents, or reject a Proposal which is in any way incomplete or irregular.

5.3 ACCEPTANCE OF PROPOSAL (AWARD)

5.3.1 The Owner shall have the right to waive informalities or irregularities in a Proposal received and to accept the Proposal which, in the Owner's judgment, is in the Owner's best interests.

ARTICLE 5 PERFORMANCE BOND AND PAYMENT BOND

6.1 BOND REQUIREMENTS

6.1.1 In the event the contract amount exceeds $25,000.00, the contractor to whom the contract is awarded must provide a payment bond in the amount of 100% of the contract price.

6.1.2 In the event the contract amount exceeds $100,000.00, the contractor to whom the contract is awarded must provide a performance bond in the amount of 100% of the contract price.

ARTICLE 7 CRIMINAL BACKGROUNDS

7. All contractors, subcontractors, and their employees must submit to the Owner proof of a satisfactory criminal record history of all individuals working on Owner property through background checks. The criminal record history must be obtained by the successful vendor before any work is performed.
Respondent agrees by signing and executing this solicitation to provide assurance that all employees, subcontractors, and volunteers of the provider who have contact with students have passed a criminal history background check current within the last year.

END OF DOCUMENT

BID FORM

Date:

OWNER'S NAME: Endurance Services Limited / SOMPO

OWNER'S ADDRESS: 5107 82nd Street, Suite 201.
Lubbock Texas

BID SUBMITTED BY:_____

SCOPE OF BID:_____

The undersigned, having carefully examined the specifications, drawings, and related documents entitled:

SOMPO Finish Out
5107 82nd St., Suite 201
Lubbock, Texas

as prepared by Chapman Harvey Architects Inc., 612 Broadway, Lubbock, Texas, made an on-site inspection of the premises and all other conditions affecting the cost and/or execution of the work, proposes to furnish all materials, labor, and equipment necessary to complete the work in accordance with said documents, of which this bid is a part, for the following sum, including any designated contingency allowances:

BASE BID _____

_____ Dollars ($_____)

(Note: All amounts shall be shown in both written and figure form. In case of discrepancy between the written amount and the figure, the written amount will govern. For alternate bid items, circle one of the options: add, deduct, or no change. If not circled, will assume no change.)

The undersigned acknowledges receipt of _____ addenda to the Drawings and Specifications as follows:

No._____ Date_____ No._____ Date_____ No._____ Date_____

No._____ Date_____ No._____ Date_____ No._____ Date_____

(The Bidder is to fill in I.D. Number and date of each thereby acknowledging receipt of addenda).

If awarded the contract, the undersigned agrees to commence work under this contract on or before a date to be specified in a Written Notice to Proceed and to substantially complete the project within the calendar days stipulated below from said date, unless modified by change order.

Project Base Bid: _____ calendar days.

If notified of the acceptance of this proposal within thirty (30) days of the time set for the opening of bids, bidder agrees within ten (10) days of notification, to execute a contract in the form of the AIA Document A101, Standard Form of Agreement Between Owner and Contractor as amended for the above work, for the above stated compensation.

BID SECURITY, as defined in the Invitation and Instructions to Bidders, which the Undersigned agrees to disposition of, as stated in Invitation and Instructions to Bidders, is attached to this Bid.

It is understood that the Owner reserves the right to accept or reject any and all Bids and to waive all formalities in accordance with State law.

Respectfully Submitted,

By:_____

Title:_____

Business Address:

_____ (SEAL: If Bid is by Corporation)

_____

_____

_____

Telephone Number: (_____)_____

FAX Number: (_____)_____

E-mail Address:_____

Fill in the applicable information:

A Corporation, chartered in the State of _____. Authorized to do business in the State of Texas.

A Partnership, composed of _____, and _____ and _____.

An Individual operating under the name of _____ _____ _____.

END BID FORM

PART 1 GENERAL

1.01 APPLICABLE DOCUMENT

A. AIA Document A201.2007 "General Conditions of the Contract for Construction" is a part of this Project Manual to the same extent as if bound herein. Copies may be obtained from the Architect upon request.

PART 2 PRODUCTS

Not used

PART 3 PRODUCTS

Not used

END OF SECTION

GENERAL:

Supplements: The following supplements modify, change, delete from or add to the "General Conditions of the Contract for Construction", A.I.A. Document A201, Fourteenth Edition, 2007. Where any article of the General Conditions is modified or any Paragraph, Subparagraph or Clause thereof is modified or deleted by these Supplementary Conditions, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

ARTICLE 1: GENERAL PROVISIONS

1.2 Execution, Correlation and Intent: Add the following Subparagraphs:

1.2.6 The mention of certain items in the Specifications to the exclusion of others (whether in the general statement of the work in a section or paragraph or in itemized lists of any nature); or the mention of work to be done in a specific area to the exclusion of similar or like work required in other areas; or the failure to properly cross-reference related work specified elsewhere, shall not relieve the Contractor of his responsibilities under the Contract Documents.

1.2.7 The titles of sections and paragraphs are not necessarily fully descriptive of the work required thereby. The segregation of the various parts of the Work under headings, by trades, does not relieve the Contractor of the responsibility for furnishing every item shown on the drawings or specified in the specifications, or reasonably inferable therefrom as being necessary to produce the intended results, whether properly segregated or not.

1.2.8 If an item is addressed differently in two places of the contract documents the greater quality or quantity applies and is assumed to take precedence.

ARTICLE 3: CONTRACTOR

3.6 Taxes: Revise subparagraph 3.6.1 to read as follows:

The Contractor shall pay all taxes for the work or portions thereof provided by the Contractor which are legally enacted at the time bids are received, whether or not yet effective.

ARTICLE 4: ADMINISTRATION OF THE CONTRACT

4.2 Architect's Administration of the Contract: Add the following Clause:

4.2.14 Where "as directed," “as directed by Engineer,” "as directed by Architect," or similar notation appears in the Contract Documents, the Contractor shall ask for and receive the necessary instructions from the Architect before proceeding with that portion of the Work. Requests for instructions shall be made in ample time to avoid delays in the Work.

4.3.6 Concealed Conditions: Add the following Clauses 4.3.6.1 and 4.3.6.2:

4.3.6.1 The concealed conditions encountered below the surface of the ground mentioned in 4.3.6 shall apply to man-made conditions only. The materials to be excavated shall be considered as unclassified and the Contractor shall assume responsibility for excavating to the depths and limits required by the Contract Documents unless otherwise directed by the Architect, in which case the unit prices stated in the Contract Documents or subsequently agreed upon shall apply.

4.3.6.2 Failure of the drawings to show underground utility lines or other concealed piping, wiring and the like shall not be construed as a guarantee on the part of the Architect or the Owner that such conditions do not exist, though unknown. All operations involving excavation or removals shall be done at the risk of the Contractor who shall take the necessary precautions to protect employees and the public from injury or death and to avoid damage to existing systems.

ARTICLE 5: SUBCONTRACTORS

5.2 Award of Subcontracts and other Contracts for Portions of the Work: Revise as follows:

5.2.2.1 (New Clause) - If required by the Architect, the Contractor shall submit evidence that the person or entity he proposes to use are competent, have had experience and have performed satisfactorily on jobs of similar size, complexity, type and scope. The information, if required, shall give complete experience records of the proposed person or entity which shall include:

Name of Job	Type of Job	General Contractor
Architect	Date Completed	Approximate Cost (of subcontract)

5.2.2.2 (New Clause) - The acceptance of a person or entity (including those who are to furnish materials or equipment fabricated to a special design) shall not constitute approval of the materials they customarily handle, unless the materials are acceptable to the Architect as being equal to those specified in quality, function, performance and appearance. The Architect shall be the sole judge as to acceptability of the materials as to appearance.

ARTICLE 9: PAYMENTS AND COMPLETION

9.3 Applications for Payment: Change as follows:

9.3.1 Add the following Clause 9.3.1.3:

9.3.1.3 Until Substantial Completion, the Owner will pay ninety-five percent of the amount due the Contractor on account of progress payments.

9.3.2 Add the following Clauses:

9.3.2.1 In preparing the Application for Payment, the Contractor shall verify the accuracy of the requests for payment submitted by his Subcontractors and materials suppliers and shall not include in his Application for Payment any sum which, in his opinion, if approved will result in an overpayment for their work performed or materials delivered.

9.3.2.2 All items which are shipped in crates or otherwise wrapped shall be uncrated or unwrapped and inspected by the Contractor upon arrival at the site. Materials shall be carefully inspected for quantities, sizes, color if color selection is a consideration, damage, or defects; and if damaged, defective, or otherwise not in conformance with the Contract Documents, shall be recorded immediately.

9.3.2.3 The contractor shall not request payment for any items until he has inspected the items and any materials which are not in conformance with the contract documents shall not be included in any Application for Payment.

9.11.2 The date of substantial completion of the work is identified in the proposal.

ARTICLE 11: INSURANCE AND BONDS

11.1 Contractor's Liability Insurance: Add the following Clauses 11.1.1.8, 11.1.1.9 and 11.1.2.1:

11.1.1.8 Liability Insurance shall include all major divisions of coverage and be on a comprehensive basis including:

1. Premises Operations (including X, C and U coverages as applicable).
2. Independent Contractors' Protective.
3. Products and Completed Operations.
4. Personal Injury Liability with Employment Exclusion deleted.
5. Contractual, including specified provision for Contractor's obligation under Paragraph 3.18.
6. Owned, non-owned and hired motor vehicles.
7. Broad Form Property Damage including Completed Operations.

11.1.1.9 If the General Liability coverages are provided by a Commercial General Liability Policy on an occurrence basis, the policy date or Retroactive Date shall predate the Contract; the termination date of the policy or applicable extended reporting

period shall be no earlier than the termination date of coverages required to be maintained after final payment, certified in accordance with Subparagraph 9.10.2.

11.1.2.1 The insurance required by Subparagraph 11.1.1 shall be written for not less than the following limits, or greater if required by law:

1. Workers' Compensation:

   (a) State Statutory Limits

2. General Liability: May be a single comprehensive form or a combination of comprehensive General Liability form and an umbrella with coverages including:

   (a) Premises-operations
   (b) Products/completed operations hazard
   (c) Contractual Insurance
   (d) Broad Form Property Damage
   (e) Independent Contractors
   (f) Personal Injury:

2.1 Limits of Liability shall not be less than the following:

   (a) Per Occurrence $1,000,000.00

3. Automobile Liability: Comprehensive form with coverage including: Owned, Non-owned and Hired vehicles:

3.1 Limits of Liability shall be not less than the following:

   (a) Bodily Injury: $100,000.00 (Each Person)
   (b) Bodily Injury: $300,000.00 (Each Occurrence)
   (c) Property Damage: $100,000.00 (Each Occurrence)

4. Builders Risk Insurance:

   The Contractor shall, during the progress of the work, maintain insurance equal to the full amount of the cost of the project plus three per cent for additional costs. Policy shall be Inland Marine form, subject to the approval of the Owner as to form. The insurance shall cover all work incorporated in the building project and all materials for the same in or about the premises. Money received under any such insurance shall be paid in the same manner as monthly progress payments in relation to the costs incurred in the rebuilding or reparation of the work destroyed or damaged. Builders Risk Insurance shall be subject to a deductible of $1,000.00 for all losses occasioned by perils insured. All other losses will be at the risk of the contractor(s).

5. Owner's Liability Insurance:

   The Contractor shall obtain at his expense an Owner's Protective Liability Insurance Policy naming the Owner, its employees and the Architect as insured, with the following limits:

   (a) $1,000,000.00 Aggregate
   (b) $500,000.00 Each Occurrence

6. Certificates of Insurance for the above coverages shall be filed with the Owner before work is started.

11.3 Property Insurance:

11.3.1 Modify the first sentence of Subparagraph 11.3.1 as follows: Delete "unless otherwise provided, the Owner" and substitute "The Contractor."

Add the following sentences:

The form of policy for this coverage shall be Completed Value. If the Owner is damaged by the failure of the Contractor to maintain such insurance, then the Contractor shall bear all reasonable costs properly attributable thereto.

11.3.1.2 Delete Clause 11.3.1.2.

11.3.1.3 Delete Clause 11.3.1.3.

11.3.6 Delete Subparagraph 11.3.6 and substitute the following:

11.3.6 Before an exposure to loss may occur, the Contractor shall file with the Owner two certified copies of the policy or policies providing his Property Insurance coverage, each containing those endorsements specifically related to the Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire until at least 30 days prior written notice has been given to the Contractor.

11.3.7 Modify Subparagraph 11.3.8 by substituting "Contractor" for "Owner" at the end of the first sentence.

11.3.8 Modify Subparagraph 11.3.9 by substituting "Contractor" for "Owner" as fiduciary; except that at the first reference to "Owner" in the first sentence, the work "this" should be substituted for "Owner's."

11.3.9 Modify Subparagraph 11.3.10 by substituting "Contractor" for "Owner" each time the latter work appears.

11.3.10 Modify Subparagraph 11.3.11 by substituting "Contractor" for "Owner" each time the latter word appears.

11.5 Add the following paragraph 11.5 to Article 11:

11.5 WORKMEN'S COMPENSATION INSURANCE

11.5.1 Required workers' compensation coverages, 28 TAC 110.110(c)(7), adopted to implement Texas Labor Code 406.096.

11.5.1.1 Workers' Compensation - Statutory Limits

11.5.2 A copy of a certificate of insurance, a certificate of authority to self-insure issued by the commission, or a coverage agreement (TWCC-81, TWCC-82, TWCC-83, or TWCC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on a project is required for the duration of the project.

11.5.2.1 Duration of the project includes the time from the beginning of the work on the project until the contractor's/person's work on the project has been completed and accepted by the governmental entity.

11.5.2.2 Persons providing services on the project ("subcontractor" in Texas Labor Code 406.096) include all persons or entities performing all or part of the services the contractor has undertaken to perform on the project, regardless of whether that person contracted directly with the contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity that furnishes persons to provide services on the project.

11.5.2.3 Services include, without limitation, providing, hauling or delivering equipment or materials, or providing labor, transportation, or other service related to a project. Services do not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

11.5.4 If the coverage period shown on the contractor's current certificate of coverage ends during the duration of the project, the contractor must, prior to the end of the coverage period, file a new certificate of coverage with the governmental entity showing that coverage has been extended.

11.5.5 The contractor shall obtain from each person providing services on a project, and provide to the governmental entity:

.1 A certificate of coverage, prior to that person beginning work on the project, so the governmental entity will have on file certificates of coverage showing coverage for all persons providing services on the project; and

.2 No later than seven days after receipt by the contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project.

11.5.6 The contractor shall retain all required certificates of coverage for the duration of the project and for one year thereafter.

11.5.7 The contractor shall notify the governmental entity in writing by certified mail or personal delivery, within ten days after the contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project.

11.5.8 The contractor shall post on each project site a notice, in the text, form, and manner prescribed by the Texas Workers' Compensation Commission, informing all persons providing services on the project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.

11.5.9 The contractor shall contractually require each person with whom it contracts to provide services on a project, to:

.1 Provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code 401.011(44) for all of its employees providing services on the project for the duration of the project;

.2 Provide to the contractor, prior to that person beginning work on the project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the project for the duration of the project;

.3 Provide the contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project.

.4 Obtain from each other person with whom it contracts, and provide to the contractor:

.a A certificate of coverage, prior to the other person beginning work on the project; and

.b A new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

.5 Retain all required certificates of coverage on file for the duration of the project and for one year thereafter;

.6 Notify the governmental entity in writing by certified mail or personal delivery, within ten days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project; and

.7 Contractually require each person with whom it contracts to perform as required by items 1-7, with the certificates of coverage to be provided to the person for whom they are providing services.

11.5.10 By signing this contract or providing or causing to be provided a certificate of coverage, the contractor is representing to the governmental entity that all employees of the contractor who will provide services on the project will be covered by workers' compensation coverage for the duration of the project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

11.5.11 The contractor's failure to comply with any of these provisions is a breach of contract by the contractor that entitles the governmental entity to declare the contract void if the contractor does not remedy the breach within ten days after receipt of notice of breach from the governmental entity.

END OF SECTION

SECTION 01 11 13

SUMMARY OF WORK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work of this Section.

1.2 SECTION INCLUDES

A. Work covered by Contract Documents.

B. Coordination of hazardous material.

C. Owner's responsibilities.

D. Contractor's use of site and premises.

E. Contingency allowances.

F. Project completion time.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. Work of this project includes all items shown and/or described in the bid documents for the finish out of approximately 14,000 sf on the second floor of office building, currently unfinished with limited demolition requirements and existing fire sprinkler in place. Work to include framing and finishes and coordination of owner provided furniture requirements. Work to include the modification of NFPA 13 fire sprinkler. Work to include Mechanical, Electrical and Plumbing associated with the finish out space. Work includes associated MEP utility pathways to existing building infrastructure through vertically adjacent spaces.

B. All installed work shall be in compliance with the Americans with Disabilities Act and Texas Accessibility Standards

1.4 OWNER'S RESPONSIBILITIES

A. Assist the contractor in maintaining job site safety by instructing employees, and visitors of the potential dangers at the site.

B. Provide access for the contractor to the site for this project.

C. Provide parking and storage space for contractor's employees, equipment, and materials.

1.5 CONTRACTOR'S USE OF SITE AND PREMISES

A. Contractor may not use parking lots for staging. Parking and staging will be coordinated across the street at a portion of the existing stadium parking lot to be coordinated with the District.

1.6 CONTINGENCY ALLOWANCES

A. $180,000 Contingency allowance to be included in base bid amount on the bid form.

1.7 PROJECT COMPLETION TIME

A. Time is of the essence and the owner would like to occupy the space no later than February of 2026. Work to be completed as indicated by the proposed days in the sealed proposal.

B. See Article 8.1 of the General Conditions for definition of Working Days.

C. See Article 8.2 of the General Conditions for computation of Contract Time.

D. See Article 8.3 of the General Conditions for claims for extension of Contract Time.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01 20 00

ENERGY COMPLIANCE CERTIFICATES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work of this Section.

1.2 SECTION INCLUDES

A. International Energy Conservation Code

1. Building Envelope Compliance Certificate.

2. Mechanical Compliance Certificate.

3. Lighting Compliance Certificate.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01 31 00

COORDINATION AND MEETINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work of this Section.

1.2 SECTION INCLUDES

A. Coordination.

B. Renovation project procedures.

C. Existing conditions.

D. Pre-Construction conference.

1.3 COORDINATION

A. Contractor shall coordinate scheduling, submittals, and work of the various sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. A project schedule shall be prepared and updated monthly by the general contractor. Provide copies of the updated project schedule at the beginning of each month

C. Contractor to schedule a pre-demolition job site meeting with the architect and Owner prior to starting this work. Regularly schedule update meetings at agreed upon intervals

D. The contractor shall schedule and coordinate the work so that once Notice to proceed is issued, work will proceed on a steady, continuous course without delay.

E. Contractor shall coordinate completion and clean up of work in preparation for substantial completion.

F. The Contractor may use portions of the site for staging material. Be mindful to not interfere with the needs of neighboring properties.

1.4 PRE-CONSTRUCTION CONFERENCE

A. Attendance: After award of contract and prior to start of construction, contractor's direct representative, major subcontractors, owner’s employees responsible for project, architects and engineers shall attend conference. Time and location as mutually agreed.

B. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Distribution of Contract Documents.
   3. Submission of list of subcontractors, list of products, Schedule of Values, and progress schedule.
   4. Designation of personnel representing the parties in contract.

5. Procedures and processing RFI, ASI, field decisions, material submittals, product substitutions, monthly applications for payment, CCR, Change Orders, amendments to the contract and Contract closeout procedures.
6. Coordinated daily use of premises by owner and contractor.
7. Owner's requirements.
8. Security and housekeeping procedures, identification of contractor’s work force.
9. Project Schedules.
10. Procedures for maintaining record documents at the site.
11. Review of Texas Accessibility Standards.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01 33 00

SUBMITTALS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work of this Section.

B. Submit copies of all City Permits and inspection receipts to architect.

1.2 SECTION INCLUDES

A. Submittal procedures.

B. Schedule of Values.

C. Construction Progress Schedules.

D. Application for Payment.

E. Shop drawings.

F. Samples.

G. Change Procedures.

H. Manufacturer's instructions.

I. Manufacturer's certificates.

J. AIA Form G702 - Application and Certificate for Payment.

K. AIA Form G703 - Continuation Sheet.

1.3 RELATED SECTIONS

A. Section 01700 - Contract Closeout: Contract warranty and closeout submittals.

1.4 SUBMITTAL PROCEDURES

A. If agreeable to all parties involved, all submittals are to be in electronic format, with the exception of: color charts, product samples, and finished texture samples.

B. Transmit each submittal with AIA Form G810 or contractor's standard preprinted transmittal form. Identify the project title, project number, the number of copies submitted, give notice of any deviation from contract documents and any other pertinent data.

C. Sequentially number the transmittal forms. Do not repeat a transmittal number, keep each unique.

D. Identify project, contractor, subcontractors or supplier; pertinent drawing sheet and detail number(s), and specification section number, as appropriate.

E. Submit Material Safety Data Sheets with each submittal.

F. Coordinate and schedule submittals to expedite the project.

G. Deliver all electronic and hard copies of the submittals to the architect's business address.

1.5 SCHEDULE OF VALUES

A. Using AIA Form G703 - Application and Certificate for Payment, Continuation Sheet, submit Schedule of Values to Architect at least twenty (20) days before the first application for payment.

B. Submit Schedule of Values within twenty (20) days after date established in Notice to Proceed.

C. Use the Table of Contents to establish Schedule of Values format. Identify each line item with number and title of the specification section.

D. Include in each line item any amount of Allowances specified in the project.

E. Include within each line item Contractor’s overhead and profit.

F. Each application, revise the schedule as necessary to include approved contract changes to date.

1.6 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial progress schedule within twenty (20) days after date established in Notice to Proceed.

B. Revise and resubmit schedule as required to reach an agreed schedule and completion date.

C. Submit revised schedules with each Application for Payment, identifying ahead of schedule or behind schedule changes since previous month’s schedule.

D. Submit a horizontal bar chart with separate line for each major section of work or operation, identifying first work day of each week.

E. Show complete sequence of construction by activity, identifying work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration of the task or operation.

F. Indicate estimated percentage of completion for each item of work at each submission.

G. Indicate submittal dates required for shop drawings, product data, sample reviews, and product delivery dates, including those that may be furnished by owner and / or included as an allowance.

1.7 APPLICATIONS FOR PAYMENT

A. Submit one electronic copy of each application on AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet.

B. Utilize Schedule of Values for listing items in Application for Payment.

C. Payment period to be as defined in Owner-Contractor Agreement.

D. Include any request for extension of the contract time with each pay application. Do not assume that accumulated unrequested days will be granted as the project’s contracted time expires.

1.8 SHOP DRAWINGS

A. Refer to Section 00100, Instructions to Bidders, paragraph 3.6, for submittal schedule.

B. Submit shop drawings with all product literature, product data sheets, color charts, and / or photographs in a bound paper or electronic copy.

C. If submitting in paper format, submit the number of copies which the contractor requires, plus **three** copies which will be retained by the architect, engineer, and owner.

D. If submitting electronically, contractor shall provide either a construction management software or a web based shared drive for file transfer and tracking.

E. Mark in **GREEN INK** each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this project. The architect's review comments will be in **RED INK**.

F. Apply contractor's stamp, signed, or initialed certifying that review, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and contract documents. Submittals delivered to the architect for review that have not been stamped and initialed will be returned without review.

G. Identify variations from contract documents and product or system limitations which may be detrimental to successful performance of the completed work.

H. Provide space for architect's review stamps.

I. Revise and resubmit shop drawings as required, identify all changes made since previous submittal. Re-submittal shall continue to use the same identification number as the original submittal plus the letter “R” for re-submittal and R 1, R 2, R 3, etc. for multiple re-submittals.

J. Distribute copies of reviewed and approved shop drawings to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

K. Provide copies for Record Documents described in Section 01700 - Contract Closeout.

1.9 SHOP DRAWING REVIEW

A. All may be submitted electronically.

B. The architect and engineer shall affix a stamp upon the submittal with appropriate wording stating if submittal is accepted, accepted with noted revisions, revise and re-submit, or rejected. Rejected submittals are to be addressed promptly and a new submittal prepared.

C. The architect shall provide copies of the submittal to the owner for the owner’s review at the same time the architect is reviewing shop drawings.

D. The contractor shall not begin work or order material for which a submittal is required until a submittal has been stamped accepted or accepted with noted revisions and returned to the contractor.

E. Schedule submissions at least fourteen (14) working days before date reviewed submittal will be needed by contractor. The architect shall be allowed fourteen (14) working days for each submittal review.

F. The architect shall notify the contractor when submittals are reviewed and ready for inclusion into the project.

G. The architect shall review the same shop drawing submittal no more than two times. If more than two submittals are required in order to achieve an accepted submittal, the contractor shall be charged $100.00 per hour for each review beyond the initial two. The architect's review fee shall be paid by the contractor in full prior to the release of the accepted shop drawings.

1.10 SAMPLES

A. Submit samples to illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing with work.

B. Submit samples of finishes from the full range of manufacturers' standard colors or in custom colors selected, textures, and patterns for architect's selection.

C. Include identification on each sample, with full project information.

D. Submit the number or samples specified in individual specification sections. Provide at least **two** copies of each item being submitted for review and selection. These copies will not be returned.

E. Reviewed samples which may be used in the work are indicated in individual specification sections.

1.11 CHANGE PROCEDURES

A. The Architect may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications and a change in Contract Time for executing the change. Contractor will prepare and submit an estimate within seven (7) days.

B. The Contractor may propose a change by submitting request for change to the Architect, describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01600.

C. Architect may issue a directive, on AIA form G713 Construction Change Directive signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute the change.

D. Architect will issue Change Orders, using AIA G701 - Change Order, for signatures of all parties as provided in the Conditions of the Contract.

E. Contract amendments or change orders are not approved and no action shall be taken until the Ki Corp Executive Director has agreed and signed the document. A copy of the signed document will be provided to the contractor for execution of the work.

1.12 MANUFACTURERS INSTRUCTIONS

A. When specified in individual specification sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for product data.

B. Identify conflicts between manufacturers' instructions and contract documents to the architect.

1.13 MANUFACTURER'S CERTIFICATES

A. When specified in individual specification sections, submit manufacturers' certificate to architect for review, in quantities specified for product data.

B. Indicate that material or product conforms to or exceeds specified requirements. Submit supporting reference date, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or product, but must be acceptable to architect and / or engineer.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

END OF SECTION

SECTION 01 42 19

REFERENCE STANDARDS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work of this Section.

1.2 SECTION INCLUDES

A. Quality assurance.

B. Schedule of references.

C. Adherence to accessibility standards.

1.3 RELATED SECTIONS

A. General Conditions: Reference Standards.

1.4 QUALITY ASSURANCE

A. For products or workmanship specified by association, trade, or Federal standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of contract documents.

C. Obtain copies of standards when required by contract documents.

D. Should specified reference standards conflict with contract documents, request clarification from architect before proceeding.

E. The contractual relationship of the parties to the contract shall not be altered from the contract documents by mention or inference otherwise in any reference document.

1.5 SCHEDULE OF REFERENCES

AA	Aluminum Association
AABC	Associated Air Balance Council
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ADA	Americans with Disabilities Act
ADC	Air Diffusion Council
AGA	American Gas Association

AGC	Associated General Contractors of America
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
APA	American Plywood Association
ARI	Air-Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builder’s Hardware Manufacturer Association
BIA	Brick Institute of America
CDA	Copper Development Association
CLFMI	Chain Link Fence Manufacturers Institute
CPSC	Consumer Product Safety Commission
CRSI	Concrete Reinforcing Steel Institute
DHI	Door and Hardware Institute
EJMA	Expansion Joint Manufacturers Association
FGMA	Flat Glass Marketing Association
FM	Factory Mutual System
FS	Federal Specification
GA	Gypsum Association
ICBO	International Conference of Building Officials

IEEE	Institute of Electrical and Electronics Engineers
MBMA	Metal Building Manufacturers Association.
ML/SFA	Metal Lath/Steel Framing Association
NAAMM	National Association of Architectural Metal Manufacturers
NCMA	National Concrete Masonry Association
NECA	National Electrical Contractor Association
NEMA	National Electrical Manufacturers' Association
NFPA	National Fire Protection Association
NPCA	National Paint and Coating Association
NRCA	National Roofing Contractor Association
NWMA	National Woodwork Manufacturers Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PS	Product Standard
RMA	Rubber Manufacturers Association
SDI	Steel Deck Institute
SDI	Steel Door Institute
SGCC	Safety Glazing Certification Council
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors' Association
SSPC	Steel Structures Painting Council
TAS	Texas Accessibility Standards
TCA	Tile Council of America, Inc.
UL	Underwriters' Laboratories, Inc.
WCLIB	West Coast Lumber Inspection Bureau
WRI	Wire Reinforcement Institute
WWPA	Western Wood Products Association

WWPA Woven Wire Products Association

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 The general contractor and all sub-contractors constructing, installing, or providing materials for this project shall provide and/or install building components that comply with these standards.

3.2 Special attention shall be given to Americans with Disabilities Act (ADA) and Texas Accessibility Standards (TAS) criteria. The contractors shall make themselves knowledgeable of ADA and TAS criteria and shall comply with the latest adopted version of these standards and acts.

END OF SECTION

SECTION 01 43 00

QUALITY CONTROL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work of this Section.

1.2 SECTION INCLUDES

A. Quality assurance and control of installation.

B. References.

C. Field samples.

D. Inspection and testing laboratory services.

1.3 RELATED SECTIONS

A. Section 01 42 19 - Reference Standards.

B. Section 01 33 00 - Submittals: Submission of Manufacturers' Instructions and Certificates.

C. Section 01 60 00 - Material and Equipment: Requirements for material and product quality.

D. Individual Specification Sections: Inspections and tests required and standards for testing.

1.4 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply fully with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with contract documents, request clarification from architect before proceeding with work.

D. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform work by persons qualified to produce workmanship of specified quality.

F. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.5 REFERENCES

A. Conform to reference standard by date of issue current on date of contract documents.

B. Obtain copies of standards when required by contract documents.

C. Should specified reference standards conflict with contract documents, request clarification from architect before proceeding with work.

D. The contractual relationship of the parties to the contract shall not be altered from the contract documents by mention or inference otherwise in any reference document.

E. ANSI/ASTM E329 - Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials Used in Construction.

1.6 FIELD SAMPLES

A. Install field samples at the site as required by individual specifications sections for review.

B. Acceptable samples represent a quality level for the work.

C. Where field sample is specified in individual sections to be removed, clear area after field sample has been accepted by architect.

1.7 OWNER'S INSPECTION AND TESTING LABORATORY SERVICES

A. Owner may employ and pay for services of an independent testing laboratory or owner may use its own personnel and facilities to perform inspection and testing laboratory services.

B. If the results provided by the Owner's laboratory differ from the contractor's laboratory report, the owner's laboratory shall be final.

C. Work found to be unsatisfactory according to test results, shall be removed from the project and re-constructed at contractor's expense.

1.8 CONTRACTOR'S INSPECTION AND TESTING LABORATORY SERVICES

A. The Owner shall employ and pay for a reputable testing laboratory to perform inspections, tests, and other services specified in individual specification sections and as required by the architect.

B. Reports will be submitted directly to the architect and owner from laboratory, in duplicate, indicating observations and results of test and indicating compliance or non-compliance with contract documents. Copies of reports shall also be sent to the contractor for his use.

C. Cooperate with testing laboratory: furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.

1. Notify testing laboratory 24 hours prior to expected time for operations requiring services.
2. Make arrangements with testing laboratory and pay for additional samples and tests required for contractor's use.

D. Retesting required because of non-conformance to specified requirements shall be performed by the same testing laboratory on instructions by the architect. Payment for retesting will be charged to the contractor by deducting inspection or testing charges from the contract sum.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01 50 00

CONSTRUCTION FACILITIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work in this Section.

1.2 SECTION INCLUDES

A. Sanitary Facilities: Contractor's employees.

B. Temporary Utilities: Electrical, water, sewer, gas and telephone.

C. Field Offices: Services and size.

D. Temporary Controls: Barriers, enclosures and fencing, and protection of the work.

E. Construction Facilities: Parking, progress cleaning, and project signage.

1.3 RELATED SECTIONS

A. Section 01700 - Contract Closeout: Final cleaning.

1.4 TEMPORARY SANITARY FACILITIES

A. Existing or newly constructed toilet facilities may be used by construction crews.

B. General Contractor is responsible for maintaining toilets clean and in a neat appearance.

1.5 TEMPORARY UTILITIES

A. Contractor shall furnish and install all temporary piping and wiring required for construction.

B. New and modified existing service is anticipated for this project.

C. All temporary utility connections and distribution shall be approved by owner and respective local utility companies, and shall be removed by contractor at completion of construction.

1.6 TEMPORARY FIELD OFFICES

A. Provide weather tight enclosure with lights, telephone, and layout table for drawings.

B. Facility shall be large enough to allow for at least three people to stand and meet comfortably.

1.7 BARRIERS

A. Provide suitable barriers to prevent unauthorized entry to construction areas while still allowing access for owner's use of site. Protect existing facilities and adjacent properties from damage during construction operation and demolition. Type of barrier to be used will be at the discretion

of the contractor and the circumstance involved. The contractor to submit proposed barrier for review and approval by owner.

B. Protect stored materials, site, and structures from damage.

C. Clearly post warning signs all around the work sites. Signs are to be secured to the barriers.

D. Suitable barriers include durable solid partitions, chain-link fences, temporary dust and acoustic partitions and woven fabric. Suitable barriers do not include ropes or warning tape tied to saw horses or similar devices.

E. Prohibit traffic through work areas.

1.8 WATER CONTROL

A. Since this is mostly an interior renovation project and there is an established exterior, no additional exterior water control is anticipated.

1.9 PROTECTION OF INSTALLED WORK

A. Protect installed work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed products. Control activity in the immediate work area so as to minimize damage of installed work.

1.10 PROTECTION OF LANDSCAPING

A. Prohibit construction worker traffic through any established landscaped areas. Damaged landscape shall be replaced by the contractor at no cost to owner.

1.11 SECURITY

A. Contractor shall provide security and facilities to protect work, existing facilities, and owner's operations directly adjacent to new construction from unauthorized entry, vandalism, or theft.

B. The loss of building materials and/or equipment from the job site will be replaced with same at contractor’s expense.

C. If necessary, the contractor shall coordinate with City of Lubbock to secure a permit for a construction dumpster and space.

1.12 PARKING

A. All Contractor’s and sub-contractor’s vehicle parking is available West or North of ANB Commercial Vault.

B. Construction access is from the west and east side of the building.

C. When site space is not adequate, the contractor shall acquire additional off-site parking.

1.13 PROJECT SIGNAGE

A. Contractor, sub-contractors, owner, and architect are to share one combined sign measuring no more than 4 feet wide and 8 feet high, mounted securely to sign posts. If the contractor wishes to share the sign, the owner shall review wording and location before sign is installed.

B. Project sign is to be constructed of weather resistant material, submit sign material for review.

C. Project signs are to remain in place until the project is complete. Remove signs only upon reaching substantial completion.

1.14 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean, orderly condition. Do not allow lawns or weeds to grow taller than six inches.

B. Remove waste materials, debris, and rubbish daily, empty dumpster weekly, and dispose off-site.

C. Do not allow hazardous conditions to develop or continue. This shall include lumber with un-pulled nails and concrete with projecting rebar.

1.15 REMOVAL OF TEMPORARY UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary above grade or buried utilities, equipment, facilities, materials, prior to substantial completion inspections.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

D. Remove all job signs, barriers, fences, controls and repair holes dug for posts; regrade lawn and/or sod as necessary.

1.16 HAUL ROUTE

A. All materials, tools, equipment, etc. shall be transported via the shortest possible route.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01 60 00

MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work of this Section.

1.2 SECTION INCLUDES

A. Products.

B. Transportation and handling.

C. Storage and protection.

D. Product options.

E. Substitutions.

1.3 RELATED SECTIONS

A. Instruction to Bidders: Product options and substitution procedures.

1.4 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the work. Does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the work. Products may also include existing materials or components required for salvage and reuse.

B. Do not reuse materials and equipment removed from existing premises, except as specifically permitted by the contract documents or as approved by the architect.

C. For similar components provide interchangeable components of the same manufacturer.

D. All materials are to be certified by the contractor to be asbestos-free. Provide written certification to owner as part of close out documents.

1.5 TRANSPORTATION AND HANDLING

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery:
   1. Deliver materials, products and equipment to the project site in undamaged condition in manufacturer's original unopened containers or packaging with identify labels intact and legible.
   2. Arrange deliveries in accordance with the construction schedule and in ample time to facilitate inspection prior to installation in order to avoid unnecessary delays in the construction process.
   3. Delivery of construction material and removal of construction debris shall occur after normal business hours only.

B. Storage:
   1. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.
   2. For exterior storage of fabricated products, place on sloped supports, above ground.
   3. Provide off-site storage and protection when site does not permit on-site storage or protection.
   4. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
   5. Store loose granular materials on solid flat surfaces in a well-drained area. Provide mixing with foreign matter.
   6. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
   7. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

C. Handling:
   1. Handle materials, products and equipment in a manner prescribed by the manufacturer or as required to protect from damage during storage and installation.
   2. Do not handle material in such a way that may leave permanent scars, dents, impressions, cracks, or blemishes.

1.7 PRODUCT OPTIONS

A. Products specified by reference standards or by description only: Any product meeting those standards or description.

B. Products specified by naming one or more manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products specified by naming one or more manufacturers with a provision for substitutions: Submit a request for substitution for any manufacturer not named.

1.8 SUBSTITUTIONS

A. Instructions to bidders specify time restrictions for submitting requests for substitutions during the bidding period to requirements specified in this section.

B. Substitutions may be considered after the bid date only when a product becomes unavailable through no fault to the contractor.

C. Owner's advantage to select substitution submitted by contractor based on either cost and/or quality.

D. Document each request with complete data substantiating compliance of proposed substitution with contract documents.

E. A request constitutes a representation that the contractor:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Will provide the same warranty for the substitution as for the specified product.
3. Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to owner.
4. Waives claims for additional costs or time extension which may subsequently become apparent.
5. Will reimburse for review or redesign services associated with re-approval by authorities.

F. Will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the contract documents.

G. Substitution Submittal Procedure:
1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
2. Submit shop drawings, product data, and certified test results attesting to the proposed product's equivalence.
3. The architect, after consultation with owner, will notify contractor, in writing, of decision to accept or reject request.

1.9 CONTRACTOR'S CONSTRUCTION METHODS OPTIONS

A. Where contract documents indicate no specific method of construction, the contractor shall employ standard industry practices.

B. Where contract documents indicate a specific method of construction, the contractor shall employ the method indicated or, at his option, may submit a written request for an alternate method of construction.

C. Architect/engineer will consider written requests for alternate construction methods, if received in time as to allow for review and return of such requests and for alternation to be made with no delay to total construction methods. See contract for total working days allowed.

D. Submit separate requests for each alternate. Support each request with three copes of complete details and/or documentation for alteration.
1. Indicate changes of materials to be used.
2. Show significant effects of alterations to other affects of alterations to other affected areas.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01 70 00

CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work of this Section.

1.2 SECTION INCLUDES

A. Closeout procedures.

B. Final cleaning.

C. Adjustments.

D. Project record documents.

E. Operation and maintenance data.

F. Warranties and Certificates.

G. Texas Accessibility Standards Warranty.

H. Spare parts and maintenance materials.

I. Starting of systems.

1.3 CLOSEOUT PROCEDURES

A. Submit written certification that contract documents have been reviewed, work has been inspected, and that work is complete in accordance with contract documents and ready for architect's inspection.

B. Final payment will be authorized only after all requirements of this section have been met, all punch list items have been completed and verified by the architect, updated record documents have been delivered to the architect, and complete operation and maintenance manuals have been delivered to the architect. Submit final application for payment identifying total adjusted contract sum, previous payments, and sum remaining due.

C. Contractor to submit to owner Payment Waivers or Release of Liens signed and dated by all subcontractors along with request for final payment.

1.4 FINAL CLEANING

A. Execute final cleaning prior to final inspection.

B. Clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Clean equipment and fixtures to a new and sanitary condition.

D. Replace all filters of operating equipment with new, clean filters. Provide owner with one complete set of all filters required for all equipment.

E. Clean debris from roofs, gutters, downspouts, and drainage systems.

F. Clean site; sweep paved areas and rake clean landscaped surfaces.

G. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.5 ADJUSTMENTS

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

B. If adjustments cannot provide a smooth and unhindered operation, replace product with matching item that will operate correctly.

1.6 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the work:
1. Contract drawings.
2. Specifications.
3. Addenda.
4. Change orders and other modifications to the contract.
5. Accepted shop drawings, product data, and samples.

B. Store record documents separate from documents used for construction.

C. Record information concurrent with construction progress. Do not wait to update Record Documents at the end of work, update as work progresses.

D. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by addenda and modifications.

E. Record documents and shop drawings: Legibly mark each item to record actual construction, showing any and all modifications, including:
1. Measured depths of foundations in relation to finish main floor datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
4. Field changes of dimension and detail.
5. Details not on original contract drawings.

F. Submit Record Documents to architect prior to claim for final payment. Architect to transfer information to original drawings and deliver to owner.

1.7 OPERATION AND MAINTENANCE DATA

A. Submit one complete paper copy and two electronic sets of operation and maintenance data at least 2 weeks prior to final inspection. Paper format is to be organized on 8-1/2 x 11 inch pages, bound in three ring binders with durable plastic covers. Electronic format is to follow the paper format’s organization and be submitted on labeled CD’s in clear plastic cases.

B. Prepare binder covers with printed title "Operation and Maintenance Instructions", title of project, and subject matter of binder when multiple binders are required.
1. Label multiple binders as “Volume I of II” and Volume II of II”, as appropriate.

C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below, with tab titling clearly printed under reinforced laminated plastic tabs.

D. Contents: Prepare a Table of Contents for each volume, with each product or system description identified.

E. Part 1: Directory, listing names, addresses, and telephone numbers of architect, contractor, subcontractors, and major equipment suppliers.

F. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
1. Significant design criteria.
2. List of equipment, make, model, and serial number. Verify that numbers are correct.
3. Parts list for each component.
4. Operating instructions.
5. Maintenance instructions for equipment and systems.
6. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.

G. Part 3: Project documents and certificates, including the following:
1. All approved shop drawings and product data.
2. Hauling and dumping permits, receipts, and/or manifest.
3. Air and water balance reports two (2) weeks prior to final inspection.
4. Written statement certifying that all building materials installed in project are asbestos free.
5. Natural gas pressure test and certification.
6. Contractors' Affidavit of Payment of Debts and Claims. Use latest version of AIA Documents G706 and G706A.
7. Certificates issued by the architect; change orders, addenda, field reports, etc.
8. Photocopies of manufacturers' warranties and bonds.
9. General Contractor's and Sub-Contractors' warranties.

1.8 WARRANTIES AND CERTIFICATES

A. Provide original warranties and certificates in a bound, 3 ring binders to the owner. Label the binder “Warranties and Certificates” with project name.

B. Where specifications request warranties and certificates, provide such items requested. Warranties are required from each of the major sub-contractors, those who are responsible for a building system installed in the building.

C. Provide required certifications requested by state and local governing agencies.

D. The following are known Texas Department of Health required certificates, other certificates may be required.
1. Flame spread/smoke density ratings of carpets.

E. Provide a written warranty on contractor’s business letterhead stating that the work is warranted against defects in material and labor for a period of one year from date of final acceptance. This is not the date of substantial completion.

1.9 TEXAS ACCESSIBILITY STANDARDS WARRANTY

A. A Texas Department of Licensing and Regulations inspector will walk the site within approximately one year of the completion date. The contractor shall warrant that if, after this walk through, there are

items provided and installed by the contractor that do not comply with the code, the contractor shall provide the necessary labor and material to correct the unacceptable items. If the construction documents provided the correct information and this information was not followed, the corrective work shall be at the contractor's expense. If the corrective work is necessary due to changes in the code or omission on the documents, circumstances beyond the contractor's control, the work is to be priced at a fair market value.

B. The contractor's warranty shall state that any necessary corrective work associated to the Texas Accessibility Standards shall be completed within 30 days of written notification that the installed work did not pass the Texas Department of Licensing and Regulations inspection.

C. If for some reason the contractor or sub-contractor does not believe that a given dimension or installation detail is in compliance with the Texas Accessibility Standard, the contractor is obligated to bring this concern to the architect's attention prior to performing said work.

1.10 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification sections.

B. Deliver to project site and place in location as directed by owner and obtain receipt prior to final payment.

1.11 STARTING OF SYSTEMS

A. Preparation:
1. Notify architect and owner seven days prior to start-up of each system.
2. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions which may cause damage.
3. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
4. Verify wiring and support components are complete and tested.
5. Execute start-up under supervision of responsible manufacturer's and owner's representatives in accordance with manufacturer's instruction.
6. Demonstrate start-up, operation, control, adjustment, trouble shooting, servicing maintenance and shutdown of each piece of equipment to owner's personnel two weeks prior to date of final inspection.
7. Amount of time to be devoted to instruction shall be reasonable and consistent with size of installation and its complexity.

PART 2 PRODUCTS
NOT USED

PART 3 EXECUTION
NOT USED

END OF SECTION

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, and Supplementary General Conditions apply to work of this Section.

1.2 SECTION INCLUDES

A. Concealed fire resistant wood blocking in walls; wood furring and grounds for grab bars.

1.3 RELATED SECTIONS

A. Section 06400 – Architectural Millwork

1.4 QUALITY ASSURANCE

A. Perform work in accordance with the following agencies:
   1. Lumber Grading Agency: Certified by ALSC.
   2. Plywood Grading Agency: Certified by APA.

B. Meet or exceed ASTM E 84 criteria.

C. Meet or exceed UL 723:PR-S criteria.

PART 2 PRODUCTS

2.1 LUMBER MATERIALS

A. Lumber Grading Rules: NFPA, WWPA.

B. Fire resistant treated 2 x 6: NFPA.

2.2 UNDERLAYMENT MATERIALS

A. Plywood Underlayment: APA Rated Sheathing; sanded.

B. Particleboard Underlayment: Not allowed on this project.

2.3 ACCESSORIES

A. Fasteners: Galvanized steel for exterior, high humidity, and treated wood locations, plain finish elsewhere.

B. Die Stamped Connectors: Galvanized steel.

C. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorage to steel.

2.4 WOOD TREATMENT

A. Fire retardant: AWPA Treatment C20, Exterior Type, chemically treated and pressure impregnated; capable of providing a maximum flame spread/smoke development rating of 25 or less.

B. D-Blaze, Bowie-Sims-Prange Treating Corporation.

C. Wood Preservative (Pressure Treatment): AWPA Treatment C1 using water-born preservative with 0.25 percent retainage.

PART 3 EXECUTION

3.1 FRAMING

A. Erect wood members in accordance with applicable code. Place members level and plumb.

3.2 SITE APPLIED WOOD TREATMENT

A. Site apply preservative treatment in accordance with manufacturer's instructions.

B. Allow preservative to cure prior to erecting members.

3.3 CONCEALED GROUNDS

A. Provide fire resistant concealed grounds in framing as required for secure anchoring of wall mounted building components.

END OF SECTION

SECTION 06 41 16
PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, and Supplementary General Conditions apply to work of this Section

1.2 SECTION INCLUDES

A. Plastic-laminate-faced architectural cabinets.
B. Custom wood cabinets as detailed and drawn.
C. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products high-pressure decorative laminate adhesive for bonding plastic laminate fire-retardant-treated materials and cabinet hardware and accessories.
B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
C. Samples:
   1. Plastic laminates, for each color, pattern, and surface finish.

1.4 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
B. Grade: Custom.
C. Type of Construction: Frameless.
   1. Cabinet, Door, and Drawer Front Interface Style: Reveal overlay
D. Reveal Dimension: 1/2 inch (13 mm).
E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.

F. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Formica Corporation.
   2. Wilsonart International Holdings, Inc.

G. Laminate Cladding for Exposed Surfaces:
   1. Horizontal Surfaces: Grade HGS.
   2. Postformed Surfaces: Grade HGP.
   3. Vertical Surfaces: Grade HGS.
   4. Pattern Direction: All patterns to run the same direction - Vertically for doors and fixed panels, vertically for drawer fronts unless noted otherwise

H Materials for Semiexposed Surfaces:
   1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
   2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
   3. Drawer Bottoms: Thermoset decorative panels.

I. Dust Panels: 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers unless located directly under tops.

J. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
   As indicated on the drawings and approved upon submittal.

2.2 WOOD MATERIALS

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

   1. Wood Moisture Content: 5 to 10 percent.

   2. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
      a. Medium-Density Fiberboard: ANSI A208.2, Grade 130.
      b. Particleboard: ANSI A208.1, Grade M-2.
      c. Softwood Plywood: DOC PS 1, medium-density overlay.

B. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

C. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

D. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087111 "Door Hardware (Descriptive Specification)."

B. Cabinet hardware as follows:
   1. Semi-concealed Soft self-close Hinges for Overlay Doors: BHMA A156.9, B01602
   2. Edge Pulls: Solid metal, 3 inch center top knob finger pulls, 1 5/8” projection (8 mm) in diameter. Color black
   3. Catches: Push-in magnetic catches, BHMA A156.9, B03131.
   4. Adjustable Shelf Standards and Supports: BHMA A156.9, B04102; with shelf brackets, B04112.
   5. Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip.
   6. Drawer Slides: BHMA A156.9.
      a. Grade 1 and Grade 2: Side mounted; full-extension type; with polymer rollers.
      b. Soft self-close
      c. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-overtravel-extension type; zinc-plated-steel ball-bearing slides.
      d. For drawers not more than 3 inches (75 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1.
      e. For drawers more than 3 inches (75 mm) high but not more than 6 inches (150 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1.
      f. For drawers more than 6 inches (150 mm) high or more than 24 inches (600 mm) wide, provide Grade 1HD-100 Grade 1HD-200.
      g. For computer keyboard shelves, provide Grade 1HD-100.
      h. For trash bins not more than 20 inches (500 mm) high and 16 inches (400 mm) wide, provide Grade 1HD-100.

D. Aluminum Slides for Sliding Glass Doors: BHMA A156.9, B07063.

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

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

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

F. Tempered Float Glass for Cabinet Doors: ASTM C 1048, Kind FT, Condition A, Type I, Class 1 (clear), Quality-Q3, with exposed edges seamed before tempering, 6 mm thick unless otherwise indicated.

G. Tempered Float Glass for Cabinet Shelves: ASTM C 1048, Kind FT, Condition A, Type I, Class 1 (clear), Quality-Q3; with exposed edges seamed before tempering, 6 mm thick.

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

   Satin Stainless Steel: BHMA 630.

2.5 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber], kiln dried to less than 15 percent moisture content.
B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
C. Adhesives: Do not use adhesives that contain urea formaldehyde.
D. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
E. Adhesive for Bonding Plastic Laminate: wood worker's option.

F. Adhesive for Bonding Edges: Hot-melt adhesive.

2.6 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." For glass in wood frames, secure glass with removable stops.

PART 3 EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Install cabinet’s level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
C. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

D. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
E. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.

2. 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 064116

SECTION 07 21 16

BATT, BLANKET, AND RIGID INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work in this Section.

1.2 RELATED WORK

A. Provide un-faced acoustic batt insulation in all partitions shown on the drawings.

1.3 RELATED SECTIONS

A. Section 06 10 00: Rough Carpentry.

B. Section 06 41 16: Gypsum Board Systems.

1.4 QUALITY ASSURANCE

A. Thermal Resistivity: Where thermal resistivity properties of insulation materials are designated by r-values they represent the rate of heat flow through a homogenous material exactly 1 inch thick, measured by test method included in referenced material standard or otherwise indicated. They are expressed by the temperature causing one BTU to flow through one square foot per hour at mean temperatures indicated.

B. Fire Performance Characteristics: Provide insulation materials which are identical to those whose fire performance characteristics as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

C. Contractor shall be an established firm regularly engaged in installation of wall insulations for the past five years.

1.5 REFERENCE STANDARDS

A. Surface Burning Characteristic: ASTM E 84.

B. Fire Resistance Ratings: ASTM E 119.

C. Combustion Characteristics: ASTM E 136.

D. Thermal Performance: ASTM C653.

E. Acoustical Performance: ASTM C665.

1.6 SUBMITTALS

A. Submit manufacturer's specifications and installation instructions for each type of insulation required. Include data substantiating that materials comply with specified requirements.

B. Certified Test Reports: With product data, submit copies of certified test reports showing compliance with specified performance values, including R-values (aged values for plastic insulations), densities, compression strengths, fire performance characteristics, perm ratings, water absorption ratings, and similar properties.

C. Submit support material and anchor hardware for vertical and horizontal installations.

1.7 DELIVERY, STORAGE AND HANDLING

A. Protect insulations from physical damage and from becoming wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage, and protection during installation. All materials damaged from above instances will not be used and will be disposed of properly from the site.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Batt Insulation:
1. Owens/Corning Corporation.
2. CertainTeed

B. Substitutions:
1. In accordance with Section 01600.

2.2 MATERIALS

A. Sound attenuation batts to be equal to Owens/Corning un-faced batt for 3 1/2 inch thick cavity, flame spread 0-25, smoke developed of 50, compliant with the International Building Code.

PART 3 EXECUTION

3.1 INSPECTION

A. Inspect cavity wall surfaces prior to starting insulation work. Proceeding with installation constitutes acceptance of the substrate.

B. The installer must examine the substrate and the conditions under which the insulation work is to be performed and notify the contractor in writing of unsatisfactory conditions. Do not proceed with the insulation work until substrate is satisfactory.

3.2 INSTALLATION

A. Comply with manufacturer's instructions for the particular conditions of installation in each case; including method of support or anchorage to the substrate, as appropriate for each application indicated. If printed instructions are not available or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work.

B. Extend insulation full thickness as shown over entire surface to be insulated. Cut and fit tightly around obstructions.

END OF SECTION

SECTION 07 92 00

JOINT SEALERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work in this Section.

1.2 WORK INCLUDED

A. Provide caulking in conjunction with interior painting operations and as otherwise indicated on drawings for interior caulking.

B. Perform all work required to complete the joint preparation, joint packing or filler, priming, caulking and sealing indicated by the drawings and specified herein. Furnish all supplementary items necessary.

C. In fire rated partitions, install only fire resistant sealants.

1.3 RELATED SECTIONS

A. Section 08100 - Hollow Metal Frames.

B. Section 08410 – Aluminum Entrances and Storefronts

C. Section 09900 - Painting.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications:
   1. Minimum two year’s experience in applying sealants and approved by manufacturer.

B. Manufacturer's Representative:
   1. Arrange for technical representative to be on project site to advise installer of proper procedures and precautions for use of materials and to check installation.

1.5 REFERENCE STANDARDS

A. FS TT-S-00230C, Type II Sealing Compound: Elastomeric Type, Single Component.

B. FS TT-S-001543A Sealing compound: Silicone Rubber Base.

C. FS TT-S-00227E, Type I, Class A Joint Sealant: Self Levelling.

D. ASTM C834 Standard Specification for latex sealing compounds.

1.6 SUBMITTALS

A. Submit the following:
   1. Product Data:
      a. Manufacturer's specifications, recommendations and installation instructions for sealant, backing, and related materials.
   2. Samples:
      a. Color charts for selection by architect.
      b. Furnish samples of custom colors.
   3. Certification:
      a. Letter of certification from manufacturer or certified test laboratory report that materials are chemically compatible with each other and with substrate.
      b. Letter from manufacture that certifies material’s fire resistant qualities.
      c. When requested by the architect, submit samples of cured sealants and a 6 inch long sample of each type of joint backup.

1.7 DELIVERY AND STORAGE

A. Deliver materials in unopened containers as packaged by the manufacturer. Store in a manner to protect materials from the weather.

1.8 WARRANTY

A. Warrant, in writing, materials and workmanship against air and water leakage for a five-year period.

B. Provide written warranty of materials fire resistance and accepted use in at least a one hour fire resistant assembly.

PART 2 PRODUCTS

2.1 PRODUCTS

A. Pecora Chemical corporation.

B. Sonneborn Building Products.

C. W.R. Grace and Company.

D. General Electric Company.

E. Products Research and Chemical Corporation.

F. Substitutions: In accordance with Section 01600.

2.2 MATERIALS

A. Polysulfide (Type I):
   1. Two-part conforming to FS TT-S-00227E, Class A, Type I (self-leveling) or Type 2 (nonsag) as recommended by manufacturer.
   2. Color: As selected by architect.

3. Acceptable products:
   a. Synthacalk GC-5, Pecora Corp.
   b. 350, PRC.
   c. Sonolastic, Sonneborn-Contech, Inc.

B. Chlorosulfonated Polyurethane (Type 2)
1. One part conforming to FS TT-S-230C.
2. As selected by architect.
3. Acceptable products:
   a. Synthacalk, Pecora.

C. Polyurethane (Type 3):
1. Two-part conforming to FS TT-S-0000227E, Class A, Type I or II.
2. Color: As selected by architect.
3. Acceptable products:
   a. NR-200, Pecora.
   b. No. 200, PRC.
   c. Sonolastic Paving Joint Sealant, Sonneborn-Contech.
   d. THC-900/901, Tremco.

D. Polyurethane (Type 4):
1. One-part conforming to FS TT-S-000230C, Class A, Type II.
2. Color: Custom color as selected by architect.
3. Acceptable products:
   a. No. 6000, PRC.
   b. NP 1, Sonneborn - Contech.
   c. Dymonic, Tremco.

E. Silicone (Type 5):
1. One part rubber based silicone conforming to FS TT-S-001543, Class A, Type I.
2. Color: Custom color as selected by architect.
3. Acceptable products:
   a. 790 Building Sealant, Dow Corning.
   b. Silproof, General Electric.
   c. Proglaze, Tremco.

F. Acrylic, Solvent Cure (Type 6):
1. One-part, FS TT-S-00230.
2. Acceptable products:
   a. Unicrylic, Pecora.
   b. Permacryl, Schnee-Moorhead Chemicals, Inc.
   c. Mono, Tremco Manufacturing Company.

G. Nondrying, Nonskinning (Type 7):
1. One-part sealing compound.
2. Acceptable products:
   a. GC-55, Noncuring, Goal Chemical.
   b. BR-96, Pecora.
   c. Curtain Wall Sealant, Tremco.

H. Bitumen Impregnated Sealant (Type 8):
1. Precompressed bitumen impregnated foam joint sealant.
2. Size: As recommended by manufacturer for joint condition as rain seal.
3. Acceptable product: Emseal compressed, Emseal Corporation.

I. Backer Rod: Closed cell expanded polyurethane or polyethylene "Denver" foam, compatible with sealant; sized and shaped to control depth of sealant; and to maintain 20% to 50% compression of material.

J. Joint Cleaners and Primers: As recommended by sealant manufacturer.

K. Bond Breaker: Pressure sensitive adhesive polyethylene tape.

L. Masking Tape: Pressure sensitive adhesive paper tape.

M. Sealant Tape:
1. Compressible adhesive-cohesive tape of cross-linked butyl polyisobutylene rubber that accommodates variations and movement, sized as necessary to allow for joint movement of + or - 25%.
2. Acceptable product: PTI 606, Protective Treatments, Inc.

N. Expansion Joint Filler:
1. Closed cell polyethylene compatible with sealant.
2. Acceptable product: Sonoflex F, Sonneborn.
3. Fire resistant to be used in at least a one hour fire rating classification.

2.3 MIXING

A. Mix components in accordance with manufacturer's recommendations.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine all surfaces to receive sealant and report all conditions not acceptable. Installation shall be deemed as acceptance of the surface.

3.2 PREPARATION

A. Clean all surfaces and joints thoroughly, removing all foreign matter, dust, oil, grease, water surface, dirt, frost, old caulking material, and previously applied paint or primer.

B. Prime and prepare surfaces in strict accordance with sealant or caulk manufacturer's written instructions and recommendations.

C. Remove loose mill scale from steel surfaces. Remove dirt, oil, or grease by solvent cleaning and wipe surfaces. All surfaces must be clean and dry. Any protective coating on building materials that will impair sealant bond shall be removed.

3.3 APPLICATION

A. Sealants:
1. Follow sealant manufacturer's instructions regarding preparation, priming, application life, and application procedure.
2. Apply masking tape where required in continuous strips in alignment with joint edge. Remove tape immediately after joints have been sealed and tooled as directed.
3. Apply sealant under pressure with gun having nozzle of proper size or other appropriate means. Provide sufficient pressure to completely fill joints.
4. Neatly point or tool sealant to provide proper contour. Use clean water-wet tool or tooling solution recommended by manufacturer when tooling white or light colored sealant.

B. Caulking:
   1. Caulking: Apply caulking joints before final coat of paint is applied to adjacent surface. Apply caulking with a pressure gun having a nozzle of proper size to fit joint. Completely fill joint and firmly tool against backing to make a smooth, convex bed, and assure good adhesion. Caulking shall develop a firm skin before paint is allowed.

C. Joint Size:
   1. Sealant and Caulking: Depth equal to 1/3 times joint width or as recommended by manufacturer.

3.4 CLEANING

A. Remove excess caulking or sealant materials and smears from adjacent surfaces as work progresses.

B. On non-porous surfaces excess uncured sealant shall be removed with a solvent moistened cloth immediately. On porous surfaces excess sealant should be allowed to cure overnight, then removed by lightly wirebrushing or sanding. All adjacent surfaces shall be clean and free from stains.

C. Remove all debris resulting from these operations from the site.

3.5 SCHEDULE

A. Interior and Exterior Joints Subject to Movement (Not Including Traffic): Type 1, 2, 4, or 5 at Contractor's option and as recommended by manufacturer for joint condition and sealant color.

B. Interior and Exterior Horizontal Joints Subject to foot and Vehicular Traffic: Type 2, self-leveling.

C. Interior Horizontal and Vertical Joint Not Subject to Movement (Not Including Traffic): Type 6.

D. In contact with roofing and waterproofing materials: Type 3 or 4, low modulus, unmodified.

E. Unexposed window joints: Type 7.

F. Interior fire resistant rating of at least a one hour rated assembly subjected to minimal movement: Type 2.

G. Secondary seal and exterior brick expansion joint secondary seals: Type 8.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL FRAMES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work in this Section.

1.2 WORK INCLUDED

A. Custom fabricated rated and non-rated steel frames.

1.3 RELATED SECTIONS

A. Section 08 13 13 - Steel Doors.

B. Section 08 71 00 - Finish Hardware

C. Section 08 14 29 – Prefinished Wood Doors

D. Section 08 80 00 – Glazing

E. Section 09 90 00 - Painting.

1.4 REFERENCES

A. ASTM A569 - Steel, Carbon, Hot-Rolled Sheet and Strip, Commercial Quality.

B. ASTM A591 - Steel Sheet, Cold-Rolled, Electrolytic Zinc Coated.

C. NFPA 80 - Fire Doors and Windows.

D. NFPA 252 - Fire Tests for Door Assemblies.

E. SDI - 100 - Standard Steel Doors and Frames.

1.5 QUALITY ASSURANCE

A. Conform to requirements of SDI - 100.

B. Fire rated frame construction to conform to NFPA 252.

C. Installed door and frame assembly to conform to NFPA 80 for fire rated class indicated on drawings.

1.6 SHOP DRAWINGS AND PRODUCT DATA

A. Submit shop drawings and product data under provisions of Section 01300.

B. Indicate frame configuration, anchor spacings, anchor types, and location of cutouts for hardware and reinforcement.

C. Submit manufacturer's installation instructions under provisions of Section 01300.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Protect products under provisions of Section 01600.

B. Protect frames with resilient packaging.

1.8 WARRANTY

A. Provide five year manufacturer's warranty under provisions of Section 01700.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Republic Builders Products Corp./ Subs. Republic Steel

B. Ceco Corporation

C. Tex-Steel Corporation

D. Substitutions: Under provisions of Section 01600.

2.2 FRAMES

A. Material: ASTM A569, hot rolled carbon steel.

B. Frame Gage: 16 gage for interior frames, 14 gage for exterior frames.

C. Hardware Reinforcement: SDI - 107.

D. Dimensions: 1 inch return by required wall thickness; all frames are to match.

2.3 ACCESSORIES

A. Jamb Anchors: 'Z' type for metal studs.

B. Silencers: As specified in Section 08700. Exterior door frames are not to have silencers.

2.4 FABRICATION

A. Fabricate frames and assemble as a complete welded unit. Weld exposed joints continuously, grind, dress, and make smooth, flush, and invisible. No joint shall be obvious between head and jambs.

B. Fabricate frames with hardware reinforcement plates welded in place. Comply with ANSI A115 "Specifications for Door and Frame preparation for Hardware".

C. Prepare frames for silencers. Provide three single silencers for single interior doors on strike side. Exterior frames are not to have silencers.

D. Fabricate jamb anchors to be set in metal stud partitions from minimum 16 gage cold rolled steel complying with ASTM A526.

E. Shop paint surfaces of doors and frame units, including galvanized surfaces, using manufacturer's standard baked-on rust-inhibitive primer.

F. Provide 26 gage steel plaster guards or mortar boxes, welded to frame, at back of hardware cutouts where installed in concrete, masonry or plaster opening.

2.5 FINISH

A. Primer: Baked on.

B. Paint: As specified in Section 09900.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install frames in accordance with SDI - 100.

B. Coordinate with gypsum wallboard wall construction for anchor placement.

C. Install minimum of 4 anchors per jamb for frames set in metal stud framing.

3.2 TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.3 ADJUSTING AND CLEANING

A. Adjust for smooth and balanced door movement.

B. Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up paint of compatible air-drying primer.

END OF SECTION

SECTION 08 11 16
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes: Architectural Aluminum Storefront Systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units.
   1. Types of Aluminum Storefront Systems include:
      a. Storefront System - 1-3/4" x 4-1/2" nominal dimension;Center, Weatherseal Glazed, Stick Fabrication – Interior System.

C. Related Sections:
   1. Section 08 80 00 Glazing
   2. Section 07 90 00 Joint Sealers
   3. Section 08 71 00 Hardware Schedule

1.2 SYSTEM DESCRIPTION

1.3 SUBMITTALS

A. General: Prepare, review, approve, and submit specified submittals in accordance with Submittals Sections. Product data, shop drawings, samples, and similar submittals are defined in “Conditions of the Contract.”

B. Quality Assurance/Control Submittals:
   1. Test Reports: Submit certified test reports showing compliance with specified performance characteristics.

1.4 WARRANTY

A. Project Warranty: Refer to “Conditions of the Contract” for project warranty provisions.

B. Manufacturer’s Product Warranty: Submit, for Owner’s acceptance, manufacturer’s warranty for entrance system as follows:
   1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by . In addition, welded door corner construction shall be supported with a limited lifetime warranty for the life of the door under normal use.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications: Installer experienced (as determined by contractor) to perform work of this section who has specialized in the installation of work similar to that required for this project and who is acceptable to product manufacturer.
   2. Manufacturer Qualifications: Manufacturer capable of providing structural calculations, applicable independent product test reports, installation instructions, a review of the application method, customer approval and periodic field service representation during construction.
   3. On access control installations, all wiring to be coordinated with a licensed electrical installer.

B. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer’s installation instructions, and manufacturer’s warranty requirements.

1.6 DELIVERY, STORAGE AND HANDLING

A. Ordering: Comply with manufacturer's ordering instructions and lead- time requirements to avoid construction delays.

B. Packing, Shipping, Handling, and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle entrance doors and components to avoid damage. Protect entrance doors against damage from elements, construction activities, and other hazards before, during and after entrance installation.

PART 2 – PRODUCTS

2.1 MANUFACTURERS (ACCEPTABLE MANUFACTURERS/PRODUCTS)

A. Acceptable Manufacturers:

1. Kawneer Company, Inc
   555 Guthridge Court,
   Technology Park/Atlanta,
   Norcross, GA 30092
   Telephone: 770 449 5555
   Fax: 770 734 1560

2. YKK AP
   229 Hwy 441 Bypass
   Dublin, GA 31021
   Phone: 478-277-1955

B. Substitutions:
   1. General: Refer to Substitutions Section for procedures and submission requirements.
      a. Pre-Contract (Bidding Period) Substitutions: Submit written requests ten (10) days prior to bid date.
      b. Post-Contract (Construction Period) Substitutions: Submit written request in order to avoid entrance door installation and construction delays.
   2. Substitution Documentation:
      a. Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
      b. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for entrance door system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum entrance doors for a period of not less than ten (10) years. (Company Name)
      c. Test Reports: Submit test reports verifying compliance with each test requirement for entrance door configurations required by the project.
      d. Product Sample and Finish: Provide samples of typical product sections and finish samples in manufacturer’s standard sizes.
   3. Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 MATERIALS

A. Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.

B. Thermal separators for door cladding shall be rigid polyvinylchloride (PVC) extrusions and VHB acrylic foam tape.

C. Provide adjustable glass jacks to help center the glass in the door opening.

2.3 ACCESSORIES

A. Fasteners: Where exposed, shall be aluminum, stainless steel or plated steel.

B. Perimeter Anchors: Aluminum. When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

2.4 RELATED MATERIALS

A. Sealants: Refer to Joint Treatment (Sealants) Section

B. Glass: Refer to Glass and Glazing Section

2.5 FABRICATION

A. Entrance System Fabrication:
1. Door corner construction shall consist of mechanical clip fastening, SIGMA deep penetration plug welds and 1-1/8" (28.6) long fillet welds inside and outside of all four corners. Glazing stops shall be hook-in type with EPDM glazing gaskets reinforced with non-stretchable cord.
2. Exposed portions of door cladding moldings shall be 3/32" (2.4) thick.
3. Aluminum cladding shall be interlocked with PVC separators and applied with VHB acrylic foam tape. There shall be no metal to metal contact, direct or indirect, between the cladding or the cladding attachments and the door structure.
4. Accurately fit and secure joints and corners. Make joints hairline in appearance.
5. Prepare components with internal reinforcement for door hardware.
6. Arrange fasteners and attachments to conceal from view.

B. General framing system:
1. Fabricate components per manufacturer's installation instructions and with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
2. Accurately fit and secure joints and corners. Make joints flush, hairline and weatherproof.
3. Prepare components to receive anchor devices. Fabricate anchors.
4. Arrange fasteners and attachments to conceal from view.

2.6 FINISHES

A. Factory Finishing:
1. Black anodized aluminum.

B. Face Sheets:
1. Aluminum with finish options above.

2.7 SOURCE QUALITY CONTROL

A. Source Quality: Provide aluminum entrances specified herein from a single source.
1. Building Enclosure System: When aluminum entrances are part of a building enclosure system, including storefront framing, windows, curtain wall system and related products, provide building enclosure system products from a single source manufacturer.

B. Fabrication Tolerances: Fabricate aluminum entrances in accordance with entrance manufacturer’s prescribed tolerances.

2.8 HARDWARE

Refer to section 08 71 00

PART 3 – EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions. Verify openings are sized to receive entrance system and sill plate is level in accordance with manufacturer's acceptable tolerances.
   1. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

3.2 INSTALLATION

A. General: Install storefront system in accordance with manufacturer's instructions and AAMA storefront and entrance guide specifications manual.
   1. Dissimilar Materials: Provide separation of aluminum materials from sources of corrosion or electrolytic action contact points.
   2. Weather Tight Construction: Install sill members and other members in a bed of sealant or with joint filler or gaskets, to provide weather tight construction. Coordinate installation with wall flashings and other components of construction.
   3. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

A. General: Install entrance system in accordance with manufacturer's instructions and AAMA storefront and entrance guide specifications manual.
   1. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
   2. Provide alignment attachments and shims to permanently fasten system to building structure.
   3. Align assembly plumb and level, free of warp and twist. Maintain assembly dimensional tolerances aligning with adjacent work.
   4. Set thresholds in bed of mastic and secure.
   5. Adjusting: Adjust operating hardware for smooth operation.

B. Related Products Installation Requirements:
   1. Sealants (Perimeter): Refer to Joint Treatment (Sealants) Section.
   2. Glass: Refer to Glass and Glazing Section.
      a. Reference: ANSI Z97.1, CPSC 16 CFR 1201 and GANA Glazing Manual.

3.3 CLEANING AND PROTECTION

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

A. Protection: Protect installed product's finish surfaces from damage during construction. Protect aluminum entrances from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants. Remove and replace damaged aluminum entrances at no extra cost.

END OF SECTION

SECTION 08 14 29
FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

B. Related Requirements:

1 Section 083473.16 "Wood Sound Control Door Assemblies" for acoustic flush wood doors.
2. Section 088000 "Glazing" for glass view panels in flush wood doors.

3. Section 134900 "Radiation Protection" for lead-lined flush wood doors.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of door. Include factory-finishing specifications.
B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.
5. Requirements for veneer matching.
6. Doors to be factory finished and finish requirements.
7. Fire-protection ratings for fire-rated doors.

C. Samples: For factory-finished doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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. ABS- American Building Supply- Doormerica.

2. Marshfield DoorSystems, Inc.
3. VT Industries Inc.

2.2 FLUSH WOOD DOORS, GENERAL

A. WDMA I.S.1-A Performance Grade:

1. Extra Heavy Duty: Classrooms, public toilets, janitor's closets, assembly spaces, exits.

2. Standard Duty: Closets (not including janitor's closets) private toilets.

B. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL 10C.

1. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.

2. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.

3. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors :

1. Grade: Premium, with Grade AA faces.

2. Species: Select white birch.

3. Cut: Rotary cut.

4. Match between Veneer Leaves: Book match.

5. Assembly of Veneer Leaves on Door Faces: Running match.
6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.

7. Core: Particleboard.
8. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.

9. Construction: Seven plies, either bonded or nonbonded construction.

2.4 LIGHT FRAMES AND LOUVERS

A. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

2.5 FABRICATION

1. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

2. Comply with NFPA 80 requirements for fire-rated doors.

3. Factory machine doors for hardware that is not surface applied.

4. Openings: Factory cut and trim openings through doors.

5. Light Openings: Trim openings with moldings of material and profile indicated.
6. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."

7. Louvers: Factory install louvers in prepared openings.

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

B. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

C. Factory finish doors that are indicated to receive transparent finish.

E. Use only paints and coatings that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

F. Transparent Finish:

1. Grade: Premium.

2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" System 5, conversion varnish.
3. Staining: As selected by Architect from manufacturer's full range.

4. Effect: Open-grain finish.

5. Sheen: Satin.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hardware: For installation, see Section 08710 "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

D. Install fire-rated doors according to NFPA 80.

F. Install smoke- and draft-control doors according to NFPA 105.

H. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

I. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.

K. Comply with NFPA 80 for fire-rated doors.

L. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

M. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

END OF SECTION 08210

SECTION 08 71 00

FINISH HARDWARE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work of this Section.

1.2 WORK INCLUDED

A. Complete sets of hardware for all new doors. New hardware shall be as manufactured SARGENT with style, type, finish, and installation heights as scheduled.

B. Butts and hinges, locks and latch sets, closers, push/pulls, trim units, kick plates, silencers, and miscellaneous items required for a complete installation.

C. Provide all items, articles, materials, operations or methods listed, mentioned or scheduled on the drawings and/or herein, including all labor, materials, equipment and incidentals necessary and required for their completion. Any item of finish hardware not specifically mentioned, but which is necessary for proper completion of the work shown on the Drawings shall be provided without additional cost to owner. Any omissions shall be called to the attention of the Architect prior to bid opening; otherwise the Drawings and Specifications will be considered complete.

D. All door hardware shall meet current Texas Accessibility Standards criteria.

1.3 RELATED SECTIONS

A. Section 01090 - Reference Standards.

B. Section 01700 - Contract Closeout.

C. Section 06400 - Architectural Millwork.

D. Section 08100 - Hollow Metal Frames.

E. Section 08213 - Wood Doors.

F. Section 08800 - Glazing.

G. Section - Electrical

1.4 REFERENCES

A. ADA - Americans with Disabilities Act, 36 CFR.

B. ANSI/NFPA 80 - Fire Doors and Windows.

C. AWI - Architectural Woodwork Institute.

D. BHMA - Builders' Hardware Manufacturers Association.

E. DHI - Door and Hardware Institute.

F. NAAMM - National Association of Architectural Metal Manufacturers.

G. NFPA 101 - Life Safety Code.

H. SDI - Steel Door Institute

I. ANSI A115.2 - Door and Frame Preparation for Bored or Cylindrical Locks for 1-3/4 inch Doors.

J. ANSI A115.9 - Door and Frame Preparation for Closer, Offset Hung, Single Acting.

K. ANSI A156.1 - Butts and Hinges.

L. ANSI A156.2 - Locks and Lock Trim.

M. ANSI A156.4 - Door Controls (Closers).

N. ANSI A156.6 - Architectural Door Trim.

O. ANSI A156.7 - Template Hinges.

1.5 COORDINATION

A. Coordinate work of this section with other sections involving manufacturer of any internal reinforcement for door hardware.

B. Hardware subcontractor shall examine the drawings and specifications to determine the extent of hardware quantities required. Should any particular door or item be omitted in any scheduled hardware group, provide such door or item with hardware similar to that required for similar conditions on the project. Locks, bolts, hinges, pulls, levers shown on the plans for non-factory manufactured cabinet and casework shall be included in the Division of Finish Hardware.

C. When new hardware is to match an existing owner’s standard, new shall match in every way so long as it does not violate Texas Accessibility Standards criteria. New door hardware shall comply with T.A.S. Contractor shall confirm what is owner’s standard prior to ordering material.

1.6 QUALITY ASSURANCE

A. Manufacturers: Companies specializing in manufacturing door hardware with minimum three year’s experience.

B. Hardware Supplier: Company specializing in supplying commercial and institutional door hardware with five year’s documented experience.

C. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of the section.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable codes for requirements applicable to fire rated doors and frames.

B. Conform to the applicable sections of Chapter 5 of NFPA 101.

C. Conform to criteria stated in the most current edition of the Texas Accessibility Standards.

1.8 SUBMITTALS

A. Submit schedule, shop drawings, and product data under provisions of Section 01300. Resubmittals will be required until complete architectural approval is obtained.

B. Indicate location and mounting heights of each type of hardware. Show required mortising and internal reinforcing of metal products.

C. Provide product data on specified hardware.

D. Submit keying diagrams to show grandmaster, master, etc. level of hierarchy.

E. Submit proposed replacement levers, finish, function, and example of new hardware that is replacing existing hardware.

1.9 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Section 01700.

B. Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

C. Lost or stolen hardware shall be the responsibility of the contractor. Replace all items lost or stolen with identical items at no cost to owner.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually; label and identify package with door opening code to match hardware schedule.

B. Protect hardware from theft by cataloging and storing in secure area.

1.11 MAINTENANCE MATERIALS

A. Provide special wrenches and tools applicable to each different or special hardware component.

B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

1.12 WARRANTY

A. Provide a written warranty per Section 01700, 1.8, on business letterhead stating that installed door components comply with TAS and/or ADA.

B. Provide warranties for all hardware furnished under this division to the general contractor for transmittal to the architect. Warranties shall be for a period of one (1) year (five [5] years for closer) from date of owner acceptance, against defects in material and workmanship of the merchandise.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Locksets and Latches: Sargent. No substitutions allowed.

B. Hinges: Hager, McKinney.

C. Closers: Sargent. No substitutions allowed.

D. Exit Devices: Sargent. No substitutions allowed.

E. Kickplates, stops, and silencers: Trimco, Rockwood. IPC, Pawling

F. Smoke seals: Pemko, Zero,

2.2 STYLE

All hardware components shall match throughout the facility in finish, style, and function.

2.3 KEYING

A. Supply two keys for each lock.

B. Coordinate keying of new cylinders with owner.

2.4 FINISHES

Finishes for new hardware are identified in the schedule at end of this section. Submit for architect's approval.

PART 3 EXECUTION

3.1 INSPECTION

A. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings.

B. Beginning of installation means acceptance of existing conditions.

C. The Owner reserves the right to request and pay for an inspection by a representative of the referenced organization to determine that the work of this Section has been performed in accordance with the specified requirements.

D. In the event such inspection determines that the work of this Section does not comply with the specified requirements, immediately remove the non-complying items and immediately replace them with items complying with the specified requirements, all at no additional cost to the Owner, and reimburse the Owner for the cost of the inspection.

3.2 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and requirements of SDI, NAAMM, AWI, ANSI/NFPA 80, BHMA, DHI, and Texas Accessibility Standards.

B. The contractor shall install all finished hardware plump, square, true and in accordance with the manufacturer's instructions, using the best practices as approved by architect. Hardware shall be fitted and operated prior to painting, then removed and painting completed before final installation. All hardware must be thoroughly cleaned, free from mars and blemishes and in perfect operating condition when turned over to the owner. Damaged or malfunctioning hardware will not be acceptable.

C. No extra costs will be allowed to facilitate proper installation of any hardware. The general contractor shall be responsible for the proper fabrication of all materials and work to receive hardware.

D. Finish hardware shall be furnished with all necessary screws, bolts, or other fastenings of suitable size use and long life and shall harmonize with the hardware as to material and finish. These fastenings shall be furnished where necessary with expansion shield, security bolts, toggle bolts or other approved anchors according to the material to which it is applied and recommended by the manufacturer. All hardware fastened to concrete shall be furnished with machine screws and lead shields. Extension flushbolts shall be edge mounted in all cases. Wrought box strikes shall be furnished where strikes are mortised into wood. Strikes shall have sufficiently extended lips where required to protect trim from being marred by latch-bolts, but no more than necessary. Strikes for pairs of doors shall have 1" lips to center. All backsets of locks and latches shall be 2-3/4" from the door edge unless otherwise indicated.

E. Hardware for fire doors shall conform to the requirements for NFPA 80 and NFPA 101. In case of conflict between the type of hardware specified in these specifications or the type required for fire protection, materials of equal quality and design required by NFPA, shall be furnished, at no additional cost to owner.

3.3 HANDICAP ACCESSIBILITY PROVISIONS

A. Door Hardware: Handles, levers, pulls, latches, locks, and other operating devices on accessible doors shall be mounted no higher than 48 inches above the floor or ground surface and shall have a shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or severe twisting to operate. The force required to activate door hardware shall be no greater than five lbf. Designs include lever-operated mechanisms, push-type mechanisms and U-shaped handles. When sliding doors are fully open, operating hardware shall be exposed and usable from both sides. Doors to hazardous areas such as loading platforms, boiler rooms, mechanical and electrical rooms, and to other areas that might be dangerous to a blind person, shall be made identifiable to the touch by a textured surface on the door handle, lever, pull or other operating hardware. This textured surface maybe made by knurling or roughening or by a material applied to the contact surface. Such textured surfaces shall not be provided for emergency exit doors or any doors other than those to hazardous areas.

B. Door Closer: If a door has a closer, then the sweep period of the closer shall be adjusted so that from an open position of 90 degrees to 12 degrees, the door will take at least five (5) seconds minimum. Fire doors are excluded from this requirement. Spring Hinges shall be adjusted to close from 70 degrees to closed position in 1.5 seconds minimum.

C. Door Opening Force: The maximum force for pushing or pulling open a door shall comply with this paragraph. For hinged doors, the force shall be applied perpendicular to the door at the door opener or 30 inches from the hinged side, whichever is farther from the hinge. For sliding or folding doors, the force shall be applied parallel to the door at the door pull or latch.

1. Exterior hinged doors shall not exceed 8.5 lbf. Slight increases in opening force shall be allowed where 8.5 lbf is insufficient to compensate for air pressure differentials.
2. Sliding doors, folding doors, and interior hinged doors shall not require a force exceeding five lbf.
3. Fire doors may be adjusted to meet the minimum opening force allowed by the governing authority or applicable building code.

D. Thresholds: The height of any floor level change plus the height of any applied threshold at doorway sills shall no exceed 1/2" and shall be beveled with a slope no greater than 1" in 2".

E. Conform to latest adopted version of the Americans with Disabilities Act and Texas Accessibility Standards criteria for positioning, operating, and opening force requirements. In case of conflict, materials of equal quality and design required by ADA or TAS shall be provided.

3.4 HARDWARE LOCATIONS

A. Adjust any of the following heights, as required to maintain the existing standards established by the owner.

B. Locks, latches: Finish floor to C/L of knobs, 41-13/16"

C. Deadlocks: Finish floor to C/L of cylinder shall be as scheduled – not to exceed 48”

D. Push/Pull Plates: Finish floor to C/L of plate shall be as scheduled, as scheduled

E. Flushbolts: C/L of bolt face to top (and bottom) edge of floor, 12"

F. Exit Devices: Per template and installation instructions; Rails shall not conflict with door lites, mounting heights shall be adjusted to center exit rail on appropriate door rail. Finish Floor to C/L of Pushrails shall be 38”.

G. Closer, O/H Holders: Per template and installation instructions.

H. Stops: To protect doors and hardware from contact with parts of the building or other conflicting doors.

I. Butt Hinges:
1. Top anchor butt - per template instructions;
2. Top butt hinge - top edge of butt leaf to rabbet, 5"minimum
3. Bottom butt hinge - bottom edge of butt leaf to finish floor, 10" maximum
4. Intermediate butt hinge - equal distant between top and bottom butts.

3.5 ADJUSTMENT AND MAINTENANCE

A. Within thirty (30) days after Owner Acceptance of the Project, the subcontractor shall meet with the Owner's maintenance foreman and thoroughly instruct him in the care and adjustment of all movable hardware furnished under this division. Provide him with a Manufacturer's Parts List for all locks, exits and closer, a Bound Care and Adjustment Manual, and an adjustment tool for each type of adjustable hardware. Included shall be a copy of an approved Hardware Schedule.

3.6 HARDWARE SCHEDULE

Hardware Set 1.1 Heavy Glass Frameless Entry

Each to receive:

4	EA	Door Patch	CRL DR4TMBL12P	PE
2	EA	Ladder Pull	CRL36LPMBL	SA
2	EA	OH Concealed Closer	CRL 21101AP20	

Electromagnetic locks
Controlled access to be provided by owner. Contractor to coordinate requirements.

Hardware Set 1.2 Heavy Glass Frameless Conference

Each to receive:

2	EA	Door Patch	CRL DR4TMBL12P	PE
1	EA	Ladder Pull	CRL36LPMBL	SA
1	EA	OH Concealed Closer	CRL 21101AP20	

Hardware Set 1.3 AL single

Each to receive:

1	EA	Continuous Hinge	KCFM83-HD1 SER8	PE
1	EA	Rim Exit Device	8888F 649 US32D	SA
1	EA	Mortise Cylinder	41 US32D	
1	EA	Surface Closer	LDP 351 CPS EN	SA

All other weather stripping and sweeps by door manufacturer

Hardware Set 2.1 Office

Each to receive:

3	EA	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2" US26D	MK
1	EA	Office/Entry Lock	8205 LW1L US26D	SA
1	EA	Wall Stop	409 US32D	RO
3	EA	Silencer	608-RKW	RO

Hardware Set 3.1 Storeroom

Each to receive:

3	EA	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2" US26D	MK
1	EA	Storeroom/Closet Lock	8204 LW1L US26D	SA
1	EA	Wall Stop	409 US32D	RO
3	EA	Silencer	608-RKW	RO

Hardware Set 4.1 Privacy

Each to receive:

3	EA	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2" US26D	MK
1	EA	Privacy Lock	8265 LW1L US26D	SA
1	EA	Surface Closer	351 UO EN	SA
1	EA	Kick Plate	K1050 10" x 34" US32D	RO
1	EA	Wall Stop	409 US32D	RO
3	EA	Silencer	608-RKW	RO

Hardware Set 5.1 Egress Single

Each to receive:

1	EA	Continuous Hinge	KCFM83-HD1 SER8	PE
1	EA	Rim Exit Device	55 56 8504 862 US32D	SA
1	EA	Mortise Cylinder	41 US32D	
1	EA	Surface Closer	LDP 351 CPS EN	SA
3	EA	Silencer	608-RKW	RO

Hardware Set 6.1 Egress Single Controlled Access

Each to receive:

1	EA	Continuous Hinge	KCFM83-HD1 SER8	PE
1	EA	Rim Exit Device	55 56 8504 862 US32D	SA
1	EA	Mortise Cylinder	41 US32D	
1	EA	Surface Closer	LDP 351 CPS EN	SA
1	EA	Threshold	2005AV 36”	PE
3	EA	Silencer	608-RKW	RO

Controlled access to be provided by owner. Contractor to coordinate requirements.

SECTION 08 80 00

GLAZING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work of this Section.

1.2 SECTION INCLUDES

A. Glass and glazing for storefront and entrance systems referencing this section for products and installation.

1.3 RELATED SECTIONS

A. Section 07900 - Joint Sealers.

B. Section 08410 - Aluminum Entrances and Storefronts.

1.4 REFERENCES

A. ANSI/ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

B. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.

C. ASTM C1036 - Flat Glass.

D. ASTM C1048 - Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.

E. FGMA - Glazing Manual.

F. FGMA - Sealant Manual.

G. FS TT-C-00598 - Caulking Compound, Oil and Resin Base Type.

H. FS TT-S-001657 - Sealing Compound, Single Component, Butyl Rubber Based, Solvent Release Type.

I. FS TT-S-00230 - Sealing Compounds, Synthetic-Rubber Base, Single Component, Chemically Curing.

J. FS TT-S-01543 - Sealing Compound, Silicone Rubber Base.

K. FS TT-G-410 - Glazing Compound, Sash (Mental) for Back Bedding and Face Glazing (Not for Channel or Stop Glazing).

L. Laminators Safety Glass Association - Standards Manual.

1.5 PERFORMANCE REQUIREMENTS

A. Glass and glazing materials of the section shall provide continuity of building enclosure vapor and air barrier:
   1. In conjunction with materials described in Section 07900.
   2. Maintain continuous air and vapor barrier throughout glazed assembly from glass pane to heel bead of glazing sealant.

B. Size glass to withstand dead loads and positive and negative live loads acting normal to plane of glass as calculated in accordance with 1985 U.B.C. in accordance with ANSI/ASTM E330.

C. Limit glass deflection to 1/200 or flexure limit of glass with full recovery of glazing materials, whichever is less.

1.6 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product data on glass types specified: Provide structural, physical and environmental characteristics, size limitations, special handling, or installation requirements.

C. Product data on glazing compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

D. Samples:
   1. Submit 2 inch long bead of glazing sealant, color as selected.
   2. Submit 12" x 12" piece of each glass indicated.

E. Manufacturer's installation instructions: Indicate special precautions required.

F. Manufacturer's certificate: Certify that glass meets or exceeds specified requirements.

1.7 QUALITY ASSURANCE

A. Perform work in accordance with FGMA Glazing Manual, FGMA Sealant Manual, SIGMA and Laminators Safety Glass Association - Standards Manual for glazing installation methods.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Do not install glazing when ambient temperature is less than 50 degrees.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.9 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on the drawings.

B. Actual site measurements are the responsibility of the contractor.

1.10 COORDINATION

A. Coordinate work under provisions of Section 01040.

B. Coordinate the work with glazing frames, wall openings, and perimeter air and vapor seal to adjacent work.

1.11 WARRANTY

A. Provide five year manufacturer's warranty under provisions of Section 01700.

B. Warranty: Include coverage for de-lamination of laminated glass and replacement of same.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Vitro Architectural Glass, Inc.

B. Ford Glass Division

C. ASG Industries

D. Substitutions: Under provisions of Section 01600

2.2 MATERIALS – GLASS

A. Exterior Glazing – MATCH EXISTING - CONTRACTOR TO

B. Interior Glass Material

G1 - non-rated – 1/2" Clear Tempered with polished edges

i. All Office and Conference room glass walls to receive privacy film equal to SOLYX Dual Feather gradient. SXJ-0548

ii. All transitional passthrough glass doors across paths of egress to receive SOLYX Distraction strips.

G2 – non-rated lite kits Tempered Glass 1/4" clear glass.

2.3 GLAZING COMPOUNDS

A. Shall conform to ASTM C669 and as required by the glazing manufacturer.

B. Butyl Sealant (Type GC-B): FS TT-S-001657; Shore A hardness of 10-20 black color; non-skinning.

C. Acrylic Sealant (Type GC-C): FS TT-S-00230, Type II, Class A; single component; cured Shore A hardness of 15-25; color as selected.

D. Polysulphide Sealant (Type GC-D): FS TT-S-00227, Glass A Type II; two component; cured Shore A hardness of 15-25; color as selected.

E. Polyurethane Sealant (Tupe GC-E): FS TT -S-00230, Type II-non-sag, Class A; as recommended by the manufacturer.

F. Silicone Sealant (Type GC-F): FS TT-S-01543, Class A; single component; chemical solvent curing; capable of water immersion without loss of properties; cured Shore A hardness of 15-25 CLEAR.

2.4 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene, 80 - 90 Shore A durometer hardness, length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) x width of glazing rabbet space minus 1/16 inch (1.5 mm) x height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 - 60 Shore A durometer hardness, minimum 3 inch (75 mm) long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.

C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 - 15 Shore A durometer hardness; coiled on release paper; black color.

D. Glazing Splines: Resilient polyvinyl chloride extruded shape to suit glazing channel retaining slot; color: black.

E. Glazing Clips: Manufacturer's standard type.

2.5 SOURCE QUALITY CONTROL AND TESTS

A. Provide testing and analysis reports of glass under provisions of Section 01400.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify prepared openings under provisions of Section 01040.

B. Verify that openings for glazing are correctly sized and within tolerance.

C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.2 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Remove all evidence of existing putty glazing from existing steel frames scheduled to be reglazed.

3.3 INSTALLATION

A. General: Comply with referenced FGMA standards and instructions of manufacturers of glass, glazing sealants, and gaskets, to achieve airtight and watertight performance, and to minimize breakage.

B. Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.

C. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.

3.4 CLEANING

A. Clean work under provisions of Section 01700.

B. Remove glazing materials from finish surfaces.

C. Remove labels after work is complete.

D. Clean glass.

3.5 PROTECTION OF FINISHED WORK

A. Protect finished work under provisions of Section 01500.

B. After installation, mark pane with an 'X' by using removable plastic tape or paste. Do not mark heat absorbing or reflective glass units.

C. Protect glass from contact with contaminating substances resulting from construction operations.

D. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.

E. Remove and replace glass which is broker, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.

END OF SECTION

SECTION 09 29 00

GYPSUM BOARD SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work of this Section.

1.2 WORK INCLUDED

A. Metal stud wall and wall furring

B. Gypsum Board

C. Taped and Sanded joint treatment

1.3 RELATED SECTIONS

A. Section 06100 – Rough Carpentry: Wood blocking for support of toilet accessories.

B. Section 08100 – Hollow Metal Frames.

C. Section 09511 – Painting: Surface Finish.

1.4 REFERENCES

A. ANSI/ASTM C36 - Gypsum Wallboard.

B. ANSI/ASTM C79 - Gypsum Sheathing Board.

C. ANSI/ASTM C475 - Joint Treatment Materials for Gypsum Wallboard Construction.

D. ANSI/ASTM C645 - Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board.

E. ANSI/ASTM C646 - Steel Drill Screws for the Application of Gypsum Sheet Material to Light Gage Steel Studs.

F. ANSI/ASTM C754 - Installation of Framing Members to Receive Screw Attached Gypsum Wallboard, Backing Board, or Water Resistant Backing Board.

G. ANSI/ASTM E119 - Fire Tests of Building Construction and Materials.

H. GA-201 - Gypsum Board for Walls and Ceilings.

I. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board.

1.5 SYSTEM DESCRIPTION

1.6 QUALITY ASSURANCE

A. Applicator: Company specializing in gypsum board systems work with three years' documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable codes for fire rated assemblies.
   1. NA

1.8 SUBMITTALS

A. Provide product data on metal framing, gypsum board, joint tape decorative finish, and accessories.

B. Submit two samples of pre-decorated gypsum board 12x12 inch in size, one illustrating a sand texture finish and one illustrating an orange peel texture. Selection will be made by the architect.

C. Submit manufacturer's installation instructions and Material Safety Data Sheets under provisions of Section 01300.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. United States Gypsum Co. - Gypsum Panels

B. Dietrich - metal stud system.

C. Other acceptable manufacturers offering equivalent products:
   1. Gold Bond Products, Inc.
   2. Redman Industries Inc.

D. Substitutions: Under provisions of Section 01600.

2.2 MATERIALS

A. Framing
   1. Studs and Tracks: ANSI/ASTM C645; galvanized sheet steel, stud width 2 1/2”, 3 5/8" and 6” as noted, interior wall framing to be 25 gauge thickness (0.0209 inches), exterior wall framing to be 18 gauge thickness (0.0478 inches), 'C' shape with return edges.
   2. Slotted Tracks: ASTM A1003, ASTM C 645; 3 5/8” and 6” width by 20 gauge thickness (0.0359 inches)
   3. Stud Bridging: ASTM C955; 1 ¼”x 1 ¼” by 16 gauge (0.0566 inches)
   4. Furring and Framing: ANSI/ASTM C645; 2 1/2”, 3 5/8" by 25 gauge (0.0209 inches).

B. Fasteners: ANSI/ASTM C1002

C. Adhesive: ANSI/ASTM C557 and as recommended by the manufacturer.

D. Gypsum Board Materials.
   1. Moisture Resistant Gypsum Board: ANSI/ASTM C36; moisture resistant, 5/8” inch thick, maximum permissible length; ends square cut, tapered edges.
   2. Fire Rated Gypsum Board: ANSI/ASTM C36; fire resistive type, UL rated; 5/8” inch thick, maximum permissible length; ends square cut, tapered edges.

2.3 ACCESSORIES

A. Corner Beads: Metal equal SLOC by United States Gypsum.

B. Edge Trim: Metal equal to No. 200-A by United States Gypsum.

C. Control Joints: Metal equal to United States Gypsum

D. Joint Materials: ANSI/ASTM C475; reinforcing tape, joint compound, adhesive and fasteners.

E. Grounds: Concealed 9 gage sheet metal or fire treated 2x wood.

F. Acoustic Batt: unfaced R 11 (3 5/8” studs) and R19 (6” studs), refer to Section 07213.

G. Corner Guards: Equal to Wallguard, 877-943-6826, Defender Series 2305, 2” wings by 48” long with top and bottom matching caps, Class A fire rating, textured vinyl cover of selected color, continuous aluminum retainer anchored to the wall. Top of guard to be 42” above finished floor.

PART 3 EXECUTION

3.1 INSPECTION

A. Verify that site conditions are ready to receive work and opening dimensions are as instructed by the manufacturer.

B. Beginning of installation means acceptance of substrate.

3.2 METAL STUD INSTALLATION

A. Install studding in accordance with ANSI/ASTM C754.

B. Metal Stud Spacing: 16 inches on center.

C. Partition Heights: To minimum 6 inches above suspended ceilings, or as noted on drawings. Install additional bracing for partitions extending above ceiling. Allowable deflection of L/240.

D. Door Opening Framing: Install double studs at door frame jambs. Install stud tracks on each side of opening, at frame head height, and between studs and adjacent studs.

E. Blocking: Nail wood blocking to studs. Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, and hardware.

F. Coordinate installation of bucks, anchors, blocking, electrical and mechanical work placed in or behind partition framing.

3.3 WALL FURRING INSTALLATION

A. Erect free-standing metal stud framing tight to masonry and plaster walls, attached by adjustable furring brackets in accordance with manufacturer's instructions.

B. Erect furring studs vertically. Secure in place at maximum 16" on center.

C. Space furring studs maximum 16 inches on center.

D. Install thermal insulation batts between studs in accordance with manufacturer's instructions.

3.4 CEILING FRAMING INSTALLATION

A. Install in accordance with GA 201 and GA 216.

B. Coordinate location of hangers with other work.

C. Install ceiling framing independent of walls, columns, and above-ceiling work.

D. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 24 inches past each end of openings.

E. Laterally brace entire suspension system.

3.5 ACOUSTICAL ACCESSORIES INSTALLATION

A. Place acoustical insulation in partitions tight within spaces, around cut openings, behind and around electrical and mechanical items with or behind partitions, and tight to items passing through partitions.

B. Install acoustical sealant at gypsum board perimeter at:
1. Metal framing: two beads.
2. Slab/Sill Track: two beads.
3. Face layer.
4. Caulk all penetrations of partitions by conduit, pipe, ductwork, rough-in boxes, and all other wall penetrations.

3.6 GYPSUM BOARD INSTALLATION

A. Install gypsum board in accordance with GA 201 and GA 216.

B. Erect single layer of gypsum board in most economical direction, with ends and edges occurring over firm bearing.

C. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.

D. Use screws when fastening gypsum board to metal furring or framing.

E. Treat cut edges and holes in gypsum sheathing with sealant, or tape.

F. Place control joints consistent with lines of building spaces as directed.

G. Place corner beads at external corners as indicated. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.

H. Install concealed grounds in wall framing where shown or required, if not shown, for mounting of surface hardware. Concealed grounds are not to be obvious when gypsum board system is finished.

3.7 PERMANENT MARKING AND IDENTIFICATION OF FIRE WALLS

A. Permanently identify with red stenciled 3-inch high lettering all fire rated walls. Identification to be located on the fire-rated wall/partition above ceilings and at exposed areas (such as Mechanical

and Electrical Equipment Rooms), on 10-foot intervals and as high as possible and still visible from the finished floor and include the wording “FIRE WALL”. Areas of fire-rated walls/partitions exposed to viewing by the public shall be exempt from stenciling.

3.8 JOINT TREATMENT

A. Tape, fill, and sand exposed joints, edges, and corners to produce a LEVEL 5 finish surface ready to receive finishes.

B. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.

C. Erect pre-decorated gypsum board vertically, with exposed batten fastening system.

D. Erect in accordance with manufacturer's instructions.

E. Install No. 093 control joints in the interior face of gypsum board partitions opposite all exterior expansion joints. Install control joints at other locations as directed.

3.9 TOLERANCES

A. Maximum Variation from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 30 13

TILE FINISHES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work of this Section.

1.2 REFERENCES

A. The latest editions of the following specifications and references govern the work in this section and constitute minimum requirements. Where specific requirements of this section are more stringent, they shall supersede the corresponding requirements of these reference specifications.

1. American National Standards Institute, Inc. (ANSI) Standards:
   a. A108.1-1985 Installation of Glazed Wall Tile, Ceramic Mosaic Tile, Quarry Tile and Paver Tile with Portland Cement Mortar.
   b. A108.4-1985 Installation of Ceramic Tile with Water-Resistant Organic Adhesives.
   c. A108.5-1985 Installation of Ceramic Tile with Dry-Set Portland Cement Mortar of Latex-Portland Cement Mortar.
   d. A118.1-1985 Dry-Set Portland Cement Mortar.
   e. A118.4-1985 Latex-Portland Cement Mortar.
   f. A118.6-1985 Ceramic Tile Grouts.
   g. A136.1-1985 (R1972) Organic Adhesives for Installation of Ceramic Tile.
2. American Society for Testing and Materials (ASTM) Publications:
   a. A 185-85 Steel Welded Wire Fabric, Plain for Concrete Reinforcement.
   b. C 144-84 Aggregate for Masonry.
   c. C 150-84 Portland Cement.
   d. C 206-84 Finishing Hydrated Lime.
   e. C 207-79 (R1984) Hydrated Lime for Masonry Purposes.
   f. C 395-85 Chemical-Resistant Resin Mortars.
3. Tile Council of America, Inc. (TCA):
4. TCA 137.1 Recommended Standard Specifications for Ceramic Tile. Handbook for Ceramic Tile Installation

1.3 DESCRIPTION OF WORK

A. This section includes ceramic surfacing units made from clay or other ceramic materials. The types of work of this section include:

1. Glass Mosaic Tile.
2. Schluter trims.
3. Glazed Wall Tile.
4. Floor tile

1.4 QUALITY ASSURANCE

A. Tile Manufacturing Standard: TCA 137.1. Furnish tile complying with standard grade requirements unless indicated otherwise.

B. Proprietary Materials: Handle, store, mix and apply proprietary setting and grouting materials in compliance with manufacturer's instructions.

C. Provide materials obtained from one source for each type and color of tile, grout, and setting materials.

1.5 SUBMITTALS

A. Submit manufacturer's color charts consisting of actual tiles or sections of tiles showing full range of colors available, for each tile specified. Include samples of grout and accessories requiring color selection.

B. Furnish the manufacturer's signed Master Grade Certificates for each type of tile specified.

1.6 HANDLING

A. Deliver packaged materials and store in original containers with seals unbroken and labels intact until time of use, in accordance with manufacturer's instructions.

1.7 JOB CONDITIONS

A. Maintain environmental conditions and protect work during and after installation in accordance with referenced standards and manufacturer's printed recommendations.

PART 2 PRODUCTS

2.1 MATERIALS

A. Tile 1 Tile Products:
   1. Field Glazed Wall Tile: Tile Bar Curved Fluted - Alternating 6 " x 12 " RED/Gloss.
   2. Install running bond 1/3 offset
   3. Trim and Special Shapes: Rounded external corners and trim shapes at head, jamb and sills of openings, of same material and finish as field tile and as follows:
      a. Base: Schluter Dilex-AHK
      b. External Corners: Schluter Jolly
      c. Internal Corners: Schluter Dilex-AHK
   4. Grout Mapei – 5105 Driftwood

B. Mortar and Grout:
   1. Portland Cement Mortar and Grout: ANSI A 108.1.
      a. Provide reinforcing wire fabric.
      b. Color pigment: Mineral oxides, unaffected by lime, cement or weathering. Use when required to produce selected grout color.
   2. Dry-Set Mortar: Factory-sanded portland cement and additives; ANSI A 118.1. Use only the type of dry-set mortar to set types of tile for which they are labeled.
   3. Latex-Portland Cement Mortar: Latex modified portland cement dry-set mortar; ANSI 118.4.
   4. Organic Adhesive: ANSI A 136.1; of proper type for intended use with respect to moisture resistance, tile material and backing as certified by adhesive manufacturer.
      a. Provide Primer-sealer where recommended by manufacturer.
   5. Dry-Set Grout: Proprietary compound composed of portland cement and additives formulated for the type of tile installed. Color as selected by architect from manufacturer's standard.
   6. Latex-Portland Cement Grout: Proprietary compound composed of portland cement with latex additive for a more flexible and less permeable grout.

a. Wall Grout: Custom Building Products poly blend non-sanded grout - color to be selected by architect from manufacturer's full range of colors.
b. Floor Grout: Custom Building Products poly blend non-sanded grout – color to be selected by architect from manufacturer's full range of colors.

7. Provide product with latex additive which is compatible with latex additive in latex-portland cement mortar.

C. Extra Materials:
1. Provide one unopened carton of each tile used on the project. Clearly identify on the carton the tile type, color, size, building in which it was installed, and name and number of room installed.
2. Deliver extra cartons to project site for verification. Owner will store cartons at their preference.

PART 3 EXECUTION

3.1 INSTALLATION

A. Tile Installation Standards:
1. ANSI Standards: Comply with applicable requirements of the following, except as otherwise indicated.
a. ANSI A108.1: ANSI 108.4 or ANSI 108.5, as applicable.
2. Comply with manufacturer's instructions for mixing and installation of proprietary materials.
3. Extend tile work into recesses under or behind equipment and fixtures to form a complete covering without interruptions, except as otherwise shown. Terminate work neatly at obstruction, edges and corners without disruption pattern or joint alignment.
4. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.

B. Placement Methods:
1. Thin-set Installations: Dry-set portland cement mortar, latex-portland cement mortar, or organic adhesive, to suit substrate.
2. Submit for review and approval a water resistant adhesive for all floor tile installations. Adhesive is to form a continuous waterproof coating under the floor tile and behind the base tile. Stop coating at the top of the base tile.

C. Jointing Pattern:
1. Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are same size. Layout tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise shown.
2. Neatly place tiles uniformly spaced around floor drains, wall hydrants, or other finished items that do not include cover plates to conceal uneven edges or spacing.

D. Expansion and Control Joints:
1. Provide openings for joints where shown and to comply with details, or if not shown and detailed, to comply with recommendations in TCA "Handbook for Ceramic Tile Installation." Sealant work is specified in Section 07900.
2. All vertical wall intersections shall have a continuous bead of water and mildew resistant sealant from floor to ceiling. The sealant color shall match that of the grout.

E. Thresholds:
1. Use Schluter transitions as requred.

2. Install sealant between bullnose ceramic tile and adjacent floor finish, except carpeting.

F. Grout:
1. 11.7.1 Use dry-set grout or latex-portland cement grout as recommended.

3.2 CLEANING

A. Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

B. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but not sooner than 14 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.

C. Leave finished installation clean and free of cracked, shipped, broken, unbonded, or otherwise defective tile work.

D. When recommended by tile manufacturer, apply protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent damage and wear.

E. Prohibit foot and wheel traffic from using tiled floors for at least three days after grouting is completed.

F. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION

SECTION 09 51 00

SUSPENDED ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work of this Section.

1.2 GENERAL NOTES

A. This contractor shall furnish all labor and materials necessary to complete all acoustical ceiling work as shown on the drawings or as specified herein. This contractor shall be responsible for the furnishing and installation of all accessories required for the completion of the work.

B. See reflected ceiling plan for locations of electrical and mechanical items related to the acoustical ceilings. Cooperate with electrical and mechanical contractors to insure a first class appearance in the completed work.

1.3 RELATED SECTION

A. Section 01700 - Contract Closeout

1.4 COOPERATION

A. This contractor shall consult and cooperate with trades whose work precedes and follows ceiling installation to permit orderly procedure in executing work under this contract. Installation of tile shall not start until foundation work to receive the tile has been obtained to proceed. The contractor shall give the architect advance notices for such operations.

B. The contractor shall inspect personally all surfaces to receive material and shall report to the architect any defects or conditions which would affect his installation.

1.5 WARRANTY

A. This contractor shall furnish a written warranty that the work under this division shall be free from defects of materials and workmanship for a period of two years from the date of final acceptance of his work, and all other work damaged thereby, which becomes defective during the term of the warranty.

B. The following shall be judged as defective work: loosening, buckling, undue shrinkage, warping, cracking, settling, chipping, spotting, and loss of acoustical properties of material.

1.6 SUBMITTAL

A. Submit to the architect for approval four sets of manufacturer's literature describing the ceiling boards and suspension system proposed for the project.

PART 2 PRODUCT

2.1 MATERIALS

A. Type I - Ceiling board shall be 24 x 24 x 5/8 inches, beveled tegular, with an NRC of 0.55, Class A rating, and a white color coating.
1. Armstrong ULTIMA, HIGH NRC 15/16” BEVELED TEGULAR 2081

B. Exposed suspension system shall be equal to Prelude and white enameled steel. Main beams shall be generally spaced at 24 inches on center. Use 24 inch cross tees and 24 inch sub cross tees. Wall angle shall be white enameled steel. Provide an intermediate-duty classification.

C. 6” Axiom Edge Trim where indicated on the drawings. Color White

PART 3 EXECUTION

3.1 EXPOSED SUSPENSION SYSTEM

A. The contractor shall employ workmen who are experienced in the erection of the types of ceilings specified and shall maintain competent supervision of the work at all times.

B. Erect runner level and true to the elevation shown on the drawings. Start channels a minimum of 1 foot from walls, and space 2 feet on center thereafter. Where splices occur in channels, use special splice bars as furnished with system specified.

C. Lay out ceiling work symmetrically in the various rooms with no less than one-half tile at the walls. Cut tile accurately around electrical outlets.

D. Upon completion of the work, all tile shall be cleaned and left free form defects of any kind.

E. In general, lighting fixtures of fluorescent type shall be suspended directly on the runner bars. Where fixture centers between two runner bars, both shall be main runner bars. See reflected ceiling plans for fixture locations.

F. Install perimeter ceiling angle tight to wall partition, free from curves, breaks, and other irregularities. Fill any gaps at wall angle and wall partition intersection with caulk.

3.2 HANGERS

A. Hanger wires shall be #12 soft annealed wire. Hanger wires shall be plumb and taut in the completed work. Slanting of hanger wires will not be permitted unless an equal and opposite hanger wire is installed to offset the thrust of the original wire hanger. This may be done only with the expressed permission of the architect.

B. Where hanger wires occur directly under ductwork or other overhead obstructions, provide a trapeze of 1-1/2 inch channel iron. Install regular hanger wire at proper location along the length of trapeze.

C. The use of bridging angles spanning between bar joists is expressly forbidden for attachment of hanger wires for supporting ceiling suspension systems.

D. Hanger wires shall be attached to the bottom chords of bar joists or to special scissor clips attached to steel sub-purlins supporting the roof deck.

E. Where acoustical board ceilings occur below concrete structural members provide power driven studs with eyes into vertical face of concrete joists.

3.3 INSTALLATION OF TILES

A. Step 1: Contractor shall only install ceiling tiles in which a building system is anchored to or through the tile in order to complete the installation of the building system.
   1. Such building systems include, but not limited to fire sprinkler heads, fire/smoke detectors, audio equipment and cameras.
   2. Once Step 1 is complete and systems are operational, the contractor shall schedule a pre-final building system walk through with the architect.
   3. Do not install ceiling tiles that do not support a building system component, building systems are to be visible via omitted ceiling tile openings.

B. Step 2: After pre-final walk through and all corrective work is completed, install balance of ceiling tiles.
   1. Complete ceiling system is to be installed prior to final project walk through.

3.4 EXTRA TILE

A. Upon completion of the work furnish to the owner one unopened carton of each type of acoustical board installed in the project.

END OF SECTION

SECTION 09 54 26
SUSPENDED WOOD CEILINGS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.2 SUMMARY

A. Section Includes

1. Wood ceilings
2. Exposed grid suspension system
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings
4. Perimeter Trim

B. Related Sections

1. Section 09 51 00 - Acoustical Ceiling Suspension Assemblies
2. Section 09 29 00 – Gypsum Board Systems
3. Division 23 (15) - HVAC Air Distribution
4. Division 26 (16) – Electrical Work

C. ALTERNATES

1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products that have not been pre-approved by the architect and included in the Addenda, the originally specified products shall be provided without additional compensation.
2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):
    1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
    2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
    3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
    4. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
    5. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
    6. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
    7. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
    8. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
    9. ASTM E 1264 Classification for Acoustical Ceiling Products
B. International Building Code
C. ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality
D. NFPA 70 National Electrical Code
E. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures
F. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components
G. International Code Council-Evaluation Services Report - Seismic Engineer Report
    1. ESR 1308 - Armstrong Suspension Systems
H. California Air Resource Board (CARB) compliant
I. LEED - Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings
J. Clean Rooms up to ISO Class 5 (Class 100)

1.4 SUBMITTALS

A. Shop Drawings: Layout and details of ceilings. Show locations of items that are to be coordinated with or supported by the ceilings.
B. Installation Instructions: Submit manufacturer’s installation instructions as referenced in Part three, Installation.
C. Product Data: Submit manufacturer’s technical data for each type of ceiling unit and suspension system required.

D. Samples: Solid Wood (Poplar) Finishes – Clear or tinted semi-gloss, except White (GWH), which has a lacquer finish

E. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

F. Non-Conformance: All products not conforming to the requirements of this specification and or the manufacturer's published values are to be disposed. The Contractor performing the work will replace with approved product at their expense.

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer to ensure fit and function.

B. Installer Qualifications: Company specializing in performing specified work type, a minimum of three years of documented experience, and approved by the manufacturer.

C. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

D. Surface Burning Characteristics: Tested per ASTM E 84 and complying with ASTM E 1264 Classification.

E. HPVA (Hardwood Plywood and Veneer Association) certification and audit program per ASTM E-84 tunnel test.

F. Woodworking Standards: Manufacturer must comply with specified provisions of Architectural Woodworking Institute quality standards.

G. Coordination of Work: Coordinate ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store ceiling components in a dry interior location in their cartons prior to installation to avoid damage. Store cartons in a flat, horizontal position. The protectors between the panels should not be removed until installation.

B. Do not store in unconditioned spaces with humidity greater than 55 percent or lower than 25 percent relative humidity and temperatures lower than 50 degrees F or greater than 86 degrees F. Panels must not be exposed to extreme temperatures, for example, close to a heating source or near a window with direct sunlight.

C. Handle ceiling units carefully to avoid chipped edges or damage to units in any way.

1.7 PROJECT CONDITIONS

A. Wood ceiling materials should be permitted to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation. (Remove plastic wrap to allow panels to climatize).

B. The wood panels should not be installed in spaces where the temperature or humidity conditions vary from the temperatures and conditions that will be normal in the occupied space.

C. As interior finish products, the solid wood panels are designed for installation in temperature conditions between 50 degrees F and 86 degrees F, in spaces where the building is enclosed, and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.

1.8 WARRANTY

A. Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to:

1. Ceiling: Defects in materials or factory workmanship.
2. Grid System: Rusting and manufacturing defects.

B. Warranty Period:

1. Ceiling: One (1) year from date of installation.
2. Grid: Ten years from date of installation.

C. The Warranty shall not deprive the owner of other rights the owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.9 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Ceiling Units: Furnish quality of full-size units equal to 2.0 percent of amount installed.
2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 1.0 percent of amount installed.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Ceiling Panels:

1. Armstrong World Industries, Inc.

B. Suspension Systems:

1. Armstrong World Industries, Inc.

2.2 ACOUSTICAL WOOD CEILINGS / SUSPENDED WOOD CEILINGS

A. Suspended Wood Ceilings

1. Surface Texture: Smooth
2. Composition: Solid Wood (Poplar)

3. Finish: Clear or Tinted, UV Cured Topcoat Finishes on Solid Wood (Poplar) – All Finishes are part of Sustain Portfolio except for the painted white finish (GWH)
    i. As selected by architect from manufacturers full line
4. Dimensions:
    i. Panel Width: 12”
    ii. Panel Length:96”
    iii. Slat Width: 5/8”
    iv. Slat Height: 1 3/8”
    v. Slats per panel: 9
    vi. Space between slats 7/8”
    vii. Edge: Backer
5. Acoustical Performance Infill Options:
    i. BioAcoustic Infill Panel - Item 5823
        - NRC 0.70
6. Flame Spread: ASTM E 1264; Class C
7. Basis of Design: WOODWORKS Grille- Classics as manufactured by Armstrong World Industries, Inc.
8. Ceiling Accessories:
    i. Junction 1-3/8”- Item 5672 Finish to be selected upon submittal
    ii. End Cap 1-3/8”- Item 5674 Finish to be selected upon submittal
    iii. Backer Clip- Item 5687
    iv. WoodWorks Grille Solid End-stain- Gallon- Finish to be selected upon submittal
    v. WoodWorks grille Solid End-Stain Quart- Finish to be selected upon submittal
    vi. Substitutions: Refer to Alternates in Part 1.

2.3 METAL SUSPENSION SYSTEMS

A. Components: Main beams and cross tees, base metal and end detail, fabricated from commercial quality hot dipped galvanized steel complying with ASTM A 653. Main beams and cross tees are double-web steel construction exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.
    1. Structural Classification: ASTM C 635 Heavy Duty.
    2. Basis of Design:
        i. Prelude XL 15/16" Exposed Tee 12’ Main beam - item 7301BL as manufactured by Armstrong World Industries, Inc.
        ii. Prelude XL Exposed Tee 4’ Cross Tee - item XL7341BL as manufactured by Armstrong World Industries, Inc.

iii. Prelude XL Exposed Tee 2’ Cross Tee - item XL8320BL as manufactured by Armstrong World Industries, Inc.

3. Substitutions: Refer to Alternates in Part 1.

B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

C. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft annealed, with a yield stress load of at least time three design load, but not less than 12 gauge.

D. Suspension System Accessories, Edge Moldings and Trim as manufactured by Armstrong World Industries, Inc.

1. Dowel Clip- Item 5688
2. Ledger- Item 5671 Finish to be selected upon submittal
3. 12-Gauge Solt Hanger Wire- Item 7891
4. Uptight Clip- Item 6459BL
5. RC2 Radius Clip- Item RC2BL
6. Adjustable Trim Clip- Item 7239

PART 3 – EXECUTION

3.1 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out.

B. Proper designs for both supply air and return air, maintenance of the HVAC filters and building interior space are essential to minimize soiling. Before starting the HVAC system, make sure supply air is properly filtered and the building interior is free of construction dust.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

B. WoodWorks ceiling materials should be permitted to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation. (Remove plastic wrap to allow panels to climatize).

3.3 INSTALLATION

A. Interior WoodWorks products, the solid wood panels are designed for installation in temperature conditions between 50 degrees F and 86 degrees F, in spaces where the building is enclosed, and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.
B. Install suspension system and panels in compliance with ASTM C636, ASTM E580, with the approval of the authorities having jurisdiction, and in accordance with the manufacturer’s Installation Instructions.

3.4 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.
B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.

END OF SECTION

SECTION 09 54 46

LINEAR ACOUSTICAL PANELS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.2 SUMMARY

A. Section Includes:
   1. Non-Woven layered and formed Polyester felt fiber ceiling panels
   2. Wire hangers, fasteners, main runners, cross tees, wall angle moldings and accessories.

B. Alternates
   1. Prior Approval: Unless otherwise provided for in the Contract documents, submit proposed product substitutions no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review and acceptance. Approved products will be set forth by the Addenda. If a substitution is included in a Bid and is not approved by an Addendum, the specified products shall be provided as in place of the substitute without additional compensation.
   2. Submittals, which do not provide adequate data for the product evaluation, will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); panel design, size, composition, color, and finish; suspension system component profiles and sizes; compliance with the referenced standards.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
   2. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
   3. ASTM E580 Application of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Requiring Seismic Restraint.
   4. ASTM C423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
   5. ASTM E795 Standard Practices for Mounting Test Specimens During Sound Absorption Tests
   6. International Building Code
   7. ASHRAE Standard 62 1 2004 Ventilation for Acceptable Indoor Air Quality

8. California Department of Public Health CDPH/EHLB Emission Standard Method Version 1.2 2017
9. California Green Building Standards Code Cal Green Title 24
10. NFPA 70 National Electrical Code
11. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures
12. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components
13. LEED - Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings
14. Underwriters Laboratories Green Guard
15. International Living Building Challenge

1.4 SUBMITTALS

A. Shop Drawings: Provide layout including panel type and components used in the assembly of the ceiling. Show locations of items that are to be coordinated with the ceiling.
B. Installation Instructions: Submit manufacturer's installation instructions as referenced in Part three, Installation.
C. Samples: Minimum 6 inch x 6 inch sample of the colors selected in the ceiling design, include manufacturer sample of suspension components.
D. Product Data: Submit manufacturer's technical data for each type of ceiling unit and suspension system required.
E. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.
F. Non-Conformance: All products not conforming to the requirements of this specification and or the manufacturer's published values are to be disposed. The Contractor performing the work will replace with approved product at their expense.

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide ceiling panel units and suspension components by a single manufacturer.
B. Fire Performance Characteristics: Identify ceiling components with appropriate markings of applicable testing and inspecting organization.
    1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with Class A products.
        i. Flame Spread: 25 or less
        ii. Smoke Developed: 450 or less
C. Fire Sprinklers: Ceiling systems may obstruct or Skew the planned water distribution pattern of fire sprinkler. In addition to creating a possible delaying or accelerating the activation of the sprinkler of fire detection system. Consult with a fire protection engineer for guidance.

D. Coordination of Work: Coordinate ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
C. White gloves recommended for handling to avoid marring, especially on light color panels.

1.7 PROJECT CONDITIONS

A. Space Enclosure:

1. HumiGuard Plus Ceilings: Building areas to receive ceilings shall be free of construction dust and debris. Products with HumiGuard Plus performance and hot dipped galvanized steel suspension systems can be installed up to 120°F (49°C) and in spaces before the building is enclosed, where HVAC systems are cycled or not operating. Cannot be used in exterior applications where standing water is present or where moisture will come in direct contact with the ceiling.

1.8 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period.
B. Warranty Period:

1. Acoustical panels and Suspension: One (1) year from date of substantial completion

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.9 SUSTAINABLE MATERIALS

A. The GREENGUARD Certification Program gives assurance that products designed for use in indoor spaces meet strict chemical emissions limits, which contribute to the creation of healthier interiors. GREENGUARD Certified products meet stringent chemical emissions requirements, such as being screened for more than 10,000 volatile organic compounds (VOCs).
B. Health Product Declaration. The end use product has a published, complete Health Product Declaration with disclosure at a minimum of 1000ppm of known hazards in compliance with the Health Product Declaration open Standard.
C. Declare Label. The end use product has a published Declare label by the International Living Future Institute with disclosure of 100 ppm with a designation of Red List Free or Compliant (less than 1% proprietary ingredients).
D. Low Emitting products with VOC emissions data. Preference will also be given to manufacturers that can provide emissions data showing their products meet CDHP Standard Method v1.2 (Section 01350).

E. Life cycle analysis. Products that have communicated lifecycle data through Environmental Product Declarations (EPDs) will be preferred.
F. Products meeting LEED V4 requirements.

1.10 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
    1. Ceiling Units: Furnish quality of full-size units equal to 2.0 percent of amount installed.
    2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 1.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design FELTWORKS EBBS and FLOWS Blades:
    1. Armstrong World Industries, Inc.
B. Suspension Systems:
    1. Armstrong World Industries, Inc.

2.2.0 CEILING UNITS

A. Ceiling Panel:
    1. Surface Texture: Soft
    2. Composition: Non-woven layered and formed Polyester felt (PET) fiber
    3. Color: Wheat (FWT)
    4. Edge Profile: Square
    5. Light Reflectance (LR) Cotton Panel: ASTM E 1477; 0.80
    6. Material Ingredient Transparency: Health Product Declaration (HPD); Declare Label
    7. Green Guard Gold Certified
    8. Sizes
        i. Blades Rectangular Vertical Hook Custom Blades Available
            1. Length 96”
            2. Depth VARIES
    9. Pattern: Ebbs & Flows Pattern 1 4” blade spacing
    10. Acoustical Performance is tested per ASTM C423 and mounted in accordance with ASTM E795. NRC of 0.70 based on 8” blades mounted at 4” on center – coordinate with light fixture width of 3 ½”.
    11. Flame Spread: Class A
    12. Dimensional Stability: HumiGuard Plus.
    13. Acceptable Product: FELTWORKS Ebbs and Flow Blades as manufactured by Armstrong World Industries.

2.2.1 SUSPENSION SYSTEMS

A. Armstrong Aluminum Suspension System:
    1. Acceptable Product: Listed Below as manufactured by Armstrong World Industries, Inc. Items are available in custom colors; contact ASQuote@armstrongceilings.com.
        i. Item 8230 – 96” Suspension Bar for 3/8” FeltWorks Blades connector holes on both ends
        ii. Item 6651AB - 96” Suspension Bar End-to-End Connectors
        iii. Item 6655 – Blades Hanging Kit – Each kit includes 4 hanging assemblies, use on kit for each suspension

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out.
B. Proper designs for both supply air and return air, maintenance of the HVAC filters and building interior space are essential to minimize soiling. Before starting the HVAC system, make sure supply air is properly filtered and the building interior is free of construction dust.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

3.3 INSTALLATION

A. Install suspension system and blades in compliance with the approval of the authorities having jurisdiction, and in accordance with the manufacturer’s FELTWORKS Blades Installation Instructions.

3.4 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.
B. Clean exposed surfaces of ceilings panels, including trim, edge moldings, and suspension members. Comply with manufacturer’s instructions for cleaning and touch up of minor finish damage.

END OF SECTION

SECTION 09 65 13
RESILIENT BASE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Resilient base
   2. Vinyl stair treads

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

C. Samples: Full-size units of each color and pattern of floor tile required.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive products.
B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.
C. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore Standard.

B. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
C. Resilient Base Standard: ASTM F 1861.
   1. Material Requirements:
      a. Type TV (vinyl, thermoplastic).
         1) Manufacturing Method: Group I (solid, homogeneous).
         2) Style: Cove (base with toe).Minimum Thickness: 0.080 inch (2.0 mm).

3) Height: 4 inches (102 mm).
4) Lengths: Coils in manufacturer's standard length.
5) Outside Corners: Preformed.
6) Inside Corners: Job formed or preformed.
7) Finish: As selected by architect from manufacturer’s full range
8) Colors and Patterns: As selected by architect from manufacturer’s full range of industry colors

D. BASE TYPES
1. RB1: 4" Rubber base 281 - JOHNSONITE VINYL WALL BASE | COLOR : GRIZZLY
2. RB2: 4” Rubber Base TG1 – JOHSONITE VINYL Wall BASE | COLOR: SNOWBOUND

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.

2.3 PREPARATION

A. prepare substrate according to manufacturer’s written instructions to ensure adhesion of resilient products.
B. Concrete Substrates: Prepare according to ASTM F 710.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture Testing: Perform tests recommended by floor covering manufacturer. Proceed with installation only after substrates pass testing.
a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
C. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

2.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of product.

END OF SECTION

SECTION 09 65 19.23
RESILIENT TILE FLOORING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Flooring and accessories as shown on the drawings and schedules and as indicated by the requirements of this section.
B. Related Documents
   1. Drawings and General Provisions of the Contract (including General and Supplementary Conditions and Division 1 sections) apply to the work of this section.

1.02 REFERENCES

A. Manufacturer's Flooring Technical Manuals
   1. Installation Systems manual,
   2. Maintenance Recommendations and Procedures, manual,
B. ASTM International:
   1. ASTM E 648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
   2. ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
   3. ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
   4. ASTM F 1482, Standard Guide to Wood Underlayment Products Available for Use Under Resilient Flooring
   5. ASTM F 1700 Standard Specification for Solid Vinyl Tile
   6. ASTM F 1861 Standard Specification for Resilient Wall Base
   7. ASTM F 1869 Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
   8. ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
C. National Fire Protection Association (NFPA):
   1. NFPA 253 Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
   2. NFPA 258 Standard Test Method for Measuring the Smoke Generated by Solid Materials
D. Standards Council of Canada

1. CAN/ULC-S102.2 Standard Test Method for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies

1.03 SYSTEM DESCRIPTION

A. Performance Requirements: Provide flooring which has been manufactured, fabricated and installed to performance criteria certified by manufacturer without defects, damage, or failure.
B. Administrative Requirements
    1. Pre-installation Meeting: Conduct an on-site pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section.

C. Test Installations/ Mock-ups: Install at the project site a job mock-up using acceptable products and manufacturer approved installation methods, including concrete substrate testing. Obtain Owner's and Consultant's acceptance of finish color, texture and pattern, and workmanship standards.
    1. Mock-Up Size: 18" x 18"
    2. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
    3. Incorporation: Mock-up may be incorporated into the final construction with Owner's approval.

D. Sequencing and Scheduling
    1. Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring.
    2. Do not install flooring over concrete slabs until they are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond, moisture tests and pH test.

1.04 SUBMITTALS

A. Submit shop drawings, seaming plan, coving details, and manufacturer's technical data, installation and maintenance instructions for flooring and accessories.
B. Submit the manufacturer's standard samples showing the required colors for flooring and applicable accessories.
C. Submit Safety Data Sheets (SDS) available for adhesives, moisture mitigation systems, primers, patching/leveling compounds, floor finishes (polishes) and cleaning agents and Material Information Sheets for flooring products.
D. If required, submit the manufacturer's certification that the flooring has been tested by an independent laboratory and complies with the required fire tests.
E. Closeout Submittals: Submit the following:
    1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.
    2. Warranty: Warranty documents specified herein

1.05 QUALITY ASSURANCE

A. Single-Source Responsibility: provide types of flooring and accessories supplied by one manufacturer, including moisture mitigation systems, primers, leveling and patching compounds, and adhesives.
B. Select an installer who is experienced and competent in the installation of resilient solid vinyl tile flooring and the use of Flooring subfloor preparation products.
    1. Engage installers certified as Commercial Flooring Certified Installers
    2. Confirm installer's certification by requesting their credentials

C. Fire Performance Characteristics: Provide resilient tile flooring with the following fire performance characteristics as determined by testing material in accordance with ASTM test methods indicated below by a certified testing laboratory or other testing agency acceptable to authorities having jurisdiction:
    1. ASTM E 648 (NFPA 253) Critical Radiant Flux of 0.45 watts per sq. cm. or greater, Class I
    2. ASTM E 662 (NFPA 258) (Smoke Generation) Maximum Specific Optical Density of 450 or less
    3. CAN/ULC-S102.2 – Flame Spread Rating and Smoke Developed – Results as tested

1.06 DELIVERY, STORAGE AND HANDLING

A. Comply with Division 1 Product Requirements Sections
B. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
C. Deliver materials in good condition to the jobsite in the manufacturer's original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.
D. Store materials in a clean, dry, enclosed space off the ground, protected from harmful weather conditions and at temperature and humidity conditions recommended by the manufacturer. Protect adhesives from freezing. Store flooring, adhesives and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.

1.07 PROJECT CONDITIONS

A. Maintain a minimum temperature in the spaces to receive the flooring and accessories of 65ºF (18ºC) and a maximum temperature of [100ºF (38ºC)][85ºF (29ºC)] for at least 48 hours before, during, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55ºF (13ºC) in areas where work is completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances.

1.08 LIMITED WARRANTY

A. Resilient Flooring: Submit a written warranty executed by the manufacturer, agreeing to repair or replace resilient flooring that fails within the warranty period.
B. Limited Warranty Period: 20 years for Natural Creations with Diamond 10 Technology.
C. The Limited Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.
D. For the Limited Warranty to be valid, this product is required to be installed using the appropriate Flooring Guaranteed Installation System. Product installed not using the specific instructions from the Guaranteed Installation System will void the warranty.

1.09 EXTENDED SYSTEM LIMITED WARRANTY

A. Resilient Flooring System: Submit a written warranty executed by the manufacturer, agreeing to repair or replace system (subfloor preparation products, adhesive, and floor covering) that fails within the warranty period.
B. Limited Warranty Period: 10 years on top of the Resilient Flooring Limited Warranty
C. Levelling compound as recommended by manufacturer.

D. The installation of an Flooring product along with the recommended Flooring adhesive, as well as any one of the Strong System subfloor preparation products listed above, provides 10 additional years of limited warranty coverage. The Strong System limited warranty covers the installation integrity for the length of the flooring product warranty plus 10 years. In order to qualify for the Strong System Warranty, any subfloor preparation product needed for an installation must be an Flooring product.
E. For the System Limited Warranty to be valid, this product is required to be installed using the appropriate Flooring Guaranteed Installation System. Product installed not using the specific instructions from the Guaranteed Installation System will void the warranty.

F. When Flooring Strong System subfloor preparation products are used with other manufacturers' floor coverings, adhesives, or other subfloor preparation products, Flooring warrants our products to be free from manufacturing defects from the date of purchase through the limited warranty period of 15 years.

1.10 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials from same production run as products installed. Packaged with protective covering for storage and identified with appropriate labels.
    1. Quantity: Furnish quantity of flooring units equal to 5% of amount installed.
    2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra material.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Resilient tile flooring, wall base, adhesives and subfloor preparation products and accessories:

1. PATCRAFT PATCRAFT –
    Po Box 2128
    Dalton, GA 30722-2128
    800.241.4014
    www.patcraft.com

2.02 RESILIENT TILE FLOORING MATERIALS

1. Refer to finish schedule on the drawings for line information, tile size, pattern and color.

2.03 PRODUCT SUBSTITUTION

A. Substitutions: No substitutions permitted because of the specific attributes listed in Section 2.02.

2.05 ADHESIVES

A. Provide Flooring Adhesive under the flooring and Adhesive at the wall base as recommended by the flooring manufacturer.

2.06 ACCESSORIES

A. Patch and level existing concrete sub-floors as required for even installation.
B. For sealing joints between the top of wall base or integral cove cap and irregular wall surfaces such as masonry, provide plastic filler applied according to the manufacturer's recommendations.
C. Provide transition/reducing strips tapered to meet abutting materials.
D. Provide threshold of thickness and width as shown on the drawings.

E. Provide resilient edge strips of width shown on the drawings, of equal gauge to the flooring, homogeneous vinyl or rubber composition, tapered or bullnose edge, with color to match or contrast with the flooring, or as selected by the Architect from standard colors available.
F. Provide metal edge strips of width shown on the drawings and of required thickness to protect exposed edges of the flooring. Provide units of maximum available length to minimize the number of joints. Use butt-type metal edge strips for concealed anchorage, or overlap-type metal edge strips for exposed anchorage. Unless otherwise shown, provide strips made of extruded aluminum with a mill finish.

PART 3 - EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including technical bulletins, product catalog, installation instructions, and product carton instructions for installation and maintenance procedures as needed.

3.02 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions (i.e. moisture tests, bond test, pH test, etc.).
B. Visually inspect flooring materials, adhesives and accessories prior to installation. Flooring material with visual defects shall not be installed and shall not be considered as a legitimate claim.
C. Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material.
D. Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.
E. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.
F. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

3.03 PREPARATION

A. Subfloor Preparation: Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, and other defectsas recommended by the flooring manufacturer. Refer to manufacturer's Installation Systems manual, and ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring for additional information on subfloor preparation.
B. If moisture is present above recommended levels - Subfloor Preparation Moisture Mitigation: Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, mitigate moisture and other defects ass recommended by the flooring manufacturer. Refer to manufacturer's Installation Systems manual manual, and ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring for additional information on subfloor preparation.

C. Subfloor Cleaning: The surface shall be free of dust, solvents, varnish, paint, wax, oil, grease, sealers, release agents, curing compounds, residual adhesive, adhesive removers and other foreign materials that might affect the adhesion of resilient flooring to the concrete or cause a discoloration of the flooring from below. Remove residual adhesives as recommended by the flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents. Spray paints, permanent markers and other indelible ink markers must not be used to write on the back of the flooring material or used to mark the concrete slab as they could bleed through, telegraphing up to the surface and permanently staining the flooring material. If these contaminants are present on the substrate they must be mechanically removed prior to the installation of the flooring material. Refer to the manufacturer's Installation Systems manual manual, and ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring for additional information on subfloor preparation.
D. Perform subfloor moisture testing in accordance with and Bond Tests as described in publication , "manufacturer's Installation Systems manual to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. Internal relative humidity of the concrete shall not exceed 99%. MVER shall not exceed 8 lbs./1000 sq. ft./24 hrs. On installations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained
E. Concrete pH Testing: Perform pH tests on concrete floors regardless of their age or grade level. All test results shall be documented and retained.

3.04 INSTALLATION OF FLOORING

A. Install flooring in strict accordance with the latest edition of manufacturer's Installation Systems manual, . Failure to comply may result in voiding the manufacturer's warranty listed in Section 1.08.
B. Install flooring wall to wall before the installation of floor-set cabinets, casework, furniture, equipment, movable partitions, etc. Extend flooring into toe spaces, door recesses, closets, and similar openings as shown on the drawings.
C. If required, install flooring on pan-type floor access covers. Maintain continuity of color and pattern within pieces of flooring installed on these covers. Adhere flooring to the subfloor around covers and to covers.
D. Scribe, cut, and fit to permanent fixtures, columns, walls, partitions, pipes, outlets, and built-in furniture and cabinets.
E. Roll with a 100-pound (45.36 kilogram) roller in the field areas. Refer to specific rolling instructions of the flooring manufacturer
F. Install flooring with adhesives, tools, and procedures in strict accordance with the manufacturer's written instructions. Observe the recommended adhesive trowel notching, open times, and working times.

3.05 INSTALLATION OF ACCESSORIES

A. Apply top set wall base to walls, columns, casework, and other permanent fixtures in areas where top-set base is required. Install base in lengths as long as practical, with inside corners fabricated from base materials that are mitered or coped. Tightly bond base to vertical substrate with continuous contact at horizontal and vertical surfaces.
B. Fill voids with plastic filler along the top edge of the resilient wall base or integral cove cap on masonry surfaces or other similar irregular substrates.

C. Place resilient edge strips tightly butted to flooring, and secure with adhesive recommended by the edge strip manufacturer. Install edge strips at edges of flooring that would otherwise be exposed.
D. Apply metal edge strips as required before flooring installation. Secure units to the substrate, complying with the edge strip manufacturer's recommendations.

3.06 CLEANING

A. Perform initial and on-going maintenance according to the latest edition of manufacturer’s Installation Systems manual

3.07 PROTECTION

A. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.

END OF SECTION

SECTION 09 68 13

FLOOR COVERING

PART 1 GENERAL

1.01 THIS SECTION INCLUDES

A. Carpet flooring as shown on the drawings and schedules and as indicated by the requirements of this section.

1.02 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract (including General and Supplementary Conditions and Division 1 sections) apply to the work in this section only.

1.03 RELATED SECTIONS

A. Other Division 9 sections for floor finishes related to this section but not the work of this section.

B. Division 3 Concrete - not included work this section.

C. Division 6 Wood and Plastics - not included work this section.

D. Division 7 Thermal and Moisture Protection - not included work this section.

1.04 QUALITY ASSURANCE AND REGULATORY REQUIREMENTS

A. Qualifications of Installers: All work shall be done by installation firms specializing in commercial carpet installation. It is required, that the firm or individual shall be a member of the Floor Covering Installation Contractors Association (FCICA) and/or certified by the Certified Floorcovering Installers Association (CFI). Flooring contractor to be specialty contractor normally engaged in this type of work and shall have three (3) years minimum documented experience in commercial installation of these materials and participation in manufacturer's environmental program including responsible carpet removal, recycling, and installation.

B. Flooring contractor will be responsible for the proper product installation, including floor preparation in all the areas indicated in the drawings to receive carpet. The carpet installation standard will be as listed in The Carpet and Rug Institute's Standard for Installation of Commercial Carpet CRI-104, the standard that establishes the minimum installation procedures.

C. Flooring contractor to provide owner a written warranty that guarantees the completed installation to be free from defects in materials and workmanship for a period of no less than two (2) years after job completion.

D. All warranties must be issued by the manufacturer as standard published warranties on all types of carpet within this document. Second source warranties that involve parties other than the carpet manufacturer are unacceptable. If the product fails to perform as warranted when installed according to the Manufacturer Flooring carpet installation instructions and maintained according to Manufacturer Flooring maintenance instructions, the affected area will be repaired or replaced at the expense of the manufacturer. The carpet manufacturer will provide standard published written performance warranties for the following:

1. Lifetime warranty against excessive surface wear. Excessive wear means no more than 10% loss of pile fiber weight measured before and after use as tested under ASTM D-3936.
2. Lifetime static protection, meaning built-in protection below 3.0 kv as tested under AATCC-134.
3. Tuft Bind (edge ravel, yarn pulls, zippering)
4. Delamination
5. Lifetime Moisture Barrier
6. Lifetime Dimensional Stability (for modular products only)

E. Carpet manufacturer to provide field service experts to assist in project start-up as required by the job. Manufacturer will notify owner, architect, general contractor, or another designated contact if any installation instructions are not followed.

F. Provide flooring material to meet the following test performance criteria as tested by a recognized independent testing laboratory. Certified test reports shall be submitted by the carpet manufacturer for each test method. Requirements listed below must be met by all products being submitted for approval:

1. Pill Test / DOC-FF-1-70 (ASTM D-2859) - Requirement: Pass
2. Flooring Radiant Panel / ASTM E-648 - Requirement: Class I (Above .45 w/cm)
3. CRI VOC Chamber Test/Indoor Air Quality test (CRI-IAQ) Green Label Plus Test.
4. Lightfastness: Rating of not less than 5 on International Grey Scale after 40 SFU's when tested in accordance with AATCC Test Method 16E.
5. Crockfastness: Minimum stain rating on International Grey Scale of not less than 5 wet or dry when tested in accordance with AATCC Test Method 165.
6. Atmospheric Fading: Burned Gas shall not be less than 5 on International Grey Scale after two cycles on each test as per AATCC Test Method 129 Ozone and AATCC Test Method 23.

G. Waste Reduction: If applicable, all polyethylene roll wrap shall be collected and recycled and all cardboard be collected and recycled.

1.05 SUBMITTALS

A. Submit to architect and/or owner ten (10) days prior to bid, two (2) 12" x 12" finished samples of the exact type of carpet proposed, including quality, pattern, color, and backing.

B. Submit to architect and/or owner ten (10) days before bid, any proposed substitutions for consideration. Submit at least three (3) references of installations, that have been in use for two (2) years or more using the same backing technology of all carpets, as described within this text. Include contact names and telephone numbers.

C. Submit manufacturer's warranties, installation instructions, and maintenance instructions before bid date.

D. Submit the manufacturer's certification that the flooring has been tested by an independent laboratory and complies with the required fire tests as well as the test listed under 1.04 F.

E. Submit to architect and/or owner ten (10) days prior to bid, the manufacturers plan for recycling the specified carpet and related items at the end of the useful life of the carpet.

1.06 ENVIRONMENTAL/FIELD CONDITIONS

A. Deliver all materials to the installation site in the manufacturer's original packaging and in good condition. Packaging to contain manufacturer's name and marks, identification number, shipping and handling instructions and related information.

B. Delivered and stored materials must be available for inspection as required by the owner, architect,

general contractor, and/or the manufacturer.

C. Sub-floor preparation is to include all required work to prepare the existing floor for installation of the product as specified in this document. Sub-floor preparation shall meet all conditions as specified in Manufacturer's Modular Carpet installation instructions.

D. Sub-floor preparation will include, as required, the removal and repair of the existing floor surface. It is required that the floor of a renovation project be inspected before the bid date.

E. All materials, including adhesives, are to be delivered to the site of installation at a minimum of 48 hours prior to the start of installation and stored in a clean and dry room that measures above 65°F and below 95°F and measures between 10% and 65% relative humidity (RH). To maintain temperature and relative humidity, permanent heating and air conditioning systems (HVAC) must be in operation. Stack rolls horizontally and no higher than two rolls high on a flat surface. After work is completed, the ambient room temperature should remain at 65°F and relative humidity between 10% and 65% for 48 hours. These materials and related adhesives shall be protected from the direct flow of heat from heating fixtures and appliances such as hot-air registers, radiators, or other. Site conditions shall include those specified in the carpet manufacturer' installation manual and shall also include sufficient heat, light, and power required for effective and efficient working condition.

F. Once the temperature and relative humidity in area for installation have been stabilized, loose lay the carpet within the installation area and allow it to precondition for 48 hours prior to installation. Carpet installation shall not commence until painting and finishing work is complete and ceiling and overhead work is tested, approved, and completed. Traffic shall be closed during the installation of the flooring products. Verify concrete slabs are dry per the standards for bond and moisture tests listed in the manufacturer's installation manual.

1.07 SUBSTITUTIONS

A. All Bid submittals must conform to the specifications in this document.

B. All test results to be in accordance with a certified independent testing laboratory.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer:
1. PATCRAFT –
Po Box 2128
Dalton, GA 30722-2128
800.241.4014
www.patcraft.com
2. Any manufacturer and/or product must meet or exceed those requirements specified under all sections of this document in pattern, color, and fiber. Any substitutions must be made in accordance with Section 1.00 of this document.

2.02 FLOORING MATERIALS

A. Refer to finish schedule on the drawings for line information, tile size, pattern and color.

2.03 ADHESIVES

A. Per manufacturer’s recommendations.

2.04 ACCESSORIES

A. Provide transition/reducing strips tapered to meet abutting materials.

B. Provide edge strips made of extruded aluminum with a mill finish, unless otherwise noted.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine and verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.

D. Verify that concrete sub-floor surfaces are dry enough and ready for flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F 710; obtain instructions if test results are not within limits recommended by carpet manufacturer and adhesive materials manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

F. We require that the carpet be inspected prior to installation for proper style, color and potential defects. No claims will be honored if the carpet is installed with visible defects. Should there be a problem, call 800.451.1250.

3.02 PREPARATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. SURFACE PREPARATION- Dust, dirt, debris and noncompatible adhesive must be removed before the installation begins. Surfaces must be smooth and level with all holes and cracks filled with Portland cement-based patch reinforced with polymers or primed with Premium Sealer.

C. LATEX OR OLD ADHESIVES - Must be mechanically scraped down to a bare residue flat with the concrete substrate or covered with a skim coat of Portland cement-based patch reinforced with polymers. Any old adhesive residue must also be covered with Premium Sealer. Note: Failure to remove or seal old latex or cut back adhesive may cause installation failure, plasticizer migration, shifting, buckling or edge curling; these conditions will not be covered under warranty.

D. CONCRETE MOISTURE TESTING and pH Testing - Substrate surfaces must be tested for moisture emission. It is the responsibility of the owner or owner's representative to perform moisture testing prior to starting the installation. ASTM-F2170-2 relative humidity probe moisture testing or ASTM-F1869 calcium chloride testing can be performed on the concrete to determine the surface moisture emission rate. Acceptable relative humidity probe testing results are up to 90% RH. An acceptable result for calcium chloride moisture testing is up to 5 lbs per 1,000 SF per 24 hours. Alkalinity tests should also be performed per ASTM-F710. The maximum acceptable pH is 9.0. Carpet prefers relative humidity probe moisture testing over calcium chloride testing, as the results are more accurate and reliable. For test results that determine RH test readings of 90%-97%, moisture emission rates of 5 lbs - 8 lbs, or pH readings of 9.0 - 11.00, Premium Sealer is required.

3.03 SUBFLOORS

A. New Concrete - New concrete must be fully cured and free of moisture. New concrete requires a curing period of approximately 90 days.

B. Old Concrete - Old concrete must be checked for moisture. Dry, dusty, porous floors must be primed; primers will not correct a moisture problem.

C. Wood - Wood floors must be smooth and level. If the floor is uneven, an approved underlayment will be required. Old finishes must be tested for compatibility with adhesives or removed and porous wood primed with Manufacturer recommended Premium Sealer.

D. Terrazzo / Marble - Level all grout lines with Portland cement-based patch reinforced with polymers. Glossy surfaces must be sanded for adhesive bond. Waxes and similar finishes must be removed.

E. Hard Surfaces - Tiles must be well secured to the floor or removed. Broken, damaged, or loose tiles must be replaced. Waxes and similar finishes must be removed from VCT before applying adhesive. Existing sheet vinyl is not a suitable substrate for modular installation and must be removed.

F. Old Carpet - Remove old carpet and check adhesives for compatibility. If unsure, remove or cover adhesive with a Portland based patching compound or encapsulated with Manufacturer recommended Premium Sealer.

3.04 INSTALLATION OF FLOORING

A. Install flooring in strict accordance with the finish drawings, manufacturer's instructions, and CRI Carpet Installation Standard. Install carpet tile in accordance with manufacturer's instructions and CRI 104.

B. FULL SPREAD ADHESIVE SYSTEM- Per manufacturer’s instructions.

C. TILE PLACEMENT - Arrows are embossed or printed on the module backing to show pile direction. To ensure proper alignment, check spacing every ten modules. Measure ten modules; proper spacing should be within ¼ inch. Continue to check spacing every ten modules throughout the entire installation.

D. PALLET AND BUNDLE SEQUENCING - It is very important to install carpet modules in the order they were manufactured; this is easily accomplished by selecting pallets in sequential order and following the numbers located on each bundle. Typically, an installation will begin with the lowest bundle numbers and progress through the highest numbers until the project is complete. Installing modules by bundle sequence will assure the most even uniform look possible.

E. FLATWIRE CABLE / TRENCH HEADERS - Cable should be centered under modules and no adhesive used unless approved by the manufacturer. Trench headers require a control grid of adhesive on either side of header panels to prevent movement. It is highly recommended that these areas be installed ashlar.

F. STAIRS- Use single or double undercut stair nosing and cut tiles to fit nosing, both step and riser. Use full spread adhesive or SRT tape under modules.

G. FINISHED INSTALLATION- Roll entire job with 75-100 lb. roller after completion of installation.

3.04 INSTALLATION OF ACCESSORIES

A. Install accessories as required by drawings and per manufacturer's specifications.

3.05 CLEANING AND PROTECTION

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

C. LOOP PILE CONSTRUCTION--Carpet modules with loop pile constructions may experience yarn blossoming at the edges, which is consistent with this type of construction. Clipping or shearing the yarn edges can remedy this condition.

END OF SECTION

SECTION 09 77 53
MOSS WALL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Moss Walls

1.2 RELATED SECTIONS

1.3 REFERENCES

1.4 SUBMITTALS

A. Submit in accordance of Administrative Requirements

B. Product Data:

a. Manufacturer's data sheets on each product to be used.

b. Manufacturer certifications.

c. Preparation instructions and recommendations.

d. Storage and handling requirements and recommendations.

e. Typical installation methods.

C. Verification Samples: A sample box is delivered with all green reindeer moss (medium,lime, forest, light, and nature green) and Pole moss, Pillow moss, and Flat Moss samples that are labeled. The sample box is intended to help the Architect or Designer choose the appropriate moss types for their project.

D. Shop Drawings:

Manufactuer is to work with the architect to design the moss wall feature.

Include details of materials, construction and finish.

Include relationship with adjacent construction.

E. Sustainable Compliance: All information pertaining to categories, points and documentation.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.

B. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.

C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

D. Render: Construct a render with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate render as acceptable to the Architect and provide temporary foundations and support.

a. Intent of render if to demonstrate quality of workmanship and visual appearance.

b. If render is not acceptable, rebuild render until satisfactory results are achieved.

c. Retain render during construction as a standard for comparison with completed work.

d. Do not alter or remove render until work is completed or removal is authorized.

1.6 PRE-INSTALLATION CONFERENCE

A. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Contractor shall check the materials upon delivery to assure proper materials have been

received.

B. Store and handle in strict compliance with manufacturer's written instructions and recommendations.

C. Protect from damage due to weather, excessive temperature, and construction operations.
   a. Damaged materials shall not be used in the project.

D. Exposed edges of modules are to be free of defects, and other imperfections and additional materials are to be free of defects.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by the manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

B. Do not allow humidity to drop below 35% in the room where the moss wall is installed.

1.9 WARRANTY

A. Manufacturer's standard limited warranty unless indicated otherwise.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

Garden on the Wall - https://www.gardenonthewall.com/

By Nature 1.855.436.2919 https://bynaturedesign.ca/

Green Oasis LLC. https://greenoasis.com/

B. Requests for substitutions will be considered in accordance with Product Requirements.

2.2 MOSS WALLS

A. Performance and Design Requirements:
   a. Blended Media as Preserved Moss – coordinate wall design with architect.
   b. Included in the Work: Following the drawings.
      i. Wall Preparation.
      ii. If installed in a pocket or if Moss Wall needs to be flush with an edge leave a ½ inch space between edge of moss wall substrate and wall edge.
      iii. Sign components; optional, a Baltic Birch substrate is used if there is a sign component.
      iv. Approved Frames if requested.
      v. Backlighting if requested.
   c. Moss Wall Systems: Designed to be installed and not moved.
      i. Reinforcement Design:
         1. Attached to a plywood or acoustical felt substrate with glue.
         2. There is no need for additional connection means of attachment.
         3. Basis of Design: Moss Walls as manufactured by Green Oasis LLC. Real moss undergoes a preservation process that allows them to keep their natural texture and be dyed.
   a. Moss Wall: Substrate: Dimensions as shown on the drawings. Moss is attached to the substrate. Substrate sections are assembled at the installation site if the project is larger than 4 feet wide.
   b. Weight:

i. Reindeer moss with felt substrate is 1.4 lbs / sq ft.
ii. Pole Moss with felt substrate is 0.8 lbs / sq ft.
iii. Flat Moss with felt substrate is 0.6 lbs / sq ft.
iv. Pillow Moss with felt substrate is 1.2 lbs / sq ft.

c. UV Stabilization: 7 years minimum
d. Type of Moss:
i. Medium Green Reindeer Moss
ii. Lime Green Reindeer Moss
iii. Forest Green Reindeer Moss
iv. Light Green Reindeer Moss
v. Nature Green Reindeer Moss
vi. Nature Green Pole Moss
vii. Light Green Pole Moss
viii. Pillow Moss
ix. Flat Moss
e. Frame Type:
i. Wood Frame
1. Natural
2. White (Gloss or White)
3. Cherry
4. Black (Gloss or White)
ii. Aluminum Frame
1. Matte Black
2. Brushed Silver
iii. Custom Frame
f. Sign:
i. Acrylic laser cut and mounted with stainless steel rods.
ii. Screen printed on clear acrylic.
iii. Backlighting

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly aligned and prepared.
B. If substrate wall preparation is the responsibility of another installer, notify the Architect in writing of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with Green Oasis LLC instructions, approved submittals, and proper relationship with adjacent construction.
B. Failure to comply can cause installation issues which can result in additional charges for additional airfare, lodging, and time.
C. Consideration for the placement of the 4 feet wide sections should be taken.
D. If not specified by the Architect, consideration should also be given at this point to the placement of the supplemental track lighting.

E. Address and details of where Green Oasis should ship the Moss Wall.
F. Consideration of an electrical outlet available if Moss Wall includes a backlit sign.
G. Installation of the Moss Wall should be scheduled for after painting is finished. (Dusty conditions are harmful to the plants and are time-consuming and expensive to clean if the Moss Wall is installed too early. If cleaning is required after installation due to this then an additional charge may be applied)
H. Coordinate shipment of the Moss Wall with a minimum of three weeks in advance of the actual installation. A climate controlled storage area of this crate is required. The installation crew is based out of San Antonio TX, we ask for a 2 week warning to coordinate deployment. Be sure to read the pre-deployment checklist before scheduling deployment. Failure to do so will result in extra travel charges, including airfare and lodging if needed.
I. If the Moss Wall System is to be installed in an alcove or recess, field measurements should be confirmed back to Green Oasis. Final measurements should be taken when the final wall covering is installed or in the case of paint/wallpaper when the drywall is installed.
J. The Green Oasis team is committed to doing all we can to assist in ensuring a successful project.

3.4 FIELD QUALITY CONTROL

A. Field Inspection:
B. Green Oasis Services:

3.5 CLEANING AND PROTECTION

A. Clean product in accordance with Green Oasis recommendations.
B. Green Oasis will touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 09 90 00

PAINTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work of this Section.

1.2 WORK INCLUDED

A. Surface Preparation.

B. Surface Finish Schedule – Contractor to provide field and accent colors as shown on the finish schedule.

1.3 RELATED SECTIONS

A. Section 08100 – Hollow Metal Frames.

B. Section 09260 - Gypsum Board Systems.

1.4 REFERENCES

A. ANSI/ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.

B. ASTM D2016 - Test Method for Moisture Content of Wood.

C. SSPC - SP1 - Solvent Cleaning

D. SSPC - SP2 - Hand Tool Cleaning

1.5 DEFINITIONS

A. Conform to ANSI/ASTM D16 for interpretation of terms used in this section.

1.6 QUALITY ASSURANCE

A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with five years experience.

B. Applicator: Company specializing in commercial painting and finishing with three years documented experience.

C. Flame Spread: Interior finishes must meet Class II flame spread, 26-75 index, or less.

1.7 SUBMITTALS

A. Provide product data on all finishing products.

B. Submit samples under provisions of Section 01300.

C. Submit two samples 6 x 6 inch in size illustrating range of colors and textures available for each surface finishing product scheduled, after color selection.

D. Submit manufacturer's application instructions under provisions of Section 01300.

E. Certify that material installed on this project does not contain insecticide, mildewcide, and no more than 0.06 percent lead.

1.8 FIELD SAMPLES

A. Provide one field sample panel, 12 inches long by 12 inches wide, illustrating special texture, and finish for each color selected.

B. Accepted sample may not remain as part of the work.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600.

C. Deliver products to site in sealed and labelled containers; inspect to verify acceptance.

D. Container labelling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.

E. Store paint materials at minimum ambient temperature of 45° F and a maximum of 90° F, in well ventilated area, unless required otherwise by manufacturer's instructions.

F. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 55° F for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent, unless required otherwise by manufacturer's instructions.

C. Minimum Application Temperatures for Latex Paints: 55° F for interiors; 65° F for exterior; unless required otherwise by manufacturer's instructions.

D. Minimum Application Temperature for Varnish Finishes: 65° F for interior or exterior, unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 50 foot-candles measured mid-height at substrate surface.

1.11 EXTRA STOCK

A. Provide two gallon containers of each color and surface texture to owner.

B. Label each container with color, texture, and room locations in addition to the manufacturer's label.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS – PAINT

A. Kelly-Moore Paint Co., Inc.

B. Benjamin Moore

C. Sherwin Williams Company.

D. Substitutions: Under provisions of Section 01600.

2.2 MATERIALS

A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.

B. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.

C. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners, and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

2.3 FINISHES

A. Refer to schedule at end of section for surface finish schedule.

PART 3 EXECUTION

3.1 INSPECTION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Measure moisture content of surfaces using an electronic moisture meter. Report any condition that may potentially affect proper application.
1. Plaster and Gypsum Wallboard: 12 percent.
2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
3. Interior Located Wood: 15 percent, measured in accordance with ASTM D2016.
4. Exterior Located Wood: 12 percent, measured in accordance with ASTM D2016.

D. Beginning of installation means acceptance of existing surfaces.

3.2 PREPARATION

A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or finishing.

B. Correct minor defects and clean surfaces which affect work of this section.

C. Shellac and seal marks which may bleed through surface finishes.

D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

E. Gypsum Board Surfaces: Latex fill minor defects. Spot prime defects after repair.

F. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

G. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to completely and thoroughly dry.

H. Plaster Surfaces: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

I. Uncoated Steel and Iron Surfaces: Remove grease, scale, dirt and rust. Where heavy coatings of scale are evident, remove by wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.

J. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Prime metal items including shop primed items.

K. Interior Wood Items Scheduled to Receive Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.

L. Concrete Paving Scheduled to Receive Paint Finish: Remove foreign particles to permit adhesion of finishing materials.

M. Hollow Metal Doors Scheduled for Painting: Seal top and bottom edges with primer.

3.3 PROTECTION

A. Protect elements surrounding the work of this section from damage or disfiguration.

B. Repair damage to other surfaces caused by work of this section.

C. Furnish drop cloths, shields and protective methods to prevent spray or droppings from disfiguring other surfaces.

D. Remove empty paint containers from site.

3.4 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Do not apply finishes to surfaces that are not dry.

C. Apply each coat to uniform finish.

D. Apply each coat of paint slightly darker than proceeding coat unless otherwise approved.

E. Sand lightly between coats to achieve required finish.

F. Allow applied coat to dry before next coat is applied.

G. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

H. Prime back surfaces of interior and exterior woodwork with primer paint.

I. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.

J. Apply new paint as specified on new and renovated existing surfaces. The entire renovated surface shall be painted, not just the repaired portion. Renovated surfaces shall be painted from floor to ceiling, corner to corner, or break in surface plane.

K. Repainting the entire surface (new, renovated, or existing): shall be required if the surface is damaged by construction activities. The architect will make the final determination.

3.5 PERMANENT MARKING AND IDENTIFICATION OF FIRE WALLS

A. Permanently identify with red stenciled 3-inch high lettering all fire rated walls. Identification to be located on the fire-rated wall/partition above ceilings and at exposed areas (such as Mechanical and Electrical Equipment Rooms), on 10-foot intervals and as high as possible and still visible from the finished floor and include the wording “FIRE WALL”. Areas of fire-rated walls/partitions exposed to viewing by the public shall be exempt from stenciling.

3.6 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Refer to Section 15 and Section 16 for schedule of color coding and identification banding of equipment, ductwork, piping and conduit.

B. Paint shop primed equipment.

C. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are prefinished.

D. Replace identification markings on mechanical or electrical equipment when painted accidently.

E. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint, to limit of sight line. Paint dampers exposed behind louvers, and grilles, to match face panels.

F. Paint exposed conduit and electrical equipment occurring in finished areas.

G. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

H. Color code equipment, piping, conduit, and exposed ductwork in accordance with requirements indicated. Color band and identify as required.

I. Replace electrical plates, hardware, light fixture trim, and fittings removed prior to finishing.

3.7 CLEANING

A. As work proceeds, promptly remove paint where spilled, splashed, or spattered.

B. During progress of work, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.

C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.8 SCHEDULE OF PAINTING

A. The kinds and brands of paint and number of coats required on the various surfaces shall be those listed below. The types of paint are identified with Pittsburg Paint, Benjamin Moore, or Sherwin Williams numbers.

B. The owner and architect shall select color, tint, and sheen from manufacturer's standard color chart.
Selected colors & finish as referred to on Construction Documents:
1. PT-2 Benjamin Moore: Night Shade #2116-10 : Flat Finish
2. PT-4 Benjamin Moore: Gleen Ridge Gold #301 : Eggshell Finish

C. Beneath wall graphics or applied wall finishes
1. First Coat: PPG 6-2 Speedhide interior Latex primer sealer
   a. Ensure compatibility with applied finish prior to installation

D. Exterior and Interior Metal:
1. First Coat: PPG 6-208 Series Speedhide steel primer
2. Second Coat: PPG 7-282 Series Industrial Gloss Alkyd enamel
3. Third Coat: PPG 7-282 Series Industrial Gloss Alkyd enamel

E. Gypsum Board Walls and Ceilings
1. First Coat: PPG 6-2 Speedhide interior Latex primer sealer
2. Second Coat: PPG 6-510 Speedhide interior semi-gloss Latex enamel
3. Third Coat: PPG 6-510 Speedhide interior semi-gloss Latex enamel

F. Galvanized Metal
1. First Coat: PPG 90-712 series Pitt-Tech Industrial DTM primer/finish enamel
2. Second Coat: PPG 7-282 Series Industrial gloss Alkyd enamel
3. Third Coat: PPG 7-282 Series Industrial gloss Alkyd enamel

G. Concrete and Asphalt Pavement
1. First Coat: PPG 11-3 Series flat Alkyd zone marking paint.
2. Second Coat: PPG 11-3 Series flat Alkyd zone marking paint.
   Accessible parking zones to receive a second coat.

H. Concrete Unit Masonry
1. First Coat: PPG 6-7 Speedhide Latex masonry block filler.
2. Second Coat: PPG 6-2045 Series Speedhide exterior satin Acrylic Latex.
3. Third Coat: PPG 6-2045 Series Speedhide exterior satin Acrylic Latex.

I. Concrete Walks
1. First Coat: PPG 11-25 flat Traffic & Zone Marking Paint

END OF SECTION

SECTION 10 23 10
GLAZED INTERIOR WALL AND DOOR ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Frameless glazed interior wall and door assemblies.

1.02 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware.

1.03 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.
B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.
C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
E. ASTM C1036 - Standard Specification for Flat Glass; 2011e1.
F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
G. WDMA I.S.1-A - Architectural Wood Flush Doors; Window and Door Manufacturers Association; 2011.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meeting: Convene at project site seven calendar days prior to scheduled beginning of construction activities of this section to review section requirements.
    1. Require attendance by representatives of installer, other entities directly affecting, or affected by, construction activities of this section.
    2. Notify Architect four calendar days in advance of scheduled meeting date.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's descriptive literature for each component in partition assembly.
C. Shop Drawings: Drawings showing layout, dimensions, identification of components, and interface with adjacent construction.
    1. Include field measurements of openings.
    2. Include Elevations Showing:
        a. Locations and identification of manufacturer-supplied door hardware and fittings.
        b. Locations and sizes of cut-outs and drilled holes for other door hardware.
    3. Include Details Showing:
        a. Requirements for support and bracing of overhead track.
        b. Installation details.
        c. Appearance of manufacturer-supplied door hardware and fittings.
D. Selection Samples: Two sets, representing manufacturer's full range of available metal materials and finishes.
E. Verification Samples: Two samples, minimum size 2 by 3 inches (50 by 75 mm), representing actual material and finish of exposed metal.
F. Design Data: Design calculations, bearing seal and signature of structural engineer licensed to practice in the State in which the Project is located, showing loads at points of attachment to the building structure.
G. Certificates: Contractor to certify that installer of partition assemblies meets specified qualifications.
H. Operation and Maintenance Data: For manufacturer-supplied operating hardware.

I. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
J. Specimen Warranty.
K. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.

1.06 QUALITY ASSURANCE

A. Fabricator Qualifications: Minimum three years of experience designing, assembling, and installing partition assemblies similar to those specified in this section.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until installation.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
B. Correct defective Work within a one year period after date of Substantial Completion.
C. Provide five year manufacturer warranty against excessive degradation of metal finishes. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Frameless Glazed Interior Wall and Door Assemblies:
1. C.R. Laurence Co., Inc; CRL Cascade Series Frameless Glass Wall Office System: www.crl-arch.com.
2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FRAMELESS GLAZED INTERIOR WALL AND DOOR ASSEMBLIES

A. Frameless Glazed Interior Wall Assembly: Factory fabricated assemblies consisting of full-width and height glass panels fastened with U-channel fittings on top and bottom edge of glass wall.
1. Configuration: As indicated on drawings.
2. U-Channel Fittings: Extruded aluminum, Black finish, dry glazed, and with matching end caps.
a. Top channel is 1-1/2 inch (38 mm) high by 1 inch (25.4 mm) deep.
b. Bottom channel is 1 inch (25.4 mm) high by 1 inch (25.4 mm) deep.
3. Glass Thickness: 1/2 inch (12.7 mm), tempered.
4. Designed to withstand normal operation without damage, racking, sagging, or deflection.
5. Coordinate wall and door assembly preparation and provide hardware as necessary for fully operable installation.
6. Finished metal surfaces protected with strippable film.
7. Factory assembled to greatest extent practical; may be disassembled to accommodate shipping constraints.

B. Pivoting Glass Doors: Dry glazed patch fittings.
1. Door Configuration: As indicated on drawings.
2. Height: 2 inch (51 mm).
3. Length: 6-7/16 inch (164 mm).
4. Cladding Finish: Black.
5. Glass Thickness: 1/2 inch (12.7 mm), tempered.
6. Door Hardware: Patch bottom fitting, black.
7. Provide accessories as required for complete installation.
8. Basis of Design: C.R. Laurence Co., Inc; CRL Commercial Patch Hardware, Catalog No. PH20AA (Top), PH10CA (Bottom): www.crl-arch.com.

E. Other Manufacturers: Not permitted; provide the product identified as "Basis of Design".

2.03 FITTINGS AND HARDWARE

A. Operable Panel Hardware: Coordinate with additional requirements as specified in Section 08 71 00.

2.04 MATERIALS

A. Glass: Flat glass meeting requirements of ASTM C1036, Type I - Transparent Flat Glass, Class 2 - Tinted, Quality Q3, fully tempered in accordance with ASTM C1048, Kind FT, and as follows:
   1. Thickness: As indicated.
   2. Color: Grey tint; low iron.
   5. Prepare glazing panels for indicated fittings and hardware before tempering.
   6. Polish edges that will be exposed in finished work to bright flat polish.
   7. Temper glass materials horizontally; visible tong marks or tong mark distortions are not permitted.

B. Aluminum Components: Conforming to ASTM B221 (ASTM B221M), Alloy 6063, T5 Temper.

C. Sealant: One-part silicone sealant, conforming to ASTM C920, clear.

2.05 FINISHES

A. Class I Matte Black: AAMA 611 AA-M12C22A44 Black anodic coating not less than 0.7 mils (0.018 mm) thick.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that track supports are properly braced, level within 1/4 inch (6 mm) of required position and parallel to the floor surface.

C. Verify floor flatness of 1/8 inch in 10 feet (3 mm in 3 m), non-cumulative.

D. Do not begin installation until supports and adjacent substrates have been properly prepared.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean substrates thoroughly prior to installation.

B. Prepare substrates using the methods recommended by the manufacturer for achieving acceptable result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install in accordance with glazed interior wall and door assembly manufacturer's instructions.

B. Fit and align glazed interior wall and door assembly level and plumb.

3.04 ADJUSTING

A. Adjust glazed interior wall and door assembly to operate smoothly from sliding or pivoting positions.

B. Adjust swing door hardware for smooth operation.

3.05 CLEANING

A. Clean installed work to like-new condition.

B. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

3.06 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. Demonstrate operation of glazed interior wall and door assembly and identify potential operational problems.

3.07 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before date of Substantial Completion.

END OF SECTION

SECTION 10 26 13
IMPACT-RESISTANT WALL PROTECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Corner guards.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, impact strength, fire-test-response characteristics, dimensions of individual components and profiles, and finishes for each impact-resistant wall-protection unit.

B. Shop Drawings: For each impact-resistant wall-protection unit showing locations and extent. Include sections, details, and attachments to other work.
   1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples for Initial Selection: For each type of impact-resistant wall-protection unit indicated.
   1. Include similar Samples of accent strips and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
   1. Corner Guards: 12 inches long. Include examples of joinery, corners, caps, and field splices.

E. Maintenance Data: For each impact-resistant wall-protection unit to include in maintenance manuals.
   1. Include recommended methods and frequency of maintenance for maintaining optimum condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to plastic finishes and performance.

F. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain impact-resistant wall-protection units through one source from a single manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of impact-resistant wall-protection units and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Fire-Test-Response Characteristics: Provide impact-resistant, plastic wall-protection units with surface-burning characteristics as determined by testing identical products per ASTM E 84, NFPA 255, or UL 723 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

E. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install impact-resistant wall-protection units until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and maintaining temperature at 70 deg F for not less than 72 hours before beginning installation and for the remainder of the construction period.

B. Field Measurements: Verify actual locations of walls, columns, and other construction contiguous with impact-resistant wall-protection units by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall-protection units that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures.
      b. Deterioration of plastic and other materials beyond normal use.
   2. Warranty Period: Five years from date of Substantial Completion.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Corner-Guard Covers: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of units installed, but no fewer than two, 4-foot- long units.

B. Include mounting and accessory components. Replacement materials shall be from same production run as installed units.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Manufacturers: Wallguard.com
   2. Basis-of-Design Product: Defender Series 2335 – 2 ½" Mechanically fastened

2.2 MATERIALS

A. Extruded Rigid Plastic: ASTM D 1784, Class 1, textured, chemical- and stain-resistant, high-impact-resistant PVC or acrylic-modified vinyl plastic with integral color throughout; thickness as indicated.
   1. Impact Resistance: Minimum 25.4 ft-lbf/in. of notch when tested according to ASTM D 256, Test Method A.
   2. Chemical and Stain Resistance: Tested according to ASTM D 543.
   3. Self-extinguishing when tested according to ASTM D 635.
   4. Flame-Spread Index: 25 or less.
   5. Smoke-Developed Index: 450 or less.

B. Aluminum Extrusions: Alloy and temper recommended by manufacturer for type of use and finish indicated but with not less than strength and durability properties specified in ASTM B 221 for Alloy 6063-T5.

C. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

2.3 CORNER GUARDS

A. Surface-Mounted, Resilient, Corner Guards: Assembly consisting of snap-on plastic cover installed over continuous retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.
   1. Basis-of-Design Product: Construction Specialties, Acrovyn, SM-20 or a comparable product by one of the following:
      a. American Floor Products Co., Inc.
      b. ARDEN Architectural Specialties, Inc.
      c. Balco, Inc.
      d. Construction Specialties, Inc.
      e. IPC Door and Wall Protection Systems; Division of InPro Corporation.
      f. Korogard Wall Protection Systems; Division of RJF International Corporation.
      g. Pawling Corporation.
      h. Tepromark International, Inc.
   2. Cover: Extruded rigid plastic, minimum 0.100-inch wall thickness; as follows:
      a. Profile: Nominal 3-inch- long leg and 1/4-inch corner radius.
      b. Height: As indicated on the Drawings.
      c. Color and Texture: As selected by Architect from manufacturer's full range.
   3. Retainer: Minimum 0.060-inch- thick, 1-piece, extruded aluminum.

4. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

2.4 FABRICATION

A. Fabricate impact-resistant wall-protection units to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.

B. Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.

C. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of work.

1. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
2. For impact-resistant wall-protection units attached with adhesive or foam tape, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Complete finishing operations, including painting, before installing impact-resistant wall-protection system components.

B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. General: Install impact-resistant wall-protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

1. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.
   a. Provide anchoring devices to withstand imposed loads.
   b. Where splices occur in horizontal runs of more than 20 feet, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches.
   c. Adjust caps as required to ensure tight seams.

3.4 CLEANING

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

END OF SECTION 10265

SECTION 10 44 43

FIRE EXTINGUISHERS AND CABINETS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings, General Conditions, Supplementary General Conditions apply to the work of this Section.

1.2 WORK INCLUDED

A. Fire extinguishers.

B. Cabinets.

C. Accessories.

1.3 RELATED SECTIONS

A. Section 06100 - Rough Carpentry.

B. Section 09260 - Gypsum Board Systems.

1.4 REFERENCES

A. NFPA 10 - Portable Fire Extinguishers.

B. Underwriters Laboratories, Inc. Directory.

1.5 QUALITY ASSURANCE

A. Conform to NFPA 10 - Requirements for Extinguishers.

B. Underwriters Laboratories, Inc. for rated assemblies.

1.6 SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Include physical dimensions, fire rating, operational features, color and details.

C. Submit manufacturer's installation instructions under provisions of Section 01300.

1.7 OPERATION AND MAINTENANCE DATA

A. Submit manufacturer's operation and maintenance data under provisions of Section 01700.

B. Included test, refill or recharge schedules, procedures and re-certification requirements.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Do not install extinguishers when ambient temperatures may cause freezing.

B. Install extinguishers only after the interior temperatures are controlled.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURES

A. J.L. Industries.

B. Larsons Fire Protection & Safety Equipment.

C. Modern Metal Products by Muckle.

2.2 EXTINGUISHERS

A. Multi-Purpose Dry Chemical Type: Steel tank, Model Cosmic 10E manufactured by J.L. Industries, with pressure gauge, UL rated 4A-60BC.

2.3 CABINETS

A. Cabinet: J.L. Industries Ambassador model 1817 Fire-FX, formed sheet steel, 18 gauge primed, semi-recessed type, tub inside dimensions of 10 1/2 x 24 x 5 1/2 inches. Electrostatic white epoxy finish.

B. Trim: 3” Rolled Trim

C. Door: Full Glazing in 1-1/4” wide frame

D. Glass: 1/4 inch clear tempered glass.

E. Mounting Hardware: Appropriate to cabinet.

F. Fire Rated: Assembly must maintain fire rating of partition in which installed.

2.4 FABRICATION

A. Form body of cabinet with tight inside corners and seams.

B. Predrill holes for anchorage.

C. Form perimeter trim (and door stiles) by welding, filling and grinding smooth.

D. Hinge doors for a 180 degree opening with continuous piano hinge.

2.5 FINISHES

A. Extinguisher: White enamel.

B. Cabinet Trim and Door: White Powder coat paint finish.

C. Cabinet Interior: White enamel.

PART 3 EXECUTION

3.1 INSPECTION

A. Verify rough openings for cabinet are correctly sized and located.

B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A. Install cabinets plumb and level in wall openings where shown on the drawings.

B. Secure rigidly in place in accordance with manufacturer's instructions.

C. Install cabinets so cabinet door handle is 48 inches above finished floor according to Texas Accessibility Standards.

END OF SECTION

CONSULTANTS' PROFESSIONAL RESPONSIBILITY

The specifications sections to be authenticated by my seal and signature are limited to the following:

DIVISION 15 - MECHANICAL

END OF TABLE OF CONTENTS

By: Carl W. Wampler, P.E.
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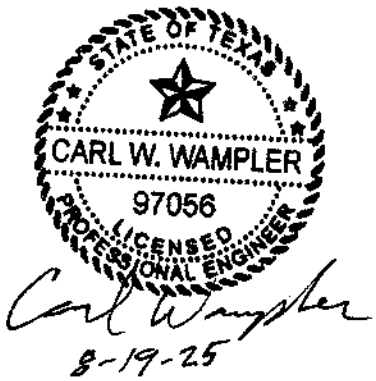

SECTION 15010 - GENERAL MECHANICAL PROVISIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work covered by this section of the specifications includes the furnishing of all materials and labor as required for the installation of the plumbing, heating, ventilating and air conditioning systems, all as shown on the drawings, as herein specified, or both.

1.2 RELATED DOCUMENTS

A. Refer to other applicable clauses and regulations for other requirements.

1.3 SUBMITTAL

A. All submittal required by this section shall be submitted in accordance with Section 01300.

B. This Contractor shall submit six (6) copies of all submittal data covering proposed equipment to the Architect for approval prior to installation. All equipment shall be submitted at one time in a bound folder with an index of submittal.

1.4 REGULATIONS

A. All work shall be done in strict accordance and compliance with State and Local Laws, together with regulations of the particular Utility Companies concerned.

B. Obtain permits as required by the local authorities.

1.5 CLARIFICATION

A. The Engineer shall provide, with reasonable promptness, written responses to requests from the Contractor for clarification and interpretation of the requirements of the Contract Documents. However, if the Contractor's requests for information, clarification or interpretation are, in the Engineers professional opinion, for information readily apparent from reasonable observation of field conditions or a review of the Contract Documents, or are reasonably inferable therefrom, the Engineer shall be entitled to compensation from the Contractor for the Engineer's time spent responding to such requests.

1.6 DEFECTS

A. Contractors shall promptly report to the Engineer any defects or suspected defects in the contract documents of which the Contractor becomes aware, so that the Engineer may take measures to minimize the consequences of such a defect. Failure by the Contractor to notify the Engineer shall relieve the Engineer or Owner of the costs of remedying the defects above the sum such remedy would have cost had prompt notification been given when such defects were first discovered.

1.7 COMPLETION

A. If the Contractor asks for a final inspection and the project is not complete enough to prepare a normal punch

list as determined by the Engineer, the Engineer shall be compensated for time and travel for subsequent site visits.

1.8 DRAWINGS

A. The drawings and the specifications are numbered consecutively. Each Contractor shall check these drawings and specifications thoroughly and shall notify the Architect of any discrepancies or omissions of sheets or pages. Upon notification, the Architect will promptly provide the Contractor with any missing portions of the drawings and/or specifications. No discrepancies or omissions of sheets or pages of the Contract Documents will relieve the Contractor of his duty to provide all work required by the complete Contract.

B. The plans accompanying these specifications are intended to show the general arrangement and the extent of the work contemplated. The Contractor shall inspect the site before bidding to verify the actual conditions involved as no allowance will be made for unforeseen conditions. The exact location and arrangement of all parts shall be determined after equipment has been approved by the Architect and as directed by the Architect. All materials or labor necessary to complete the work in accordance with the intent of these specifications shall be furnished by each Contractor without additional charge as if called for in these specifications or shown on the plans.

C. Should the particular equipment which any bidder proposes to install require other space conditions, supports or clearances other than those indicated on the drawings, he shall arrange for such items with the Architect before submitting his bid. Should changes become necessary on account of failure to comply with this clause, the Contractor shall make such necessary changes at his (the Contractor's) own expense.

D. This Contractor shall verify all existing conditions that may effect his work including exact location and size of all plumbing lines, direction of flow, ductwork, existing equipment and connection points. Any discrepancies from conditions shown on the drawings shall be reported to the Architect before bidding and the bid price shall include the cost to correct any discrepancies to provide a complete and workable system.

E. This Contractor shall thoroughly lay out all his work and check all conditions to insure that the work as shown on the Drawings can be installed without modifications. No material shall be fabricated or delivered to the job until these conditions have been determined.

F. The Owner or Owner's Representative reserves the right to make changes during construction, if required, and no allowances will be made for prefabricated material or on job materials which can not be used due to actual conditions.

1.9 APPROVAL OF MATERIALS

A. Where manufacturer's names are mentioned in these specifications, it has been done, in most cases, in order to establish a standard. The products of others than the particular manufacturers mentioned will be acceptable, if of suitable type and construction, but any substitution must be of quality as good as, or better than, the named article.

B. If the Contractor elects to substitute other equipment or materials for that specified by name, he shall be fully responsible for all coordination with other trades involved. Any expense incurred because of modifications to accommodate larger sizes, larger electrical service, fuel piping requirements resulting from such substitution shall be borne by the Contractor substituting other equipment.

C. Upon being awarded the Contract for the work under one of the following sections, the Contractor shall, within thirty (30) days, submit for approval a complete list of the materials which he proposes to use. The list shall give the manufacturer's names and designations corresponding to every item and where submitted materials are different from that specified by name, the submission shall be accompanied by a complete descriptive literature and/or any supplementary data and drawings, necessary to give full and complete details for the completed installation.

D. Any item on this list which is rejected because of unsuitability or inferior quality, must be replaced by an acceptable item within two (2) weeks following notification of the Contractor of such rejection. If no satisfactory material is submitted within two (2) weeks, then the Architect reserves the right to notify the Contractor as to the type and make of materials he will be required to furnish. Six (6) copies of the material and the equipment list shall be furnished by the Contractor in neat and firmly bound brochures for approval.

1.10 PRECEDENCE

A. The work covered in this section shall have precedence over each other in accordance with the following sequence:

1. Soil and waste piping
2. Duct work
3. Cold and hot water piping
4. Electric wiring

1.11 COOPERATION

A. Each contractor shall cooperate with the General Contractor and all other contractors to properly coordinate their work, to avoid interference and delays, and arrange all parts of the work so as to harmonize in service and appearance with all other parts.

1.12 INTERFERENCES

A. The plans are generally diagrammatic and the Contractor must harmonize the work of the different trades so that interference between piping, equipment, architectural and structural work will be avoided. All necessary offsets in piping, fittings, etc., required to properly install the work must be kept as close as possible to walls, ceiling, columns, etc., so as to take up the minimum amount of space, and all offsets, fittings, etc., required to accomplish it must be furnished and installed by the contractor without additional cost to the Owner.

B. Exact locations of mechanical equipment may be varied a reasonable amount by the Architect before installation without additional cost to the Owner.

C. All equipment and controls shall be so located and arranged that all parts will be available for proper maintenance.

PART 2 - PRODUCTS

2.1 MATERIALS AND WORKMANSHIP

A. Materials shall be new, unless otherwise specified, and of the quality specified. Materials shall be free from any defects. Materials and equipment for which the Underwriters' Laboratories have established as standard, shall be listed by the Underwriters' Laboratories, Inc., and shall bear their label.

B. Each Contractor shall be responsible for transportation of his materials to the job and shall be responsible for the storage and protection of same. This will be provided until final acceptance of the job.

C. Each Contractor shall provide protection against weather, so as to maintain all materials and equipment free from injury and damage. All new work likely to be damaged shall be covered during the day and at the end of each day.

D. Each Contractor will furnish all necessary scaffolding, tackle, tools, appurtenances and all labor required for the safe and expeditious execution of this contract.

E. The workmanship shall be in all respects, the highest grade and all construction in accordance with the best practice of the trade.

PART 3 - EXECUTION

3.1 VERIFICATION OF PLANS AND SPECIFICATIONS

A. It shall be the responsibility of all parties concerned to carefully examine the plans and specifications relating to this work for completeness, accuracy and clarity. Any conflict, errors or clarification requests shall be immediately brought to the attention of the Engineer for written interpretation or instructions. No claims for increased compensation for additions, changes or alterations will be considered unless written authority is granted by the Engineer. Otherwise, any additional materials and/or labor due to additions, alterations and changes necessary to meet existing conditions shall be furnished under this contract.

3.2 HANGERS AND SUPPORTS

A. The Contractor for the work covered by each section of these specifications shall furnish and install all foundations and supports required by equipment included in his work.

B. All piping, both vertical and horizontal, shall be supported at sufficient close intervals to keep its alignment, prevent sagging and to prevent pipe from being supported by equipment or equipment connections.

C. Vertical pipes shall be supported from floor with riser clamps sized to fit the lines and adequately support their weight. Vertical copper tubing, 1-1/4" and smaller shall be supported at 3′ intervals and at the base of pipe risers, where required for proper support. Hangers shall be manufactured by Kindorff, Unistrut, Elcen or equal. Where multiple pipes are indicated, they may be supported on a continuous hanger. All hangers must meet the Architect's approval. Use of perforated straps will not be permitted.

D. All horizontal pipes suspended with structure above shall be supported by hanger rods of the following size:

1.	Pipes up to and including 2"	3/8" rods
2.	2-1/2" and 3" pipe	1/2" rods
3.	4" and 5" pipe	5/8" rods

E. Soil pipe shall be supported at all turns and at intervals not to exceed 5′ on centers on straight runs. The following table gives maximum hanger spacing for copper and steel lines but hangers shall be more closely spaced where necessary:

SIZE OF LINE	HANGER SPACING
3/4" and smaller	5′
1"	6′
1-1/4"	7′
1-1/2"	8′
2" to 4"	10′
Larger than 4"	12′

F. If pipes of different Contractors can be racked on the same supporting structure, each Contractor shall cooperate with the other involved to properly locate the supporting members and shall furnish a proportionate share of the labor and materials involved in the installation.

3.3 EXPANSION AND CONTRACTION OF PIPES

A. Swing joints, turns, expansion loops, or long offsets, shall be provided wherever shown on the drawings, and where necessary to allow for the expansion of piping within the building. Broken pipes or fittings due to rigid connection shall be removed and replaced at the Contractor's expense. Anchors shall be installed where shown or required to control expansion of piping system. Anchors shall be of the clamp type securely fastened to the building structure.

3.4 UNIONS

A. Unions shall not be placed in any pipe in a location which will be inaccessible after completion of the building unless shown on drawings or specified. Unions shall be installed on both sides of all valves, regulators, check valves, traps, etc., so that such equipment may be readily disconnected. Where copper pipe joins iron or steel pipe, an insulation union using a "Bakelite" insulator shall be used.

3.5 ESCUTCHEONS

A. Where exposed to view, pipes insulated or bare, passing through floors, walls, or ceilings, shall be filled with near, heavy spun or stamped steel escutcheons, firmly secured to the pipes. Escutcheons shall be of sufficient outside diameter to surround both the pipe and the sleeves. The sleeve shall have a nickel plated finish, fabricated in one piece and shall be firmly anchored in space. "Snap-on" type escutcheons will not be permitted.

3.9 PAINTING

A. No painting will be required under this section.

3.10 TESTING

A. This contractor shall test all plumbing lines and equipment as described under "Testing" section of these specifications.

3.11 ELECTRICAL

A. Electric motors shall be of the speed, phase and voltage as specified and shall be of type recommended by motor manufacturer for type of service involved.

B. The Contractor furnishing the motor shall install it. The Contractor shall furnish such motor controls and starting equipment as specified or as required. The erection and connection of all switches, starting and control equipment, and the wiring of same, shall be done as required. Conduits from controllers to motors shall be flexible for not over three feet (3′) and shall be attached to the terminal housing of the motor. All flexible conduit to motor shall be waterproof type with neoprene jacket.

C. Where automatic controls are called for in the Plumbing, Heating and Air Conditioning specifications, the control instruments, such as motorized damper motors, motorized valves, etc., shall be installed by the Contractor furnishing the controls. All wiring necessary shall be done by the Electrical Contractor. The Contractor furnishing the controls shall furnish a control wiring diagram to the Electrical Contractor.

D. Starters on air cooled condensing units shall be furnished by the equipment manufacturer. Starters for Heating and Ventilating units shall be furnished by the equipment manufacturer.

3.12 PIPE SLEEVES

A. Each contractor shall provide sleeves for service lines passing through walls, roof or floors, subject to Architect's approval and/or as shown on the Drawings. Pipes passing through interior wall sleeves shall be free to move through sleeve. Sleeves exposed to view shall be equipped with cast brass escutcheons.

B. All sleeves installed in vertical position shall be constructed of standard weight galvanized steel pipe. All sleeves in horizontal position shall be constructed of standard weight steel or extra heavy cast iron pipe unless otherwise noted, welded to steel plate in vertical position as detailed on the drawings. Pipe sleeve diameter shall be a minimum of 2 diameters larger than the outside of pipe passing through same, and a minimum of 1" larger than pipe plus insulation. Insulation shall pass through sleeves.

C. Where pipe extends through exterior walls below grade, oversize pipe sleeves, 2 diameters larger,made of standard weight steel pipe shall be used, and the annular space between service pipe and sleeves shall be filled with picked oakum and cement, or lead where required, to make a waterproof joint.

D. All sleeves shall be installed flush with finished surfaces and/or as detailed on the Drawings. Copper pipes passing through steel pipe sleeves shall be installed with rubber insulation between pipe and sleeves Isolator insulation shall be similar to Johns-Manville Aeratube.

E. Where any pipe passes through fire walls, smoke walls, and concrete slabs between floors, the Contractor shall furnish and install fire seals, U.L. listed, type LS, link-seal, as manufactured by Thunderline Corp., or approved equal. Fire and smoke seals shall be installed in steel pipe sleeve of correct size for pipe and insulation.

3.13 INSULATING COUPLINGS

A. This Contractor shall furnish and install insulating couplings wherever piping material changes from galvanized steel pipe to copper, or from black steel to copper, and where shown on the drawings.

3.14 INSULATION

A. Furnish and install pipe, duct, and equipment insulation as specified under "Insulation" section of these specifications.

3.15 LABELS

A. Mechanical equipment shall have a permanent metal tag or laminated plastic (min. thickness .093 inch) attached by riveting to identify as shown on the drawings, and a brief description of the space served. Letters on tag shall be 1/4" to 3/8" in height.

3.16 FLOOR AND CEILING PLATES

A. All exposed pipes passing through floors, ceiling, or walls shall be provided with approved nickel or chromium plated cast brass ceiling plates securely attached with set screws.

3.17 DEMOLITION

A. Each contractor shall remove those items shown on the plans to be removed for each respective trade.

B. All items to be removed or discarded are property of the Owner and shall be stacked as directed by the Architect or Owner unless notified by the Architect to become property of the Contractor in which case all items shall be removed from the site.

C. Contractor shall take care not to damage more of the existing facilities than is absolutely necessary. All concrete to be removed shall be cored or sawed to widths to allow the installation of pipes or conduits indicated and replaced by Contractor who occasions the work.

3.18 EQUAL MATERIAL CONSIDERATION

A. Approval of equipment other than that specified does not relieve the Contractor from the responsibility of modifying the equipment if necessary to meet Structural, Architectural, Electrical, or Mechanical conditions as detailed and specified on the drawings.

3.19 INSTRUCTION MANUALS

A. Furnish four (4) complete bound copies of Instruction Manuals on all operating equipment to Owner. Manuals: complete with repair instructions, replacement parts list, and complete operating instructions and wiring diagrams.

3.20 TESTS AND ADJUSTMENTS

A. After completion of the work but before final payment is made, the Contractor shall run test over a sufficient period of time to prove the proper capacity and performance of apparatus, etc., and of system as a whole to the approval of the Architect and Engineer. See Testing section of the Specifications.

3.21 GUARANTEE

A. This Contractor shall guarantee the workmanship and material against defects for a period of one (1) year from the date of acceptance, unless specified otherwise in other sections of this specification.

END OF SECTION 15010

SECTION 15020 – TESTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide specified testing and commissioning, as required by the International Energy Conservation Code (IECC) and all governing authorities.

1.2 RELATED DOCUMENTS

A. Refer to other applicable clauses and regulations for other requirements.

PART 2 - PRODUCTS

2.1 SUBMITTAL

A. All submittal required by this section shall be submitted in accordance with Section 01300.

B. Submit a certificate signed by the job superintendent certifying that all tests have been satisfactorily completed.

PART 3 - EXECUTION

3.1 MECHANICAL SYSTEMS

A. All testing required under the contract of the plumbing contractor or heating and ventilating and air conditioning contractor shall be approved by the Engineer before acceptance.

B. The contractor shall perform the various tests as specified and as required by State and Local Authorities. The Contractor shall furnish all fuel and materials necessary for making tests.

C. Any leaks or defective material found shall be repaired and replaced, and tests shall be repeated until no further leaks or defects are indicated.

D. Drainage System: The entire drainage and venting system shall have all necessary openings plugged to permit the entire system to be filled with water to the level of the highest vent stack without showing a drop of greater than four inches (4"). Where a portion of the system is to be tested, the test shall be conducted in the same manner as described for the entire system, except that a vertical stack ten feet (10') above the highest horizontal line to be tested may be installed and filled with water to maintain sufficient pressure, or a pump may be used to supply the required pressure. The pressure shall be maintained for four (4) hours.

E. Air Balancing: All supply and return air registers shall be balanced by the Contractor to supply CFM shown, and results of all tests, together with type of equipment used, shall be submitted to the Architect's office at completion of the job, and if the Architect deems it necessary, this Contractor shall perform such tests as may be necessary to illustrate to the satisfaction of the Architect that equipment installed performs properly. Damper operators shall be accessible for adjustment.

END OF SECTION 15020

SECTION 15060 - PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This contract shall include the furnishing and installation of all labor and material necessary to complete all plumbing and gas fitting as shown on the drawings and as herein specified.

1.2 RELATED DOCUMENTS

A. Refer to other applicable clauses and regulations for other requirements.

1.3 SUBMITTAL

A. All submittal required by this section shall be submitted in accordance with Section 01300.

B. Submit manufacturer's data for approval on all materials to be furnished as part of this project.

PART 2 - PRODUCTS

2.1 PIPING GENERALLY

A. Type of piping for the various systems shall be as specified under specific headings.

B. Pipe ends shall be square cut. Ends of pipes shall be reamed and shall be wiped clean to remove cuttings. Before installation, pipe shall be stood on end and rapped sharply to remove cuttings and other foreign material from interior. Pipe shall be thoroughly cleaned inside and outside.

C. Screwed joints shall be made with best linseed oil and graphite or "Jointite" used on male threads only. Omit compound on two (2) end starting threads.

D. Pipe shall be accurately cut to fit. Bending or springing of pipe will not be permitted.

E. The various service pipes, valves, fittings, etc., running parallel with each other and near together shall be in line with each other and shall be kept a sufficient distance from each other and other work, to permit not less than 1/2" between finished coverings on the different services.

F. No unions are to be placed in any pipe in a location which will be inaccessible after completion of the building unless so shown on drawings or specified. Unions must be installed on each side of all special valves, regulators, etc., and one (1) side of all check valves, thermostatic traps, and at all pieces of equipment such as pumps, condensers, tanks, etc., so that such equipment may be readily disconnected.

G. Each Contractor shall furnish all foundations, structural or pipe supports indicated or called for specifically, or that may be required to support his particular equipment and material, unless hangers are definitely indicated as being furnished by others. All horizontal runs of piping shall be securely supported by pipe hangers spaced not more than 10′ apart, and closer when necessary to prevent sagging. Soil pipe shall be supported every 5′.

H. Perforated strap hangers will not be allowed for any part of hangers.

I. Swing joints, offsets, and anchors shall be provided in piping where required to provide for and control expansion or contraction of pipe.

J. All piping, except waste piping, shall be installed above finished first floor slab, unless otherwise noted on the Drawings.

2.2 EQUAL MATERIALS CONSIDERATION

A. Approval of equipment other than that specified does not relieve the Contractor from the responsibility of modifying the equipment if necessary to meet Structural, Architectural, Electrical, or Mechanical conditions as detailed and specified on the drawings.

2.3 MATERIALS

A. Locations for various kinds of pipe materials shall be in accordance with the schedule following:

1. Plastic DWV pipe and fittings:
   a. Sanitary drainage piping within the building.
   b. Aboveground vent piping.
2. Type L hard drawn copper with brass solder fittings:
   a. Drainage pipe where shown on the drawings
3. Cross-linked Polyethylene (PEX-A) Tubing
   a. Domestic water piping within the building

PART 3 - EXECUTION

3.1 COPPER PIPING:

A. Pipe and tubing shall be cut accurately to measurements established at the building by the Contractor and shall be worked into place without springing or forcing. Care shall be taken not to weaken the structural portions of the building. Piping aboveground shall be run parallel with the lines of the building unless otherwise shown or noted on the drawings. Fittings shall be kept a sufficient distance from other work and not less than 1/2" between finished covering on the different services. Changes in sizes shall be made with reducing fittings. The use of long screws and bushing will not be permitted.

B. Drains indicated on the drawings in connection with the water distribution system shall be 1/2" brass plugs. Additional drains shall be installed at low points on the hot-water and cold-water piping, and all piping shall grade down to the drains.

C. Allowance shall be made throughout for expansion and contraction or tubing. Horizontal runs of tubing over 50′ in length shall be anchored to the wall or to the supporting construction about midway on the run to force expansion, evenly divided, toward the ends.

D. Tubing shall be cut square, and burrs shall be removed. Both inside of fittings and outside of tubing shall be well cleaned with steel wool before sweating. Care shall be taken to prevent annealing of fittings and tubing when making connections. All joints shall be made with fittings. Joints for aboveground soldered fittings shall be made with a non-corrosive paste flux and solid string silver solder, and all underground joints shall be made with silfos only. Cored solder will not be permitted. Threaded swing joints shall be provided on all branch connections to mains and risers to provide for expansion and contraction of tubing. 95-5 solder shall be used to make joints extending to fixture only.

3.2 PEX WATER PIPING:

A. Install PEX tubing in accordance with the tubing manufacturer's recommendations and as indicated in the installation handbook.

B. Do not install PEX tubing within 6 inches of gas appliance vents or within 12 inches of any recessed light fixtures.

C. Do not solder within 18 inches of PEX tubing in the same waterline. Make sweat connections prior to making PEX connections.

D. Do not expose PEX tubing to direct sunlight for more than 30 days.

E. Ensure no glues, solvents, sealants or chemicals come in contact with the tubing without prior permission from the tubing manufacturer.

F. Use grommets or sleeves at the penetration for PEX tubing passing through metal studs.

G. Protect PEX tubing with sleeves where abrasion may occur.

H. Use strike protectors where PEX tubing penetrates a stud or joist and has the potential for being struck with a screw or nail.

I. Use tubing manufacturer-supplied bend supports where bends are less than six times the outside tubing diameter.

J. Minimum horizontal supports are installed not less than 32 inches between hangers in accordance with plumbing codes and the installation handbook.

K. PEX riser installations require epoxy-coated riser clamps installed at the base of the ceiling per floor.

L. A mid-story support is required for riser applications.

M. Pressurize PEX tubing with air in accordance with applicable codes or in the absence of applicable codes to a pressure of 25 psi above normal working pressure of the system.

N. Comply with safety precautions when pressure testing, including use of compressed air, where applicable. Do not use water to pressurize the system if ambient air temperature has the possibility of dropping below 32°F.

3.3 DOMESTIC HOT AND COLD WATER VALVES AND FITTINGS

A. Valves and fittings for all domestic cold water and hot water services shall be as follows:

1. Valves shall be ball valves.
2. Swing check valves 3" and smaller shall be Crane No. 137. Swing checks larger than 3" shall be Crane No. 14493.
3. Lift check valves 3" and smaller shall be crane No. 366E.

3.4 PIPE HANGERS AND FIXTURE SUPPORTS

A. Pipe hangers and fixture supports shall be furnished and set, and the Contractor shall be responsible for their proper and permanent locations.

B. Horizontal runs of copper tubing shall be supported by approved steel plastic coated hangers spaced not more than 8′ o.c. Horizontal runs of drainage and vent pipes shall be supported by adjustable expansion pipe hangers having bolted hinged loops and turnbuckles, or an approved equal. Hangers on drainage and vent pipe shall be spaced not more than 10′ o.c. Hanger and collars shall be of size proportionate to the weight of the pipe supported.

C. Fixtures and equipment shall be supported and fastened in a satisfactory manner. Where secured to concrete or brickwork walls, they shall be fastened with brass expansion bolts. Expansion bolts shall be 1/4" brass bolts with 20 threads to the inch and of sufficient length to extend at least 3" into solid concrete or brickwork, fitted with loose tubing or sleeves of proper length to bring expansion sleeves in the solid concrete or brick wall. Where secured to tile walls or partitions, they shall be fastened with 1/4" brass toggle or through bolts. Where through bolts are used, they shall be provided with plates or washers at back, set so that heads, nuts, and washers will be concealed by plaster. Bolts and nuts shall be hexagon, and exposed bolts, nuts, and screw heads shall be provided with chromium plated brass washers.

D. Copper pipe hangers shall be similar to Grinnell No. 260 with plastic coating for non-insulated water piping

and Grinnell No. 300 for insulated water piping. Drainage and vent pipe hangers shall be similar to Grinnell No. 590.

END OF SECTION 15060

SECTION 15250 - INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. This contract includes furnishing and installing all insulation specified herein.

1.2 RELATED DOCUMENTS

A. Refer to other applicable clauses and regulations for other requirements.

1.3 SUBMITTAL

A. All submittal required by this section shall be submitted in accordance with Section 01300.

B. Submit manufacturer's data for approval on all materials to be furnished as part of this project.

PART 2 - PRODUCTS

2.1 PIPE AND DUCT INSULATION

A. All insulation required under the Plumbing contract and Heating and Air Conditioning Contract shall be equal to and as manufactured by Knauf Fiber Glass, or Johns-Manville, and shall be applied in accordance with the manufacturer's directions and recommendations.

B. Insulation:

1. Water Piping Within Building Lines - Shall be insulated with 1" thick fiber glass pipe insulation with a factory applied all service jacket with self-sealing lap.
2. Pipe Fittings - Insulate pipe fittings with Manville Zestons according to manufacturer's recommendation.
3. Condensate Drain Lines - Shall be insulated with Johns-Manville Aerotube, 1/2" thick, or approved equal. Secure joints with #57 adhesive.
4. PVC, CPVC, or any flammable piping, shall be fully wrapped with foil face fiberglass duct wrap in installations exposed to a return air plenum.
5. Overhead Heating and Air Conditioning Sheet Metal Ducts Above Ceilings -Shall be insulated with 2" fiber glass duct wrap with aluminum foil Kraft vapor barrier, and shall be secured to ductwork with an approved adhesive and be sealed and stapled in place, 3/4 lb. density.
6. Contractor at his option may use interior duct liner in lieu of exterior insulation. Duct liner shall be Certainteed #150 Ultralite Duct Liner, or approved equal, 1-1/2 lb. per cubic ft. density with vinyl spray one side. All transverse joints shall be protected against air erosion by properly sealing all edges and securing with sheet metal clips. Duct liner shall be secured with mastic, 100% coverage and clips 18" on center. All exposed rectangular ducts shall be lined.

C. Where insulation is indicated to be applied inside of ducts, exterior insulation will not be required.

D. Where insulation occurs inside of ducts, allowance shall be made in sheet metal ductwork to accommodate the total insulation thickness. Duct dimensions indicated represent net inside clearances.

E. Condensate lines shall be insulated with 1" thick fiber glass pipe insulation with a factory applied all service jacket with self sealing lap.

2.2 EQUAL MATERIALS CONSIDERATION

A. Approval of equipment other than that specified does not relieve the Contractor from the responsibility of modifying the equipment if necessary to meet Structural, Architectural, Electrical, or Mechanical conditions as detailed and specified on the drawings.

2.3 SMOKE AND FLAME SPREAD

A. All duct and pipe insulation shall have a flame spread no greater than 25 and a smoke developed rating no greater than 50.

PART 3 - EXECUTION

3.1 INSULATION

A. All insulation shall be applied to clean surfaces and in accordance with the manufacturer's recommendations.

END OF SECTION 15250

SECTION 15400 - PLUMBING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This contract will include the furnishings and installation of all labor and material necessary to complete all plumbing and gas fittings as shown on the drawings and as herein specified as follows:

1. Water supply and service.
2. System of sanitary drainage, venting and connection to all fixtures as shown on the drawings.
3. Furnishing and installation of all fixtures as shown on the drawings and as herein specified.

1.2 RELATED DOCUMENTS

A. Refer to other applicable clauses and regulations for other requirements.

1.3 SUBMITTAL

A. All submittals required by this section shall be submitted in accordance with Section 01300.

B. Submit manufacturer's data for approval on all materials to be furnished as part of this project.

PART 2 - PRODUCTS

2.1 EQUAL MATERIAL CONSIDERATION

A. Approval of equipment other than that specified does not relieve the Contractor from the responsibility of modifying the equipment if necessary to meet Structural, Architectural, Electrical, or Mechanical conditions as detailed and specified on the drawings.

2.2 TRAPS

A. Each fixture and piece of equipment requiring connections at the drainage system shall be equipped with a trap. Traps installed on hub-and-spigot pipe shall be extra-heavy cast-iron. Traps installed on threaded pipe shall be recess drainage pattern. All floor drains shall be equipped with a deep seal trap.

2.3 CLEANOUTS

A. Cleanouts shall be the same size as the pipe, except that cleanout plugs larger than 4" will not be required. Cleanouts and access covers at finished walls and exterior walls shall be Wade Co. 8570-R N.B. cover and at finished floors shall be Wade Co. 8550-5 with Wade No 8300-S #2, N.B. cover, or the approved equal. Omit access covers for cleanouts in other locations. All wall covers shall be cadmium plated, and all floor cleanouts shall be polished nickel bronze flush with finish floor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Cross Connections and Interconnections: No plumbing fixtures, device or piping shall be installed which will provide a cross connection or interconnection between a distributing supply for drinking or domestic purposes and a polluted supply such as a drainage system of a soil or waste into the water supply system. Provide any and all backflow prevention devices as required by code.

B. The Contractor shall provide all necessary material and labor to connect to the Plumbing System all fixtures and equipment shown on the drawings having plumbing connections and which are furnished and installed by others or are specified in other sections of these specifications.

C. The Contractor shall carefully investigate the structural and finish conditions affecting all his work and shall arrange such work accordingly, furnishing such fittings, traps, valves, and accessories as may be required to meet such conditions. Where pipes extend through concrete members, this Contractor shall core all such members and slabs, unless sleeves have been provided. Chipping concrete will not be allowed, and if any coring of the concrete members is necessary, this contractor shall call it to the Architect's attention before doing same.

D. Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water and chemical or mechanical injury. At the completion of the work the fixtures, materials, and equipment shall be thoroughly cleaned.

END OF SECTION 15400

SECTION 15500 - AUTOMATIC FIRE PROTECTION SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section covers the materials, design, installation and testing of the automatic fire protection system as specified and shown on the drawings. Contractor shall reconfigure the complete system in accordance with NFPA 13 for the type facility involved and ensure 100% coverage for the renovated portion the building included in this project.

B. Referenced Standards: The following publications form a part of this specification to the extent indicated by the reference thereto:

1. National Fire Protection Association (NFPA) Standards:
   No. 13 - Standard for the Installation of Sprinkler Systems
2. Underwriters Laboratories, Inc. (UL) Publication:
   Fire Protection Equipment List
3. Factory Mutual System (FM) Publication:
   Approved Guide

C. General Requirements: The sprinkler system shall be installed in strict accordance with all mandatory and recommended provisions of NFPA No. 13 for wet pipe systems.

D. Design: Hydraulic design shall be based on an occupancy of light hazard.

E. Authority Having Jurisdiction: For interpretation of the NFPA Standard the "Authority Having Jurisdiction" referred to in the Standard shall be the Fire Marshal. The Contractor agrees to accept such interpretations by the same without additional cost to the Owner.

F. Qualification of the Contractor: The Fire Protection System shall be installed by an experienced firm regularly engaged in the installation and design of automatic sprinkler systems. The Contractor shall have a "Certificate of Registration" or proof of qualifications as required by the State or the Fire Marshal. The fire protection design and layout shall have the approval of the Engineer and Fire Marshal. The Engineer may reject any proposed installer who cannot show evidence of such qualifications.

G. Materials and Equipment List and Approval: The Contractor shall submit to the Engineer for approval a complete list of all materials, equipment and accessories proposed for installation, in compliance with the drawings and specifications. This list shall include catalog identification numbers, drawings, catalog cuts, and other descriptive data and material necessary to define completely all components of the work. No consideration will be given to partial list submitted from time to time. Approval of materials and equipment will be based on manufacturer's published data, and will be tentative, subject to submission and approval of complete shop drawings.

H. Shop Drawings:

1. The contract drawings show the areas which require sprinkler systems. The Contractor shall submit complete working drawings on reproducible mylars and calculations of the sprinkler system and such other descriptive data as the Engineer may require to demonstrate compliance with the contract documents.
2. Shop drawings will be submitted at one time to demonstrate that pertinent items of equipment have been properly coordinated and will function properly with each other. No installation work will be permitted prior to approval of complete shop drawings.
3. Submittal drawings shall be accurately drawn on blank mylar or vellum sheets. Drawings shall be identical in size, scales, and orientation as the contract drawings, and conform to the requirements established for working plans by NFPA No. 13.
4. If departures from the contract drawings are deemed necessary by the Contractor, details of such

departures, including changes in related portions of the project and the reasons, therefore, shall be submitted with the shop drawings and hydraulic calculations. Approved departures shall be made at no additional cost to the Owner.

5. All calculations shall be submitted for approval showing piping designs, water supplies, available pressures, residual pressures, etc. as required by NFPA for hydraulic designs.

I. Record Drawings: Upon completion of the work, the Contractor shall revise the original shop drawings to agree with the construction as actually accomplished. These drawings shall be delivered to the Engineer.

1.2 RELATED DOCUMENTS

A. Applicable requirements of the General Conditions, Supplementary Conditions and General Requirements apply to the work specified in this section.

1.3 EQUAL MATERIAL CONSIDERATION

A. Approval of equipment other than that specified does not relieve the Contractor from the responsibility of modifying the equipment if necessary to meet Structural, Architectural, Electrical, or Mechanical conditions as detailed and specified on the drawings.

PART 2 PRODUCTS

2.1 GENERAL

A. All material and equipment shall be new and the current standard products of the manufacturer. Where two or more items of equipment performing the same function are required, they shall be exact duplicates, produced by one manufacturer. However, component parts need not be products of the same manufacturer.

B. All materials and equipment shall be UL listed and/or FM approved for systems of the type indicated on the drawings, and conform to the requirements of NFPA No. 13.

2.2 MATERIALS AND EQUIPMENT

A. The following is a listing of materials and equipment requirements. It is not intended that all items will necessarily be required, but that those required for the work conform to this listing.

1. Pipe and Fittings: All pipe and fittings shall be non-galvanized except where galvanized is required by NFPA No. 13.

ITEM	SIZE (INCHES)	SPECIFICATION
Pipe	All Above ground	Schedule 40 or Schedule 10 Steel, ASTM A120-83 or A53
Fittings screwed	All	Cast iron 125 lb. on Sprinkler System
Fittings flanged	All	Cast iron 125 lb. on Sprinkler System
Fittings welding	All	Steel, Sch. 40, ANSI B16.2
Grooved Fittings	All	Malleable iron ASTM A47-77 or Ductile iron ASTM 536 500 lb.
Flanges	All	Cast iron 125 lb. on Sprinkler System

Threadolets sockolets	Through 2"	Steel, ANSI B16.11, ASTM A105
Weldolets	2" & larger	Steel, 90 deg. STD only, ANSI B16.9, ASTM A105
Unions	Through 2"	Malleable iron, 300 lb. bronze to iron ground joint
Pipe	All Below Ground	Class 150 Ductile Iron or PVC Clowe
Fittings	Below Ground	Class 150 Mechanical Joint, Trinity Valley
Sprinkler Head Type		Semi-Recessed
Vertical supports, all hangers and connections (non-seismic bracing)	All	Approved type, in accordance with NFPA No. 13 requirements
Sprinkler escutcheons		One or two-piece chrome depth as required to provide clearance in accordance with NFPA No. 13 except where otherwise specified on drawings
Sprinkler Guard		Approved guard, standard baked enamel finish

PART 3 EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

A. Piping material, including valves and fittings shall be delivered to the site in a clean condition and protected against entry of foreign material.

3.2 CLEANING

A. Prior to erection the interior or all piping shall be cleaned of all metal cuttings, loose scale, or other foreign materials. At the discretion of the Engineer, non-welded piping and welded piping with backing rings may require brush cleaning as above. After erection and prior to testing, all valves, caps, and plugs at all low points in the system shall be opened and the system thoroughly flushed with water.

3.3 JOINTS

A. Joints shall be the threaded, flanged, welded, or grooved. Shop welded joints in accordance with NFPA No. 13 will be permitted. Flanged connections shall be provided where indicated on the drawings or required by NFPA No. 13.

1. Threaded Joints: Threads shall be concentric with the outside of the pipe and shall conform to ANSI B2.1. Threaded joints shall be made tight with an approved thread joint compound or tape. Joint compound shall be applied lightly but sufficiently to cover male threads only. Leaking joints shall not be repaired by peaning or packing.
2. Flanged Joints: Flanged joints shall be faced-true, provided with non-metallic full face gaskets and made square and tight. When made up, flange bolts shall extend through nuts by at least one full thread. No flanges shall be placed in locations which will be inaccessible after erection.
3. Welded Joints: All welding, including methods and qualifications of welders, shall be in strict accordance with the standards and requirements specified in NFPA No. 13. Welded branch connections to headers shall be made by the use of threadolets, sockolets, and weldolets.

4. Groove Joints: All grooving shall be in accordance with NFPA No. 13.
5. Cutting: Pipe shall be cut accurately to measurements shown on the drawings and to suit field conditions, and shall be carefully worked into place without forcing or springing. All cuts shall be reamed to remove fins and burrs.

3.4 PIPE SUPPORTS AND HANGERS

A. Special supports and hangers shall be as detailed and located on drawings. Supports and hangers not detailed on drawings shall be an approved type, installed in accordance with NFPA No. 13. Ring hangers shall be of the adjustable type. Offsets in hanger rods will not be acceptable.

3.5 PIPE SLEEVES

A. Pipes passing through concrete or masonry walls or concrete floors shall be provided with pipe sleeves. Each sleeve shall extend through its respective wall or floor, and be of sufficient size as to provide a minimum of 1/2" all-round clearance between pipe and sleeve. Sleeves in walls shall be cut flush with the surface and sleeves in floors shall extend two inches above floor surfaces, unless otherwise shown on drawings. Sleeves in non-bearing walls, floors, or ceilings may be steel pipe, cast iron pipe, or galvanized sheet metal with lock-type longitudinal seam.

B. Where pipes pass through fire walls, fire partitions, or floor/ceiling assemblies, the Contractor shall furnish and install fire seals, U.L. listed, type LS, link seal, as manufactured by Thunderline Corp. Fire and smoke seals shall be installed in steel pipe sleeve of correct size for pipe and insulation.

3.6 ESCUTCHEONS

A. Pipe escutcheons shall be provided at all finished surfaces where exposed piping passes through floors, walls or ceilings. Sprinkler escutcheons shall be provided for all pendent heads through ceilings. Escutcheons shall be fastened securely to the pipe.

3.7 SIGNS

A. All control, drain and inspector's test valves shall be provided with identification signs.

3.8 SPARE SPRINKLERS

A. Spare automatic sprinklers with cabinets and one sprinkler wrench for each cabinet shall be furnished. The number and types of sprinklers shall be in accordance with NFPA No. 13 requirements for stock of spare sprinklers. The cabinets shall be mounted where indicated on drawings or directed by Engineer.

3.9 ELECTRICAL

A. All electrical work in connection with the installation of the fire protection system shall be performed in accordance with Section 16010 - General Electrical Provisions, and Section 16721 - Fire Alarm and Detection System.

3.10 TESTS

A. Upon completion and prior to acceptance of the installation, the Contractor shall subject the system to the tests required by NFPA No. 13 and furnish the Engineer with a test certificate signed by official of local fire department.

3.11 WARRANTY AND GUARANTEES

A. All materials and workmanship shall be guaranteed for one (1) year from date of completion to be free of defects.

END OF SECTION 15500

SECTION 15650 - AIR CONDITIONING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Contractor shall furnish and install where shown on the drawings, complete Summer-Winter, indoor and outdoor mounted air conditioning systems as shown on the drawings and as herein specified.

1.2 RELATED DOCUMENTS

A. Refer to other applicable clauses and regulations for other requirements.

1.3 SUBMITTAL

A. All submittal required by this section shall be submitted in accordance with Section 01300.

B. Submit manufacturer's data for approval on all materials to be furnished as part of this project.

1.4 REBATES AND INCENTIVES

A. Any, and all, rebates or incentives offered by utility companies or equipment manufacturers shall go directly to the Owner.

PART 2 - PRODUCTS

2.1 AIR CONDITIONING UNITS

A. All units shall be as specified in section 15700 and/or as scheduled on the drawings.

2.3 WARRANTIES

A. All heating and air conditioning equipment shall have a five year warranty on compressors, 10 years on heat exchangers and 1 year on all other parts.

PART 3 - EXECUTION

3.1 ADJUSTMENT

A. Upon completion of work the Contractor shall balance the system so that the quantity and proper velocity of air is delivered at each outlet uniformly as indicated on the drawings to within ten percent (10%). Necessary adjustment shall be made to the system to produce these quantities of air, and to eliminate any objectionable drafts or noise which might exist. Balance adjustments shall be made upstream of the registers and diffusers, leaving the O.B.D. in each grille neck fully open.

B. When balancing has been completed, the Contractor shall provide the Architect with all necessary data, readings, and velocities at each outlet to substantiate that the systems are balanced and providing the necessary quantities of air as shown on the drawings.

END OF SECTION

SECTION 15700 – DECENTRALIZED HVAC EQUIPMENT

PART 1 – GENERAL

1.1 SYSTEM DESCRIPTION

A. SYSTEM DESCRIPTION:
1. Daikin Variable Refrigerant Volume Series (heat and cool model) split systems, as specified, is the basis of design. Systems by other manufacturers, that are equal in performance and operating features, may be offered as an alternate. Other acceptable manufacturers, to be considered include Carrier-Toshiba, Hitachi, and LG.

B. QUALITY ASSURANCE
1. Units shall be ETL listed and certified to UL 1995 4th edition standard.

C. WARRANTY
1. The units shall be covered by the manufacturer's limited warranty for a period of five (5) years from date of installation. In addition the compressor shall have a manufacturer's limited warranty for a period of seven (7) years from date of installation.

PART 2 – PRODUCTS

2.1 INDOOR DUCTED FAN COILS

A. General:
Indoor, direct-expansion ducted fan coil. Unit shall be complete with a coil, fan driven by DC inverter motor, PMV (pulse modulating valve), piping connectors, electrical controls, microprocessor control system, integral temperature sensing, condensate pump drain-pump with a lift capability of 10.7 in., and hanging brackets.

B. Unit Cabinet:
Cabinet shall be constructed of zinc-coated steel. The unit shall be capable of being configured for either bottom or rear return. The cabinet shall have a knockout for fresh air intake.

C. Fans:
The fan shall be of the multi-blade type with its performance designed to match the coil performance. The fan shall be statically and dynamically balanced to ensure low noise and vibration and capable of up to 0.48 in. wg external static pressure.

D. Coil:
Coil shall be copper tube with aluminum fins and galvanized steel tube sheets. Fins shall be bonded to the tubes by mechanical expansion and specially coated for enhanced wettability. A drip pan under the coil shall have a factory-installed condensate pump and drain connection for hose attachment to remove condensate.

E. Motors:
Motors shall be totally enclosed, permanently lubricated ball bearing with inherent overload protection. Fan motors shall be inverter controlled variable speed.

F. Controls:
The system shall be microprocessor-controlled to maintain precise room temperature and minimum power consumption. The controls system shall employ a genetic algorithm for temperature control. Any of the following user interface accessories shall be compatible with the unit.
1. Wireless Remote Controller
Wireless remote controller kit shall include a hand held device and a receiver not integral to the unit. The receiver shall be field installed on the wall.
2. Wired Remote Controller

Wired remote controller shall communicate over two-core shielded wire up to 1640 ft. It shall be capable of controlling groups of up to 8 indoor units. It shall be able to operate as a primary or secondary controller when two remote controllers are connected to a single indoor unit or group. The system shall be able to be configured so that the return air (TA) can be sensed at the unit, at the remote controller or through a remote sensor. The local controller shall minimally be able to control On-OFF, set point, mode, and be able to display system generated error codes.

3. Central Controller (Smart Manager)
   Central controller shall communicate over two-core shielded wire up to 6500 ft and use existing indoor – outdoor communication protocol to communicate. A single central controller shall be capable of controlling up to 128 indoor units individually with capability to program maximum of 10 setups for each day. It shall be able to create 2 indoor unit line-ups with 64 units on each line. It shall provide master, weekly, four special day and monthly scheduling feature. During schedule operation, user can set the power status (ON/OFF), operation mode, temperature setup, and remote control operation, restricted / allowed, return back and ventilation operation. It shall provide a web interface for remote monitoring, control, and scheduling. It shall be capable of monitoring energy consumption for each tenant and generate monthly billing reports.
4. Central Controller (Touch Screen)
   Central controller shall communicate over two-core shielded wire up to 1600 ft and use existing indoor – outdoor communication protocol to communicate. A single central controller shall be capable of controlling up to 512 indoor units individually with capability to program maximum of 20 setups for each day. It shall provide master, weekly, five special day and monthly scheduling feature. In addition, an optional digital I/O interface shall provide alarm, fire and locking signals. It shall provide a web interface for remote monitoring, control, and scheduling. It shall be capable of monitoring energy consumption for each tenant and generate monthly billing reports.
5. Building Management Systems
   The system shall be able to be controlled by BACnet* or LonWorks† protocols either directly or through an external gateway.
   BACnet and LonWorks shall be able to control:
   a. ON / OFF
   b. operation mode
   c. fan speed
   d. louver
   e. set temperature
   f. permit / prohibit local operation
   BACnet and LonWorks shall be able to monitor:
   a. ON / OFF
   b. operation mode
   c. fan speed
   d. louver
   e. set temperature
   f. permit / prohibit local operation
   g. room temperature
   h. error status
   i. error code
   The VRF equipment provider shall provide the BN or LN interface device, as required, for connection to the Building Automation System (specified in 15900).
6. The unit shall have the following functions as a minimum:
   a. Selectable automatic restart. After power failure the system will restart at the same operating conditions as before the failure.
   b. Temperature-sensing controls shall sense return air temperature at the unit or at the remote control
   c. Indoor coil freeze protection in both cooling and heating (reversing valve failure) modes.
   d. Dehumidification mode shall provide increased latent removal through total system modulation.
   e. Fan-only operation to provide room air circulation when no cooling is required.

f. Fan speed control shall be user-selectable: high, medium, low, or microprocessor determined (Auto) based on the differential between the room temperature and the set point during all modes of operations.
g. Indoor coil high temperature protection shall be provided to detect excessive indoor discharge temperature in heating.
h. Cold blow prevention in heating.
i. Adjustable compensation for air stratification in heating.

G. Filters:
The cabinet shall be is supplied with a 1-in. filter track.

H. Electrical Requirements:
Indoor units are 208/230-1-60 (V-Ph-Hz).

I. Special Features (Accessories):
Fan guard

2.2 4-WAY CASSETTE

A. General:
Indoor, direct-expansion, in-ceiling fan coil. Unit shall be complete with a coil, fan driven by DC inverter motor, PMV (pulse modulating valve), piping connectors, electrical controls, microprocessor control system, integral temperature sensing, condensate pump with a lift capability of 24.7 in., and hanging brackets.

B. Unit Cabinet:
Cabinet shall be constructed of zinc-coated steel. Fully insulated discharge and inlet grilles shall be attractively styled, high-impact non- metallic material. The inlet grille shall have hinges and can be opened to obtain access to the cleanable filters, indoor fan motor and control box.

C. Fans:
1. Fan shall be centrifugal direct-drive blower type with air intake in the center of the unit and discharge at the perimeter. Automatic, motor-driven vertical air sweep shall be provided standard. Automatic motor-driven louvers shall be provided standard and shall be adjustable for 2, 3 or 4-way discharge.
2. Air sweep operation shall provide three user selectable modes.

D. Coil:
Coil shall be copper tube with aluminum fins and galvanized steel tube sheets. Fins shall be bonded to the tubes by mechanical expansion and specially coated for enhanced wettability. A drip pan under the coil shall have a factory-installed condensate pump and drain connection for hose attachment to remove condensate. A replaceable element in the condensate disposal system provides antibacterial protection.

E. Motors:
Motors shall be totally enclosed, permanently lubricated ball bearing with inherent overload protection. Fan motors shall be inverter controlled variable speed.

F. Controls:
The system shall be microprocessor controlled to maintain precise room temperature and minimum power consumption. The controls system shall employ a genetic algorithm for temperature control. Any of the following user interface accessories shall be compatible with the unit.
1. Wireless Remote Controller
Wireless remote controller kit shall include a hand held device and a receiver not integral to the unit. The receiver shall be field installed on the wall.
2. Wired Remote Controller (Lite Vision Plus)

Wired remote controller shall communicate over two-core shielded wire up to 1640 ft. It shall be capable of controlling groups of up to 8 indoor units. It shall be able to operate as a primary or secondary controller when two remote controllers are connected to a single indoor unit or group. The system shall be able to be configured so that the return air (TA) can be sensed at the unit, at the remote controller or through a remote sensor. The local controller shall minimally be able to control On-OFF, set point, mode, and be able to display system generated error codes.

3. Central Controller (Smart Manager)
   Central controller shall communicate over two-core shielded wire up to 6500 ft and use existing indoor – outdoor communication protocol to communicate. A single central controller shall be capable of controlling up to 128 indoor units individually with capability to program maximum of 10 setups for each day. It shall be able to create 2 indoor unit line-ups with 64 units on each line. It shall provide master, weekly, four special day and monthly scheduling feature. During schedule operation, user can set the power status (ON/OFF), operation mode, temperature setup, and remote control operation, restricted / allowed, return back and ventilation operation. It shall provide a web interface for remote monitoring, control, and scheduling. It shall be capable of monitoring energy consumption for each tenant and generate monthly billing reports.
4. Central Controller (Touch Screen)
   Central controller shall communicate over two-core shielded wire up to 1600ft/500m and use existing indoor – outdoor communication protocol to communicate. A single central controller shall be capable of controlling up to 512 indoor units individually with capability to program maximum of 20 setups for each day. It shall provide master, weekly, five special day and monthly scheduling feature. In addition, an optional digital I/O interface shall provide alarm, fire and locking signals. It shall provide a web interface for remote monitoring, control, and scheduling. It shall be capable of monitoring energy consumption for each tenant and generate monthly billing reports.
5. Building Management Systems
   The system shall be able to be controlled by BACnet* or LonWorks† protocols either directly or through an external gateway.
   BACnet and LonWorks shall be able to control:
   a. ON / OFF
   b. operation mode
   c. fan speed
   d. louver
   e. set temperature
   f. permit / prohibit local operation
   BACnet and LonWorks shall be able to monitor:
   a. ON / OFF
   b. operation mode
   c. fan speed
   d. louver
   e. set temperature
   f. permit / prohibit local operation
   g. room temperature
   h. error status
   i. error code
   The VRF equipment provider shall provide the BN or LN interface device, as required, for connection to the Building Automation System (specified in 15900).
6. The unit shall have the following functions as a minimum:
   a. Selectable automatic restart. After power failure the system will restart at the same operating conditions as before the failure.
   b. Temperature-sensing controls shall sense return air temperature at the unit or at the remote control

c. Indoor coil freeze protection in both cooling and heating (reversing valve failure) modes.
d. Automatic air sweep control to provide multiple operating modes of the air sweep louvers.
e. Dehumidification mode shall provide increased latent removal through total system modulation.
f. Fan-only operation to provide room air circulation when no cooling is required.
g. Fan speed control shall be user-selectable: high, medium, low, or microprocessor determined (Auto) based on the differential between the room temperature and the set point during all modes of operations.
h. Indoor coil high temperature protection shall be provided to detect excessive indoor discharge temperature in heating.
i. Cold blow prevention in heating.
j. Adjustable compensation for air stratification in heating.

G. Filters:
Unit shall have factory-supplied resin net (cleanable) type filters. The return air filter material shall have the following characteristics:
1. Odorless
2. Temperature resistant to 185 F
3. Humidity resistant up to 95% RH

H. Electrical Requirements:
Indoor units are 208/230-1-60 (V-Ph-Hz).

I. Special Features (Accessories):
Ceiling panel (grille)

2.3 VRV OUTDOOR UNIT

A. General:
Factory-assembled, single-piece, air-cooled outdoor unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, and the multiple inverter-driven twin rotary compressors.
1. The maximum sound pressure rating for a single module shall not exceed 66.5 dBA sound pressure in cooling and 67.0 dBA in heating. For twinned systems the sound pressure level shall not exceed 69.5 dBA and 70.0 dBA. For 3-module systems the sound pressure level shall not exceed 71.5 dBA and 71.5 dBA. Sound pressure ratings are measured at a distance of 3.28 ft out and 4.92 ft up from the side of the outdoor unit.
2. The outdoor unit shall include an oversized accumulator and a liquid tank for proper heating performance while allowing the indoor unit PMV (pulse modulating valve) metering device to shut off completely when a zone is satisfied.
3. The outdoor unit shall be protected by a high-pressure switch, high-pressure sensor, low-pressure sensor, fusible plug, PC board, and an inverter overload protector.
4. The outdoor unit shall be capable of operating in cooling mode down to 14 F dry bulb ambient air temperature and down to -13 F wet bulb ambient air temperature in heating. For simultaneous heating and cooling the unit shall be capable of operating between 14 F and 60 F ambient air temperature.
5. The outdoor unit shall include a total oil management system that balances oil between compressors within a module, replenishes compressor oil to the compressors in a module from the oil separator if required, and allows oil and refrigerant to move between twinned or 3-module units if required, even if one of the units is not running.

B. Unit Cabinet:
1. Unit cabinet shall be constructed of pre-coated steel, finished on both inside and outside.
2. Unit access panels shall be removable with minimal screws and shall provide full access to the compressors, fan, and control components.

3. Compressors shall be isolated in a compartment and have an acoustic wrap to assure quiet operation.
4. The outdoor unit control panel shall include a sliding window to access adjustable controls and an LED display for setup and diagnostics.
5. Unit cabinet shall be capable of withstanding 500-hour salt spray test per Federal Test Standard No. 141 (method 6061).
6. Units shall be securely mounted on the roof on Big Foot Systems Equipment Stands.

C. Fans:
1. Outdoor fan shall discharge air vertically and be driven by a DC-inverter variable-speed motor with 64 steps that is capable of running down to 60 rpm.
2. Outdoor fan motor shall be totally-enclosed with permanently-lubricated bearings.
3. Motor shall be protected by internal thermal overload protection.
4. Fan blade shall be non-metallic and shall be statically and dynamically balanced.
5. Outdoor fan shall be protected by a raised non-metallic protective grille.

D. Compressors:
1. Each outdoor unit module shall be equipped with two inverter-driven twin rotary compressors with full-range control to an accuracy of ±0.1 Hz.
2. Compressor shall be totally enclosed in the machine compartment.
3. Compressors shall be equipped with factory-mounted crankcase heaters.
4. Internal safety logic shall protect the compressor from over-temperature operation.
5. Compressor assembly shall be installed on rubber vibration isolators.
6. To maximize compressor reliability, multiple compressors within a module shall be started and operated in variable patterns to ensure equal run time on all compressors.
7. To ensure maximum efficiency throughout the system operation range, no compressor is required to run at maximum speed under any condition.

E. Outdoor Coil:
1. Coil shall be constructed of aluminum fins mechanically bonded to seamless copper tubes, which are cleaned, dehydrated, and sealed.
2. The coil configuration shall be 4-sided and fully separated from the machine compartment for more effective heat transfer and sound isolation.
3. The coil fins shall have a factory-applied corrosion resistant blue-fin finish.
4. All coils shall be protected by hail guards equal to WireGard coil guards, as manufactured by HardGard.

F. Controls and Safeties:
Operating controls and safeties shall be factory selected, assembled, and tested. The minimum control functions shall include the following:
1. Controls:
   a. Compressor speed to match the refrigerant flow and capacity with the system requirements.
   b. Outdoor fan motor speed for higher efficiency and lower sound.
   c. Oil control for improved system reliability and comfort
   d. Pulse modulating valve control for precise control of the refrigerant distribution and accurate capacity management to avoid starving any units.
   e. Control of compressor staging to maximize reliability and minimum run time on all compressors.
   f. Module control of compressor operation, compressor speed, and outdoor heat exchanger surface to maximize efficiency and sound level and reliability across the entire operating range of the system.
   g. Control of the outdoor heat exchanger surface (main vs sub heat exchangers) for maximum efficiency and comfort.
2. Safeties:
   The following safety devices shall be part of the condensing unit:
   a. High-pressure switch

b. Fuses
c. Crankcase heater
d. Fusible plug
e. Over current relay for the compressor
f. Thermal protectors for compressor and fan motor
g. Compressor time delay
h. Oil recovery system
i. Oil level sensor
j. Over-current sensor
k. Compressor suction and discharge temperature sensor
l. Compressor suction and discharge pressure sensor

G. Electrical Requirements:
1. All sizes shall utilize 208/230-3-60 or 460-3-60 (V-Ph-Hz) field power supply.
2. Modular systems shall have separate field power supply to each module.
3. Two-core, stranded, shielded low voltage cable shall be required for communication between outdoor and indoor unit.
4. All power and control wiring must be installed per NEC and all local electrical codes.

H. Refrigerant Piping and Line Lengths:
1. Piping connections shall be from the front or the bottom of the unit.
2. The unit shall be capable of operating with maximum connected refrigerant line lengths of 3281 ft (actual).
3. The outdoor unit shall have the ability to operate with a maximum height of 230 ft. between the outdoor and the lowest indoor unit.
4. The maximum distance between the outdoor unit and the furthest fan coil shall not exceed 591 ft actual or 656 ft equivalent. No line size changes or oil traps shall be required.
5. The system shall be capable of operating when the height difference between the upper and the lower fan coil is 131 ft.

I. Auxiliary Refrigerant Components:
1. All field supplied copper tubing connecting the outdoor unit to the indoor unit shall use factory-supplied branching kits consisting of either Y joints or headers to ensure even refrigerant flow.
2. To ensure piping flexibility the system shall allow having Y joints or headers downstream of another header.
3. For modular systems, in order to maximize efficiency and comfort, a 3/8-in. oil balance line shall be used to allow the flow of oil and refrigerant between the modular units even when one of the units is not running.
4. A flow selector box will be required to regulate the flow of high-pressure hot gas or high-pressure liquid to the fan coil requiring heating or cooling.
5. Up to 8 fan coils, all requiring same duty cycle, may be connected to a single flow selector box.
6. A fan coil that runs in cooling only shall not be required to connect to a flow selector box.
7. The single port flow selector box can be installed up to 49 ft from the indoor unit.
8. The multi port flow selector box can be installed up to 164 ft from the indoor unit.
9. The single port flow selector box shall be wired from the indoor unit using a factory-supplied power and control wire harness.
10. The multi port flow selector box shall be powered by a dedicated 208/230-1-60 field power supply.
11. The single port flow selector box shall not require a drain connection.
12. The multi port flow selector shall require a drain connection.
13. The single port and multi port flow selector box shall include a galvanized steel enclosure, and shall be tested prior to shipment.
14. The single port flow selector box shall include full interior insulation.

End of Section

SECTION 15840 - DUCTWORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work covered by this section of the specifications includes the furnishings of all material and labor as required for the installation of a complete duct system, as shown on the drawings and as herein specified.

1.2 RELATED DOCUMENTS

A. Refer to other applicable clauses and regulations for other requirements.

1.3 SUBMITTAL

A. All submittal required by this section shall be submitted in accordance with Section 01300.

B. Submit manufacturer's data for approval on all materials to be furnished as part of this project.

PART 2 - PRODUCTS

2.1 LOW VELOCITY - LOW PRESSURE DUCTWORK

A. All ductwork shall be of the sizes indicated on the drawings, shall be straight and smooth on the inside with neatly finished airtight joints. The ducts shall be installed as to be completely free of vibration. Metal duct slip joints shall be made with an inside radius of not less than the width of the duct, except that Factory Fabricated Air Turns shall be used where a sharper turn must be made or where otherwise indicated on the drawings. All takeoffs to registers shall be made with Factory Fabricated Deflectrols, or approved equal, and all major branches where noted on the plans shall have splitters with an accessible operating handle and locking device, Young Model No. 917 right angle gear and No. 1 ceiling regulator, or approved equal.

B. All ductwork shall be constructed of galvanized iron sheets fabricated and installed in accordance with SMACNA HVAC Duct Construction Standards for Low Velocity Systems.

C. Air turns shall be as manufactured by Barber-Colman, or approved equal. No job-built turning vanes will be used on this job. Where insulation is applied inside of ducts, turning vanes shall be installed inside of insulation.

D. After all ducts are installed, all dirt and debris shall be removed from inside of ducts.

E. Ductwork for round ducts shall conform to the latest edition ASHRAE guide.

F. All duct construction seam corners and connections shall be sealed with white "Permagum Slugs" as manufactured by Virginia Chemicals, Inc.

G. All ductwork shall be made airtight and reinforced as required for pressures as shown on the drawings.

H. All dimensions indicated shall be sheet metal dimensions. Allowance shall be made for internal insulation as it occurs, unless otherwise noted on the drawings.

2.2 ACCESS DOORS

A. Access doors in ductwork shall be 2" smaller in height than duct dimensions and 12" wide and located in accessible locations on both sides of all fire and smoke dampers. Doors in vertical position shall be equal to Ventlok insulated type, complete with all hinges, hardware and air seal. Doors in horizontal position shall be job built complete with sash lock, two (2) per side, and rubber air seal, all as manufactured by Ventlok, or approved equal.

2.3 ZONE VOLUME CONTROL DAMPERS

A. Volume control dampers shall be furnished and installed where shown on the drawings for all air unit zone ducts with locking operator installed on bottom side of ducts.

B. Dampers shall be the opposed blade type with corner bracing for stiffening as manufactured by Young Regulator Co., Model No. 817, or approved equal, of size shown on the drawings.

C. Spin-In taps shall be equal to Dace #MSD-CO5. With ROSSI seven position manual volume control.

2.4 FIBER DUCTWORK

A. Fiber ductwork will not be used on this job anywhere.

2.5 LOW PRESSURE FLEXIBLE CONNECTIONS

A. Furnish and install flexible connections of 30 ounce woven glass fabric from discharge and return openings of equipment to ductwork. The flexible connections shall be of a type that is airtight, equal to Ventfabrics "Ventglas", and shall be installed in such a manner that the air flow is not restricted nor the connection leaks air. At least 1" slack shall be allowed in connection to insure that no vibration is transmitted from fans to ductwork.

B. Fabric connections shall be UL approved.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All duct systems shall be installed in a workmanlike manner and shall provide a complete and working system.

B. Hangers for ductwork shall be galvanized steel straps and/or electro-plated zinc or hot-dipped galvanized after threading, threaded rods, minimum of 3/8" diameter.

C. Hangers shall be spaced a maximum of 8′-0" on center.

D. When threaded hanger rods are used, bearing plate shall be on channel and/or angle, hot-dipped galvanized after cutting, and drilling of hanger rod holes.

E. Hanger rods shall be secured to channels and/or angle by galvanized washer, nut, and locket nut. Hanger rods shall be suspended from super-structure.

3.2 CLEANING

A. After installation is complete, all equipment shall be thoroughly cleaned. Filters shall be cleaned and/or replaced with new. Damaged paint shall be sanded and touched-up. All damaged insulation shall be replaced.

END OF SECTION 15840

SECTION 15870 - GRILLES, REGISTERS AND CEILING DIFFUSERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work covered by this section of the specification includes the furnishing of all labor and materials as required for the installation of a complete air diffusing system as shown on the drawings, and as hereinafter specified. All side wall grilles, supply and returns, shall comply with NFPA Standard No. 90A.

1.2 RELATED DOCUMENTS

A. Refer to other applicable clauses and regulations for other requirements.

1.3 SUBMITTAL

A. All submittal required by this section shall be submitted in accordance with Section 01300.

B. Submit manufacturer's data for approval on all materials to be furnished as part of this project.

PART 2 - PRODUCTS

2.1 SIDE WALL REGISTERS

A. All side wall registers shall be extruded aluminum with removable cores.

2.2 CEILING SUPPLY DIFFUSERS

A. Ceiling supply diffusers, except where shown on the drawings and/or specified, shall be as shown on the drawings. All diffusers shall be equipped with deflectrols and opposed blade volume controls operated from the face of the diffusers.

B. Ceiling diffusers shall be of the removable core type for 1, 2, 3 or 4-way deflection as shown on the drawings.

2.3 CEILING RETURN AIR GRILLES

A. Ceiling return air grilles shall be all as shown on the drawings.

PART 3 - EXECUTION

3.1 GUARANTEE

A. This Contractor shall ensure that the grilles, registers and diffusers are recommended by the manufacturer for the installation in the surfaces as shown and the application shown.

END OF SECTION 15870

CONSULTANTS' PROFESSIONAL RESPONSIBILITY

The specifications sections to be authenticated by my seal and signature are limited to the following:

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SECTION 260110 - GENERAL PROVISIONS FOR ELECTRICAL

I. GENERAL

A. RELATED DOCUMENTS:

1. General: Drawings and general provisions of the Contract, including General and Supplementary Conditions, Special Conditions and other Division 1 Specification Sections, apply to this Section.

B. ELECTRICAL LINES:

1. General: In general, the electrical lines to be installed under these Specifications shall be run as indicated, as specified herein, as required by particular conditions at the site, and as required to conform to the generally accepted standards as to complete the work in a neat and satisfactorily workable manner. The following is a general outline concerning the running of electrical lines and is to be excepted where the drawings or conditions at the building necessitate deviating from these standards.
2. General Construction: The Contractor shall thoroughly acquaint himself with the details of the construction and finishes before submitting his bid as no allowances will be made because of the Contractor's unfamiliarity with these details. Place all inserts in masonry walls while they are under construction. All concealed lines shall be installed as required by the pace of the general construction to precede that general construction.
3. Field Conditions: The electrical Drawings do not give exact details as to elevations of electrical lines, exact locations, etc., and do not show all the offsets, and other installation details. The Contractor shall carefully lay out his work at the site to conform to the architectural and structural conditions, to avoid all obstruction, to conform to details of installation supplied by the manufacturers of the equipment to be installed, and thereby to provide an integrated, satisfactorily operating installation.
4. Locations of Electrical Devices: The electrical Drawings show diagrammatically the locations of the various electrical outlets and apparatus and the method of circuiting and controlling them. Exact locations of these outlets and apparatus shall be determined by reference to the general Drawings and to all detail drawings, equipment drawings, roughing-in drawings, etc., by measurements at the building, and in cooperation with other sections, and in all cases shall be subject to the approval of the Architect. It is assumed the Architect/Owner reserves the right to make any reasonable change in location of any outlet, switch, receptacle, fixture or panelboard or apparatus before installation (within a 10 feet radius of location shown on drawings) or after installation if an obvious conflict exists, without additional cost to the Owner.
5. Space Requirements: The Contractor shall be responsible for the proper fitting of his material and apparatus into the space. Should the particular equipment that any bidder proposes to install require other space conditions than those indicated on the drawings, he shall arrange for such space with the Architect before submitting his bid. Should changes become necessary on account of failure to comply with this clause, the Contractor shall make such necessary changes at his (the Contractor's) own expense.
6. Working Drawings: The Contractor shall submit scale working drawings of all his apparatus and equipment which in any way varies from these Specifications and Drawings. The Architect shall check these variations from the Specifications and Drawings before the work is started. Before the work proceeds, the contractor shall correct any interference with the structural conditions.
7. Order of Precedence: Order of precedence shall be observed in laying-out the conduit in order to fit the material into the space above the ceiling and in the chases and walls. The installation shall be coordinated with the work of all other trades. The following order shall govern:

    a) Items affecting the visual appearance of the inside of the building such as lighting fixtures, outlets, panelboards, etc. Coordinate all items to avoid conflicts at the site.
    b) Lines requiring grade to function such as sewers.
    c) Large ducts and pipes with critical clearances.

d) Conduit, water lines, and other lines whose routing is not critical and whose function bends and offsets would not impair.

8. Equipment Connections: Conduits serving outlets on items of equipment shall be run in the most appropriate manner. Where the equipment has built-in chases, the lines shall be contained therein. Where the equipment is of the open type, the lines shall be run as close as possible to the underside of the top and in a neat and inconspicuous manner.
9. Exceptions and Inconsistencies: Exceptions and inconsistencies in Drawings and Specifications shall be brought to the Architect's attention before the contract is signed. Otherwise, the Contractor shall be responsible for any and all changes and additions that may be necessary to accommodate his particular apparatus, material, or equipment.
10. Intent of Drawings and Specifications: The Contractor shall distinctly understand that the work described herein and shown on the accompanying drawings shall result in a finished and working job, and any item required to accomplish this intent shall be included whether specifically mentioned or not.
11. Examination of Drawings and Specifications: Each bidder shall examine the Drawings and Specifications for the General Construction. If these documents show any item requiring work under Division 16 and that work is not indicated on the respective Electrical drawings, he shall notify the Architect in sufficient time to clarify before bidding. If no notification is received, the Contractor is assumed to require no clarification, and shall install the work as indicated on the General Drawings in accordance with the Specifications.

C. DIMENSIONS:
1. General: Before ordering any material or doing any work, the Contractor shall verify all dimensions, including elevations, and shall be responsible for the correctness of the same. No extra charge or compensation will be allowed on account of differences between actual dimensions and measurements indicated on the drawings. Any difference that may be found shall be submitted to the Architect for consideration before proceeding with the work.

D. INSPECTION OF SITE:
1. General: The accompanying Drawings do not indicate completely the existing electrical installations. The bidders for the work under these sections of the Specifications shall inspect the existing installations and thoroughly acquaint themselves with conditions to be met and the work to be accomplished in removing and modifying the existing work, and in installing the new work in the present building and underground serving to and from that structure. Failure to comply with this shall not constitute grounds for any additional payments in connection with removing or modifying any part of the existing installations and/or installing any new work.
2. Utilities: Any overhead, underground or other type mechanical, electrical communication service of any nature damaged by the construction shall be restored to working condition during and after construction to the satisfaction of the Owner. The Owner will make every effort to assist the Contractor, but the location of services shall be the responsibility of the General Contractor and Electrical Contractor.

E. ELECTRICAL WIRING:
1. Description: All electric wiring of every character, both for power supply, for pilot and control, for temperature control, etc. will be done under Division 26 of these Specifications. Every electrical current consuming device furnished as a part of this project, or furnished by the Owner and installed in this project, shall be completely wired up under Division 26. Verification of exact location, method of connection, number and size of wires required, voltage requirements, and phase requirements is the responsibility of the Contractor under Division 26. If conflicts occur between the drawings and the actual requirements, actual requirements shall govern.

F. PROGRESS OF WORK:
1. General: The Contractor shall keep himself fully informed as to the progress of the work and do his work at the proper time without waiting for notification from the Architect or Owner.

G. MANUFACTURER'S DIRECTIONS:
1. General: All manufactured articles shall be applied, installed and handled as recommended by the manufacturer.

H. MATERIALS AND WORKMANSHIP:
1. Materials: All materials shall be new unless otherwise specified and of the quality specified. Materials shall be free from defects and undamaged. All materials of a type for which the Underwriters Laboratories, Inc. have established a standard shall be listed by the Underwriters Laboratories, Inc. and shall bear their label.
2. Samples: The Architect reserves the right to call for samples of any item of material offered in substitution, together with a sample of the specified material, when, in the Architect's opinion, the quality of the material and/or the appearance is involved and it is deemed that an evaluation of the two materials may be better made by visual inspection. This shall be limited to lighting fixtures, wiring devices, and similar items and shall not be applicable to major manufacturers' items of equipment.
3. Transportation: The Contractor shall be responsible for transportation of his materials to and on the job, and shall be responsible for the storage and protection of these materials and work until the final acceptance of the job.
4. Appurtenances: The Contractor shall furnish all necessary scaffolding, tackle, tools and appurtenances of all kinds, and all labor required for the safe and expeditious execution of his contract.
5. Workmanship: The workmanship shall in all respects be of the highest grade and all construction shall be done according to the best practice of the trade.

I. SUBSTITUTION OF MATERIAL:
1. Where a definite material or only one manufacturer's name is mentioned in these specifications, it has been done in order to establish a standard. The product of the particular manufacturer mentioned is of satisfactory construction and any substitution must be of quality as good as or better than the named article. No substitution shall be made without review by the Architect/Engineer, who will be the sole judge of equality.
2. The Contractor shall submit for approval a complete list of the materials he proposes to use. This list shall give manufacturers' names and designations corresponding to each and every item and the submission shall be accompanied by complete descriptive literature and/or any supplementary data, drawings, etc., necessary to give full and complete details.
3. Should a substitution be accepted under the provisions of the conditions of these specifications, and should this substitute prove to be defective or otherwise unsatisfactory for the service for which it is intended within the guarantee period, the Contractor who originally requested the substitution shall replace the substitute material with the specified material.

J. PROTECTION OF APPARATUS:
1. General: The Contractor shall at all times take such precautions as may be necessary to properly protect his new apparatus from damage. This shall include the erection of all required temporary shelters to adequately protect any apparatus stored in the open on the site, the cribbing of any apparatus above the floor of the construction, and the covering of apparatus in the uncompleted building with tarpaulins or other protective covering. Failure on the part of the Contractor to comply with the above to the entire satisfaction of the Architect will be sufficient cause for the rejection of the pieces of apparatus in question.

K. PERMITS, FEE, ETC.:
1. General: The Contractor under each section of these Specifications shall arrange for a permit from the local authority. The Contractor shall arrange for all utility services, including electric services. If any charges are made by any of the utility companies due to the work on this project, the Contractor shall pay these charges, including charges for metering, connection, street cutting, etc. The Contractor shall pay for any inspection fees or other fees and charges required by ordinance, law, codes and these Specifications.

L. TESTING:

1. General: The Contractor under each division shall at his own expense perform the various tests as specified and required by the Architect and as required by the State and local authorities. The Contractor shall furnish all fuel and materials necessary for making tests.

M. LAWS, CODES AND ORDINANCES:

1. General: All work shall be executed in strict accordance with all local, state and national codes, ordinances and regulations governing the particular class of work involved, as interpreted by the inspecting authority. The Contractor shall be responsible for the final execution of the work under this heading to suit those requirements. Where these Specifications and the accompanying drawings conflict with these requirements, the Contractor shall report the matter to the Architect, shall prepare any supplemental drawings required illustrating how the work may be installed so as to comply and, on approval, make the changes at no cost to the Owner. On completion of the various portions of the work the installation shall be tested by the constituted authorities, approved and, on completion of the work, the Contractor shall obtain and deliver to the Owner a final certificate of acceptance. The Contractor shall be responsible for providing all labor and materials as required to ensure project is in compliance with all local, state and national codes, ordinances and regulations governing the particular class of work involved.

N. TERMINOLOGY:

1. "Furnish, Provide, Install": Whenever the words "furnish", "provide", "furnish and install," "provide and install', and/or similar phrases occur, it is the intent that the materials and equipment described be furnished, installed and connected under this Division of the Specifications, complete for operation unless specifically noted to the contrary.
2. Materials: Where a material is described in detail, listed by catalogue number or otherwise called for, it shall be the Contractor's responsibility to furnish and install the material.
3. "Shall": The use of the word "shall" conveys a mandatory condition to the contract.
4. "Section": "This section" always refers to the section in which the statement occurs.
5. "Project": "The project" includes all work in progress during the construction period.
6. Multiple Items: In describing the various items of equipment, in general, each item will be described singularly, even though there may be a multiplicity of identical or similar items.

O. COOPERATION:

1. General: The contractor for the work under each section of these Specifications shall coordinate his work with the work described in all other sections of the Specifications to the end that, as a whole, the job shall be a finished one of its kind, and shall carry on his work in such a manner that none of the work under any section of these Specifications shall be handicapped, hindered or delayed at any time.

P. COORDINATION OF TRADES:

1. General: The Contractor shall be responsible for resolving all coordination required between trades. For example, items furnished under Division 23 which require electrical connections shall be coordinated with Division 26 for:
   a) Voltage
   b) Phase
   c) Ampacity
   d) No. and size of wires
   e) Wiring diagrams
   f) Starter size, details and location
   g) Control devices and details
2. Ceiling Mounted Items: Items installed in/on finished ceilings shall be coordinated with the ceiling construction. The Contractor under each section shall conform to the reflected ceiling plan and shall secure details and/or samples of the ceiling materials as necessary to insure compatibility. Any device not conforming to this requirement shall be replaced by the Contractor at his expense.
3. Electrical Items: All items specified under Divisions 26 shall be installed tight, plumb, level, square and symmetrically placed in relation to the work of other trades.

Q. CUTTING AND PATCHING:

1. General: The Contractor for work specified under each section shall perform all structural and general construction modifications and cut all openings through either roof, walls, floors or ceilings required to install all work specified under that section or to repair any defects that appear up to the expiration of the guarantee. All of this cutting shall be done under the supervision of the Architect and the Contractor shall exercise due diligence to avoid cutting openings larger than required or in wrong locations.
2. Structural Members: No cutting shall be done to any of the structural members that would tend to lessen their strength, unless specific permission is granted by the Architect to do such cutting.
3. Patching: The Contractor for work under each section shall be responsible for the patching of all openings cut to install the work covered by that section and to repair the damage resulting from the failure of any part of the work installed hereunder.
4. Coordination: Before bidding, the Contractor shall review and coordinate the cutting and patching required with all trades.
5. Existing Surfaces: In all spaces where new work under Division 26 is installed and no other alteration or refinishing work is shown or called for, existing floors, walls and ceilings shall be restored to match existing conditions. Workmen skilled in the affected trade shall do all cutting and patching.
6. Masonry Walls: Where openings are cut through masonry walls, the Contractor under each respective section shall provide and install lintels or other structural supports to protect the remaining masonry and adequate support shall be provided during the cutting operation to prevent any damage to the masonry occasioned by the operation. All structural members, supports, etc. shall be of the size, shape, and installed as directed by the Architect.

R. PAINTING:

1. General: Painting for Division 26 shall be as follows:
   a) If the factory finish on any apparatus or equipment is marred, it shall be touched up and then given one coat of half-flat-half-enamel, followed by a coat of machinery enamel of a color to match the original. Paint factory primed surfaces.
   b) Paint all exposed conduit, boxes, cabinets, hangers and supports, and miscellaneous metal.
   c) Generally, painting is required on all surfaces such that no exposed bare metal is visible.

S. LARGE APPARATUS:

1. General: Any large piece of apparatus which is to be installed in any space in the building, and which is too large to permit access through windows, doorways or shafts, shall be brought to the job by the Contractor involved and placed in the space before the enclosing structure is completed.

T. INSTALLATION DRAWINGS:

1. General: It shall be incumbent upon the Contractor to prepare special drawings as called for elsewhere herein or as directed by the Architect to coordinate the work under each section, to illustrate changes in his work, to facilitate its concealment in finished spaces to avoid obstructions or to illustrate the adaptability of any item of equipment which he proposes to use. These drawings shall be used in the field for the actual installation of the work. Unless otherwise directed, they shall not be submitted for approval but three copies shall be provided to the Architect for his information.

U. ROUGH-IN AND MAKE FINAL CONNECTION FOR EQUIPMENT:

1. General: The shop drawings for all equipment are hereby made a part of these Specifications. The Contractor under each section of the Specifications shall rough-in for the exact item to be furnished on the job, whether in another section of the Specifications or by the Owner. The Contractor shall refer to all drawings and other sections of the Specifications for the scope of work involved for the new equipment, and by actual site examination determine the scope of the required equipment connections for the Owner furnished equipment.

2. Discrepancies: Should any of the equipment furnished require connections of a nature different from that shown on the drawings, report the matter to the Architect and finally connect as directed by the Architect. Minor differences in the equipment furnished and that indicated on the drawings will not constitute ground for additional payment to the Contractor.

V. TEMPORARY POWER AND LIGHTING

1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
3. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.
4. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Architect. Neither the Owner nor Architect will accept cost or use charges as a basis of claims for Change Orders.
5. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters, and main distribution switch gear. All temporary power for construction will be provided by Contractor. Owner will pay bills when submitted for payment.
6. Install electric power service underground, except where overhead service must be used.
7. Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage. Where permitted, power wiring circuits not exceeding 125 Volts, ac 20 Ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance. All circuits must be ground-fault circuit interrupter protected.
8. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment. Provide four gang outlets, spaced so 100 foot cords can reach any areas. Provide separate 120 VAC, 20 amp GFCI circuit for each four gang outlet.
9. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
10. Temporary Lighting: When overhead floor or roof deck has been installed, provide temporary lighting with local switching:
    a) Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.
11. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.
12. Provide three 100-W incandescent lamps per 500 sq. ft. (45 sq. m), uniformly distributed, for general lighting, or equivalent illumination. Provide two 100-W incandescent lamps every 50 feet (15 m) in traffic areas.

END OF SECTION 260110

SECTION 260120 – MINOR ELECTRICAL DEMOLITION

PART 1 - GENERAL

A. RELATED DOCUMENTS:
   1. General: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to the work of this section.

PART 2 - PRODUCTS

A. MATERIALS AND EQUIPMENT:
   1. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 - EXECUTION

A. EXAMINATION:
   1. Field Measurements: Verify field measurements and circuiting arrangements are as shown on Drawings.
   2. Abandoned Circuits: Verify that abandoned wiring and equipment serve only abandoned facilities.
   3. Field Conditions: Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to Owner and Architect/Engineer before disturbing existing installation.
   4. Existing Conditions: Beginning of demolition means installer accepts existing conditions.

B. PREPARATION:
   1. Demolition: Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
   2. Utility Coordination: Coordinate utility service outages with Utility Company.
   3. Temporary Wiring: Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
   4. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Owner at least 72 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.
   5. Existing Telephone System: Maintain existing system in service until new system is accepted. All new devices, components, etc. shall match existing unless directed otherwise by Owner. Disable system only to make switchovers and connections. Notify Owner and Telephone Utility Company at least 72 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.
   6. Existing Data/Computer Network System: Maintain existing system in service until new system is accepted. All new devices, components, etc. shall match existing unless directed otherwise by Owner. Disable system only to make switchovers and connections. Notify Owner at least 72 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

7. Existing Fire Alarm/P.A./Intercom/Clock & Bell System: Maintain existing systems in service until new systems are accepted. All new devices, components, etc. shall match existing unless directed otherwise by Owner. Disable systems only to make switchovers and connections. Notify Owner at least 72 hours before partially or completely disabling systems. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

C. DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK:
1. General: Demolish and extend existing electrical work under provisions of the Drawings, General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections.
2. New Construction: Remove, relocate, and extend existing installations to accommodate new construction.
3. Abandoned Wiring: Remove abandoned wiring to source of supply.
4. Exposed Conduit: Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
5. Abandoned Devices: Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets, which are not removed.
6. Abandoned Panelboards: Disconnect and remove abandoned panelboards and distribution equipment.
7. Abandoned Equipment: Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
8. Abandoned Lighting Fixtures: Disconnect and remove abandoned lighting fixtures. Remove brackets, stems, hangers, and other accessories.
9. Adjacent Construction: Repair adjacent construction and finishes damaged during demolition and extension work.
10. Existing wiring to remain active: Maintain access to existing electrical installations, which remain active. Modify installation or provide access panel as appropriate.
11. Extension of existing wiring: Extend existing installations using materials and methods compatible with existing electrical installations, as specified.

D. CLEANING AND REPAIR:
1. Existing Materials: Clean and repair existing materials and equipment that remain or are to be reused.
2. Panelboards: Where indicated on the drawings clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.
3. Lighting Fixtures: Where indicated on the drawings remove existing lighting fixtures for cleaning. Use mild detergent to clean all exterior and interior surfaces, rinse with clean water and wipe dry. Replace lamps and broken electrical parts.

E. INSTALLATION:
1. Relocated Materials: Install relocated materials and equipment under the provisions of Division 1 of the Specifications.

END OF SECTION

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

A. VFC: Variable frequency controller.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

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

1. Alcan Products Corporation; Alcan Cable Division.
2. Alpha Wire.
3. Belden Inc.
4. Encore Wire Corporation.

5. General Cable Technologies Corporation.
6. Southwire Incorporated.

B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2.

D. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for metal-clad cable, Type MC with ground wire.

2.2 CONNECTORS AND SPLICES

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

1. AFC Cable Systems, Inc.
2. Gardner Bender.
3. Hubbell Power Systems, Inc.
4. Ideal Industries, Inc.
5. Ilsco; a branch of Bardes Corporation.
6. NSi Industries LLC.
7. O-Z/Gedney; a brand of the EGS Electrical Group.
8. 3M; Electrical Markets Division.
9. Tyco Electronics.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN-2-THWN-2, single conductors in raceway.

B. Exposed Feeders: Type THHN-2-THWN-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-2-THWN-2, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.

E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-2-THWN-2, single conductors in raceway.

F. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.

G. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 26 05 29 "Hangers and Supports for Electrical Systems."

G. Complete cable tray systems installation according to Section 26 05 36 "Cable Trays for Electrical Systems" prior to installing conductors and cables.

3.4 CONNECTIONS

A. 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.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 26 05 53 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 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 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 07 84 13 "Penetration Firestopping."

3.8 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors 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.
3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.

    a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
    b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
    c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

C. Test and Inspection Reports: Prepare a written report to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes grounding and bonding systems and equipment.

B. Section includes grounding and bonding systems and equipment, plus the following special applications:

1. Underground distribution grounding.
2. Ground bonding common with lightning protection system.
3. Foundation steel electrodes.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

A. As-Built Data: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:

1. Test wells.
2. Ground rods.
3. Ground rings.
4. Grounding arrangements and connections for separately derived systems.

B. Qualification Data: For testing agency and testing agency's field supervisor.

C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:

a. Instructions for periodic testing and inspection of grounding features at test wells ground rings grounding connections for separately derived systems based on NETA MTS.

1) Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
2) Include recommended testing intervals.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Burndy; Part of Hubbell Electrical Systems.
2. Dossert; AFL Telecommunications LLC.
3. ERICO International Corporation.
4. Fushi Copperweld Inc.
5. Galvan Industries, Inc.; Electrical Products Division, LLC.
6. Harger Lightning and Grounding.
7. ILSCO.
8. O-Z/Gedney; A Brand of the EGS Electrical Group.
9. Robbins Lightning, Inc.
10. Siemens Power Transmission & Distribution, Inc.

2.2 SYSTEM DESCRIPTION

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.

2.3 CONDUCTORS

A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.

4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.5 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.

1. Bury at least 24 inches below grade.
2. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.

C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

D. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Install bus horizontally, on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.

2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

E. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING SEPARATELY DERIVED SYSTEMS

A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

3.4 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, nonshrink grout.

C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.

D. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches from the foundation.

3.5 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. Armored and metal-clad cable runs.
8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
9. X-Ray Equipment Circuits: Install insulated equipment grounding conductor in circuits supplying x-ray equipment.

C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

D. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

E. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

F. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

G. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.6 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Section 26 05 43 "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches deep, with cover.

1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

F. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by 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.

G. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.

H. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet apart.

I. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel column, extending around the perimeter of area or item indicated.

1. Install tinned-copper conductor not less than No. 2/0 AWG for ground ring and for taps to building steel.
2. Bury ground ring not less than 24 inches from building's foundation.

J. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; using electrically conductive coated steel reinforcing bars or rods, at least 20 feet long. If reinforcing is in multiple pieces, connect together by the usual steel tie wires or exothermic welding to create the required length.

3.7 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.

    a. Measure ground resistance no fewer 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.
    b. Perform tests by fall-of-potential method according to IEEE 81.

4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

D. Grounding system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

F. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
2. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).

G. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.5 ACTION SUBMITTALS

A. Product Data: For the following:

1. Steel slotted support systems.
2. Nonmetallic slotted support systems.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following:

1. Trapeze hangers. Include Product Data for components.
2. Steel slotted channel systems. Include Product Data for components.

3. Nonmetallic slotted channel systems. Include Product Data for components.
4. Equipment supports.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Comply with NFPA 70.

1.8 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 07 72 00 "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

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

a. Allied Tube & Conduit.
b. Cooper B-Line, Inc.
c. ERICO International Corporation.
d. GS Metals Corp.
e. Thomas & Betts Corporation.
f. Unistrut; Atkore International.
g. Wesanco, Inc.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
5. Channel Dimensions: Selected for applicable load criteria.

B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch-diameter holes at a maximum of 8 inches o.c., in at least 1 surface.

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

a. Allied Tube & Conduit.
b. Cooper B-Line, Inc.
c. Fabco Plastics Wholesale Limited.
d. Seasafe, Inc.

2. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
3. Fitting and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.
4. Rated Strength: Selected to suit applicable load criteria.

C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

D. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

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

1) Hilti, Inc.
2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
3) MKT Fastening, LLC.
4) Simpson Strong-Tie Co., Inc.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

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

1) Cooper B-Line, Inc.
2) Empire Tool and Manufacturing Co., Inc.
3) Hilti, Inc.
4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
5) MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.

4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 05 50 00 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with single-bolt conduit clamps.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.

3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 05 50 00 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 03 30 00 "Cast-in-Place Concrete."

C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Touchup: Comply with requirements in Section 09 91 23 "Interior Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Boxes, enclosures, and cabinets.
5. Handholes and boxes for exterior underground cabling.

1.3 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.
2. Laboratory Test Reports for Credit IEQ 4: For solvent cements and adhesive primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

B. Qualification Data: For professional engineer.

C. Seismic Qualification Certificates: For enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
4. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.

D. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

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

1. AFC Cable Systems, Inc.
2. Allied Tube & Conduit.
3. Anamet Electrical, Inc.
4. Electri-Flex Company.
5. O-Z/Gedney.
6. Picoma Industries.
7. Republic Conduit.
8. Robroy Industries.
9. Southwire Company.
10. Thomas & Betts Corporation.
11. Western Tube and Conduit Corporation.
12. Wheatland Tube Company.

B. 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.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. ARC: Comply with ANSI C80.5 and UL 6A.

E. IMC: Comply with ANSI C80.6 and UL 1242.

F. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.

1. Comply with NEMA RN 1.
2. Coating Thickness: 0.040 inch, minimum.

G. EMT: Comply with ANSI C80.3 and UL 797.

H. FMC: Comply with UL 1; zinc-coated steel.

I. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

J. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:

a. Material: Steel.
b. Type: Setscrew or compression.

3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

K. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

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

1. AFC Cable Systems, Inc.
2. Anamet Electrical, Inc.
3. Arnco Corporation.
4. CANTEX Inc.
5. CertainTeed Corporation.
6. Condux International, Inc.
7. Electri-Flex Company.
8. Kraloy.
9. Lamson & Sessions; Carlon Electrical Products.
10. Niedax-Kleinhuis USA, Inc.
11. RACO; Hubbell.
12. Thomas & Betts Corporation.

B. 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 application.

C. ENT: Comply with NEMA TC 13 and UL 1653.

D. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

E. LFNC: Comply with UL 1660.

F. Rigid HDPE: Comply with UL 651A.

G. Continuous HDPE: Comply with UL 651B.

H. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D 3485.

I. RTRC: Comply with UL 1684A and NEMA TC 14.

J. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

K. Fittings for LFNC: Comply with UL 514B.

L. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

M. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

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

1. Cooper B-Line, Inc.
2. Hoffman.
3. Mono-Systems, Inc.
4. Square D.

B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Screw-cover type unless otherwise indicated.

E. Finish: Manufacturer's standard enamel finish.

2.4 BOXES, ENCLOSURES, AND CABINETS

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

1. Adalet.
2. Cooper Technologies Company; Cooper Crouse-Hinds.
3. EGS/Appleton Electric.
4. Erickson Electrical Equipment Company.
5. FSR Inc.
6. Hoffman.
7. Hubbell Incorporated.
8. Kraloy.
9. Milbank Manufacturing Co.
10. Mono-Systems, Inc.
11. O-Z/Gedney.
12. RACO; Hubbell.
13. Robroy Industries.

14. Spring City Electrical Manufacturing Company.
15. Stahlin Non-Metallic Enclosures.
16. Thomas & Betts Corporation.
17. Wiremold / Legrand.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

F. Metal Floor Boxes:

1. Material: Cast metal.
2. Type: Fully adjustable.
3. Shape: Rectangular.
4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Nonmetallic Floor Boxes: Nonadjustable, rectangular.

1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

H. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

I. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb.

1. Listing and Labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

J. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

K. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

L. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

M. Device Box Dimensions: 4 inches square by 2-1/8 inches deep<Insert dimension>.

N. Gangable boxes are allowed.

O. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 3R with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Fiberglass.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

P. Cabinets:

1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.5 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.

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

a. Armorcast Products Company.
b. Carson Industries LLC.
c. NewBasis.
d. Oldcastle Precast, Inc.
e. Quazite: Hubbell Power System, Inc.
f. Synertech Moulded Products.

2. Standard: Comply with SCTE 77.
3. Configuration: Designed for flush burial with closed bottom unless otherwise indicated.
4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, "ELECTRIC.".
7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
8. Handholes 12 Inches Wide by 24 Inches Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.6 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

1. Tests of materials shall be performed by an independent testing agency.
2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.

3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012 and traceable to NIST standards.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC.
2. Concealed Conduit, Aboveground: GRC IMC EMT.
3. Underground Conduit: RNC, Type EPC-40-PVC Type EPC-80-PVC, concrete encased.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:

    a. Loading dock.
    b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    c. Mechanical rooms.
    d. Gymnasiums.

4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: GRC.
7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

C. Minimum Raceway Size: 1/2-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

F. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

G. Install surface raceways only where indicated on Drawings.

H. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inchesof enclosures to which attached.

I. 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. Secure raceways to reinforcement at maximum 10-footintervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 1 inch of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from ENT to GRC before rising above floor.

J. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

L. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

M. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

N. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

O. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

P. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

Q. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

R. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

S. Surface Raceways:

1. Install surface raceway with a minimum 2-inchradius control at bend points.
2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

T. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

U. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

V. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

W. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
    d. Attics: 135 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

X. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

Y. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

Z. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

AA. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

BB. Locate boxes so that cover or plate will not span different building finishes.

CC. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

DD. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

EE. Set metal floor boxes level and flush with finished floor surface.

FF. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 31 20 00 "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Section 31 20 00 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 31 20 00 "Earth Moving."

4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
    b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

6. Underground Warning Tape: Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Install handholes with bottom below frost line, 24” below grade.

E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.

F. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 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 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 07 84 13 "Penetration Firestopping."

3.7 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. Section 07 84 13 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. LEED Submittals:

1. Product Data for Credit EQ 4.1: For sealants, documentation including printed statement of VOC content.
2. Laboratory Test Reports for Credit EQ 4: For sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

F. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

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

a. Advance Products & Systems, Inc.
b. CALPICO, Inc.
c. Metraflex Company (The).
d. Pipeline Seal and Insulator, Inc.
e. Proco Products, Inc.

2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Carbon steel.
4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

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

a. Presealed Systems.

2.4 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 07 92 00 "Joint Sealants."
b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.3 ACTION SUBMITTALS

A. Product Data: For each electrical identification product indicated.

B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams,

and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER AND CONTROL RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for Raceways Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

C. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Tape and Stencil for Raceways Carrying Circuits More Than 600 V: 4-inch-wide black stripes on 10-inch centers diagonally over orange background that extends full length of raceway or duct and is 12 inches wide. Stop stripes at legends.

G. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

H. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.

B. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

C. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil-thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the cable diameter such that the clear shield overlaps the entire printed legend.

D. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F. Comply with UL 224.

E. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

F. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

G. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of cable it identifies and to stay in place by gripping action.

H. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of cable it identifies and to stay in place by gripping action.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

B. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil-thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the conductor diameter such that the clear shield overlaps the entire printed legend.

C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of conductor it identifies and to stay in place by gripping action.

D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve with diameter sized to suit diameter of conductor it identifies and to stay in place by gripping action.

E. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around conductor it identifies. Full shrink recovery at a maximum of 200 deg F. Comply with UL 224.

F. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

G. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Labels for Tags: Self-adhesive label, machine-printed with permanent, waterproof, black ink recommended by printer manufacturer, sized for attachment to tag.

2.4 FLOOR MARKING TAPE

A. 2-inch-wide, 5-mil pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.

2.5 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE,.
3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE,.

2.6 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 7 by 10 inches.

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 10 by 14 inches.

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.7 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.

C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

2.8 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.

B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

C. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

D. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

E. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.9 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black.

C. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.

1. Minimum Width: 3/16 inch.

2. Tensile Strength at 73 deg F, According to ASTM D 638: 7000 psi.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

2.10 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape with adhesive appropriate to the location and substrate.

G. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

H. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

I. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

J. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

K. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil 4-inch-wide black stripes on 10-inch centers over orange background that extends full length of raceway or duct and is 12 inches wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch-high black letters on 20-inch centers. Stop stripes at legends. Apply to the following finished surfaces:

1. Floor surface directly above conduits running beneath and within 12 inches of a floor that is in contact with earth or is framed above unexcavated space.
2. Wall surfaces directly external to raceways concealed within wall.
3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.

B. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Self-adhesive vinyl labels. Install labels at 10-foot maximum intervals.

C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Identify with self-adhesive vinyl tape applied in bands. Install labels at 10-foot maximum intervals.

D. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:

1. Emergency Power.
2. Power.
3. UPS.

E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
b. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.

c. Colors for 480/277-V Circuits:

1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.

d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

F. Power-Circuit Conductor Identification, More than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use write-on tags.

G. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

H. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive vinyl labels with the conductor or cable designation, origin, and destination.

I. Control-Circuit Conductor Termination Identification: For identification at terminations provide heat-shrink preprinted tubes with the conductor designation.

J. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.

K. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

L. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.

1. Limit use of underground-line warning tape to direct-buried cables.
2. Install underground-line warning tape for both direct-buried cables and cables in raceway.

M. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

N. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.
4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:

    a. Power transfer switches.
    b. Controls with external control power connections.

O. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

P. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.

Q. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations,

terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

    a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.
    b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
    c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

    a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label.
    b. Enclosures and electrical cabinets.
    c. Access doors and panels for concealed electrical items.
    d. Switchboards.
    e. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
    f. Substations.
    g. Emergency system boxes and enclosures.
    h. Motor-control centers.
    i. Enclosed switches.
    j. Enclosed circuit breakers.
    k. Enclosed controllers.
    l. Variable-speed controllers.
    m. Push-button stations.
    n. Power transfer equipment.
    o. Contactors.
    p. Remote-controlled switches, dimmer modules, and control devices.
    q. Power-generating units.
    r. Monitoring and control equipment.
    s. UPS equipment.

END OF SECTION 260553

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Time switches.
2. Photoelectric switches.
3. Indoor occupancy sensors.
4. Lighting contactors.

B. Related Requirements:

1. Section 26 27 26 "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show installation details for occupancy and light-level sensors.

1. Interconnection diagrams showing field-installed wiring.
2. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 TIME SWITCHES

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

1. Intermatic, Inc.
2. NSi Industries LLC; TORK Products.

B. Electromechanical-Dial Time Switches: Comply with UL 917.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Contact Configuration: SPST.
3. Contact Rating: 20-A ballast load, 120-/240-V ac.
4. Circuitry: Allows connection of a photoelectric relay as a substitute for the on-off function of a program.
5. Astronomic time dial.
6. Eight-Day Program: Uniquely programmable for each weekday and holidays.
7. Skip-a-day mode.
8. Wound-spring reserve carryover mechanism to keep time during power failures, minimum of 16 hours.

2.2 OUTDOOR PHOTOELECTRIC SWITCHES

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

1. Intermatic, Inc.
2. NSi Industries LLC; TORK Products.

B. Description: Solid state, with SPST dry contacts rated for 1800-VA tungsten or 1000-VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of the photocell to prevent fixed light sources from causing turn-off.
3. Time Delay: Fifteen second minimum, to prevent false operation.
4. Surge Protection: Metal-oxide varistor.
5. Mounting: Twist lock complies with NEMA C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.

2.3 INDOOR OCCUPANCY SENSORS

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

1. Hubbell Building Automation, Inc.
2. Lutron Electronics Co., Inc.
3. Watt Stopper.

B. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.

3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
4. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
5. Mounting:

    a. Sensor: Suitable for mounting in any position on a standard outlet box.
    b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
    c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
7. Bypass Switch: Override the "on" function in case of sensor failure.
8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; turn lights off when selected lighting level is present.

C. PIR Type: Ceiling mounted; detect occupants in coverage area by their heat and movement.

1. Detector Sensitivity: Detect occurrences of 6-inch-minimum movement of any portion of a human body that presents a target of not less than 36 sq. in..
2. Detection Coverage (Room): Detect occupancy anywhere in a circular area of 1000 sq. ft. when mounted on a 96-inch-high ceiling.
3. Detection Coverage (Corridor): Detect occupancy within 90 feet when mounted on a 10-foot-high ceiling.

D. Ultrasonic Type: Ceiling mounted; detect occupants in coverage area through pattern changes of reflected ultrasonic energy .

1. Detector Sensitivity: Detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
2. Detection Coverage (Small Room): Detect occupancy anywhere within a circular area of 600 sq. ft. when mounted on a 96-inch-high ceiling.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch-high ceiling.
4. Detection Coverage (Large Room): Detect occupancy anywhere within a circular area of 2000 sq. ft. when mounted on a 96-inch-high ceiling.
5. Detection Coverage (Corridor): Detect occupancy anywhere within 90 feet when mounted on a 10-foot-high ceiling in a corridor not wider than 14 feet.

E. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 6-inch-minimum movement of any portion of a human body that presents a target of not less than 36 sq. in., and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch-high ceiling.

2.4 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

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

1. Hubbell Building Automation, Inc.
2. Lutron Electronics Co., Inc.
3. Watt Stopper.

B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.
3. Switch Rating: Not less than 800-VA fluorescent at 120 V, 1200-VA fluorescent at 277 V, and 800-W incandescent.

C. Wall-Switch Sensor:

1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 2100 sq. ft.
2. Sensing Technology: Dual technology - PIR and ultrasonic with no minimum load requirement.
3. Switch Type: SP, field selectable automatic "on," or manual "on" automatic "off."
4. Voltage: Match the circuit voltage; dual-technology type.
5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
6. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
7. Concealed "off" time-delay selector at 30 seconds, and 5, 10, and 20 minutes.
8. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.

2.5 LIGHTING CONTACTORS

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

1. Eaton Corporation.
2. Square D.
3. General Electric (GE).
4. Siemens.

B. Description: Electrically operated and mechanically held, combination-type lighting contactors with nonfused disconnect, complying with NEMA ICS 2 and UL 508.

1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
3. Enclosure: Comply with NEMA 250.
4. Provide with control and pilot devices as indicated on Drawings, matching the NEMA type specified for the enclosure.

C. BAS Interface: Provide hardware interface to enable the BAS to monitor and control lighting contactors.

1. Monitoring: On-off status.
2. Control: On-off operation.

2.6 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.2 CONTACTOR INSTALLATION

A. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.3 WIRING INSTALLATION

A. Wiring Method: Comply with Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch.

B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.

C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.4 IDENTIFICATION

A. Identify components and power and control wiring according to Section 26 05 53 "Identification for Electrical Systems."

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

B. Label time switches and contactors with a unique designation.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Lighting control devices will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.6 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.
3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 260923

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Distribution panelboards.
2. Lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS

A. SVR: Suppressed voltage rating.

B. TVSS: Transient voltage surge suppressor.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types and details for types other than NEMA 250, Type 1.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and overcurrent protective devices.
5. Include evidence of NRTL listing for series rating of installed devices.
6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
7. Include wiring diagrams for power, signal, and control wiring.
8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Field Quality-Control Reports:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

C. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.7 MAINTENANCE MATERIAL SUBMITTALS

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

1. Keys: Two spares for each type of panelboard cabinet lock.
2. Circuit Breakers Including GFCI and Ground Fault Equipment Protection (GFEP) Types: Two spares for each panelboard.
3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
4. Fuses for Fused Power-Circuit Devices: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

B. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

D. 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.

E. Comply with NEMA PB 1.

F. Comply with NFPA 70.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.10 PROJECT CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

    a. Ambient Temperature: Not exceeding minus 22 deg F to plus 104 deg F.
    b. Altitude: Not exceeding 6600 feet.

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet.

C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of electric service.
2. Do not proceed with interruption of electric service without Owner's written permission.
3. Comply with NFPA 70E.

1.11 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.12 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices 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 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Enclosures: Flush- and surface-mounted cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
b. Outdoor Locations: NEMA 250, Type 3R.
c. Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
e. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
4. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
5. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
6. Finishes:

a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
b. Back Boxes: Same finish as panels and trim.
c. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.

7. Directory Card: Inside panelboard door, mounted in transparent card holder.

B. Incoming Mains Location: Top and bottom.

C. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
3. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
4. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads.
5. Split Bus: Vertical buses divided into individual vertical sections.

D. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Main and Neutral Lugs: Compression type.
3. Ground Lugs and Bus-Configured Terminators: Compression type.
4. Feed-Through Lugs: Compression type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

5. Subfeed (Double) Lugs: Compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
6. Gutter-Tap Lugs: Compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
7. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.

E. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.

F. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

G. 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.

H. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 DISTRIBUTION PANELBOARDS

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. ABB Industrial - Electrical Distribution.
3. Square D; a brand of Schneider Electric.
4. Siemens Industrial; Siemens.

B. Panelboards: NEMA PB 1, power and feeder distribution type.

C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than 36 inches high, provide two latches, keyed alike.

D. Mains: Circuit breaker.

E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.

F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

G. Branch Overcurrent Protective Devices: Fused switches.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. ABB Industrial - Electrical Distribution.
3. Square D; a brand of Schneider Electric.

4. Siemens Industrial; Siemens.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: Circuit breaker or lugs only.

D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

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. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Square D; a brand of Schneider Electric.
4. Siemens Industrial; Siemens.

B. 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. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic trip circuit breakers with rms 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 x t response.

4. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
5. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Lugs: Compression style, suitable for number, size, trip ratings, and conductor materials.
    c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
    d. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
    e. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
    f. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function with other upstream or downstream devices.
    g. Multipole units enclosed in a single housing or factory assembled to operate as a single unit.

h. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
i. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

C. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.

1. Fuses, and Spare-Fuse Cabinet: Comply with requirements specified in Section 26 28 13 "Fuses."
2. Fused Switch Features and Accessories: Standard ampere ratings and number of poles.

2.5 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

B. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

C. Comply with mounting and anchoring requirements specified in Section 26 05 48.16 "Seismic Controls for Electrical Systems."

D. Mount top of trim 90 inches above finished floor unless otherwise indicated.

E. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

F. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.

G. Install filler plates in unused spaces.

H. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.

I. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

J. Comply with NECA 1.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 26 05 53 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

D. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.

b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
c. Instruments and Equipment:

1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

E. Panelboards will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges recommended by switchgear manufacturer. All electronic circuit breaker settings shall be provided by switchgear manufacturer.

C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.

1. Measure as directed during period of normal system loading.
2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.6 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Twist-locking receptacles.
3. Isolated-ground receptacles.
4. Hospital-grade receptacles.
5. Tamper-resistant receptacles.
6. Weather-resistant receptacles.
7. Snap switches and wall-box dimmers.
8. Wall-switch and exterior occupancy sensors.
9. Communications outlets.
10. Pendant cord-connector devices.
11. Cord and plug sets.
12. Floor service outlets, poke-through assemblies, service poles, and multioutlet assemblies.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

D. RFI: Radio-frequency interference.

E. TVSS: Transient voltage surge suppressor.

F. UTP: Unshielded twisted pair.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.
2. Cord and Plug Sets: Match equipment requirements.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

C. Samples: One for each type of device and wall plate specified, in each color specified.

1.6 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
3. Leviton Mfg. Company Inc. (Leviton).
4. Pass & Seymour/Legrand (Pass & Seymour).

B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, 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.

C. 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.

2.3 STRAIGHT-BLADE RECEPTACLES

A. Hospital-Grade, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Cooper; 8310 (single), 8300 (duplex).
    b. Hubbell; HBL8310 (single), HBL8300 (duplex).
    c. Leviton; 8310 (single), 8300 (duplex).
    d. Pass & Seymour; 8301 (single), 8300H (duplex).

2. Description: Single-piece, rivetless, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap.

B. Isolated-Ground, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Cooper; IG5362RN.
    b. Hubbell; IG5362.
    c. Leviton; 5362-IG.
    d. Pass & Seymour; IG5362.

2. Description: Straight blade; equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

C. Tamper-Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Cooper; TR8300.
    b. Hubbell; HBL8300SGA.
    c. Leviton; 8300-SGG.
    d. Pass & Seymour; TR63H.

2. Description: Labeled shall comply with NFPA 70, "Health Care Facilities" Article, "Pediatric Locations" Section.

2.4 GFCI RECEPTACLES

A. General Description:

1. Straight blade, non-feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Tamper-Resistant GFCI Convenience Receptacles, 125 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Hubbell; GFTR20.
    b. Pass & Seymour; 2095TR.

C. Hospital-Grade, Duplex GFCI Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Cooper; VGFH20.
b. Hubbell; HFR8300HL.
c. Leviton; 7899-HG.
d. Pass & Seymour; 2095HG.

2.5 PENDANT CORD-CONNECTOR DEVICES

A. Description:

1. Matching, locking-type plug and receptacle body connector.
2. NEMA WD 6 Configurations L5-20P and L5-20R, heavy-duty grade, and FS W-C-596.
3. Body: Nylon, with screw-open, cable-gripping jaws and provision for attaching external cable grip.
4. External Cable Grip: Woven wire-mesh type made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.6 CORD AND PLUG SETS

A. Description:

1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.7 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:

1) Single Pole:
2) Cooper; AH1221.
3) Hubbell; HBL1221.
4) Leviton; 1221-2.
5) Pass & Seymour; CSB20AC1.
6) Three Way:
7) Cooper; AH1223.
8) Hubbell; HBL1223.
9) Leviton; 1223-2.
10) Pass & Seymour; CSB20AC3.
11) Four Way:
12) Cooper; AH1224.

13) Hubbell; HBL1224.
14) Leviton; 1224-2.
15) Pass & Seymour; CSB20AC4.

C. Pilot-Light Switches, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Cooper; AH1221PL for 120 and 277 V.
b. Hubbell; HBL1201PL for 120 and 277 V.
c. Leviton; 1221-LH1.
d. Pass & Seymour; PS20AC1RPL for 120 V, PS20AC1RPL7 for 277 V.

2. Description: Single pole, with neon-lighted handle, illuminated when switch is "off."

D. Key-Operated Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Cooper; AH1221L.
b. Hubbell; HBL1221L.
c. Leviton; 1221-2L.
d. Pass & Seymour; PS20AC1-L.

2. Description: Single pole, with factory-supplied key in lieu of switch handle.

2.8 WALL-BOX DIMMERS

A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.

B. Control: Continuously adjustable slider; with single-pole or three-way switching. Comply with UL 1472.

2.9 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Smooth, high-impact thermoplastic (non-breakable).
3. Material for Unfinished Spaces: Smooth, high-impact thermoplastic (non-breakable).
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with “in-use” lockable cover.

2.10 FLOOR SERVICE FITTINGS

A. Type: 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, solid brass with satin finish.

D. Power Receptacle: NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.

2.11 PREFABRICATED MULTIOUTLET ASSEMBLIES

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

1. Hubbell Incorporated; Wiring Device-Kellems.
2. Wiremold/Legrand.

B. Description:

1. Two-piece surface metal raceway, with factory-wired multioutlet harness.
2. Components shall be products from single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.

C. Raceway Material: Metal, with manufacturer's standard finish.

D. Multioutlet Harness:

1. Receptacles: 15-A, 125-V, NEMA WD 6 Configuration 5-15R receptacles complying with NEMA WD 1, UL 498, and FS W-C-596.
2. Receptacle Spacing: 9 inches.
3. Wiring: No. 12 AWG solid, Type THHN copper, two circuit, connecting alternating receptacles.

2.12 FINISHES

A. Device Color (Verify all colors with Architect):

1. Wiring Devices Connected to Normal Power System: White, or as selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.

B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

    a. Cut back and pigtail, or replace all damaged conductors.
    b. Straighten conductors that remain and remove corrosion and foreign matter.
    c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.
2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 IDENTIFICATION

A. Comply with Section 26 05 53 "Identification for Electrical Systems."

B. Identify each light switch and receptacle with panelboard identification and circuit number. Use engraved machine printing with white-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes. All wiring device (light switch and receptacle) cover plates shall be machine engraved. Hand engraving will not be acceptable.

3.4 FIELD QUALITY CONTROL

A. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

B. Test straight-blade convenience outlets in patient-care areas and hospital-grade convenience outlets for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz..

C. Wiring device will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 262726

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Molded-case circuit breakers (MCCBs).
4. Enclosures.

1.3 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Include evidence of NRTL listing for series rating of installed devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Seismic Qualification Certificates: For enclosed switches and circuit breakers, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

D. Manufacturer's field service report.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

1.7 MAINTENANCE MATERIAL SUBMITTALS

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

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
2. Fuse Pullers: Two for each size and type.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

B. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

D. 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.

E. Comply with NFPA 70.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
2. Altitude: Not exceeding 6600 feet.

B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Owner no fewer than seven days in advance of proposed interruption of electric service.
2. Indicate method of providing temporary electric service.
3. Do not proceed with interruption of electric service without Owner's written permission.
4. Comply with NFPA 70E.

1.10 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. ABB Industrial - Electrical Distribution.
3. Square D; a brand of Schneider Electric.
4. Siemens Industrial; Siemens.

B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Isolated Ground Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.

4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
5. Hookstick Handle: Allows use of a hookstick to operate the handle.
6. Lugs: Compression type, suitable for number, size, and conductor material.
7. Service-Rated Switches: Labeled for use as service equipment.

2.2 NONFUSIBLE SWITCHES

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. ABB Industrial - Electrical Distribution.
3. Square D; a brand of Schneider Electric.
4. Siemens Industrial; Siemens.

B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Isolated Ground Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
4. Hookstick Handle: Allows use of a hookstick to operate the handle.
5. Lugs: Compression type, suitable for number, size, and conductor material.

2.3 MOLDED-CASE CIRCUIT BREAKERS

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. ABB Industrial - Electrical Distribution.
3. Square D; a brand of Schneider Electric.
4. Siemens Industrial; Siemens.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

D. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

E. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:

1. Instantaneous trip.
2. Long- and short-time pickup levels.

3. Long- and short-time time adjustments.
4. Ground-fault pickup level, time delay, and I^2t response.

F. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

G. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.

H. Ground-Fault, Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).

I. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
5. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
6. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
7. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
8. Zone-Selective Interlocking: Integral with ground-fault trip unit; for interlocking ground-fault protection function.
9. Electrical Operator: Provide remote control for on, off, and reset operations.

2.4 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 3R.
3. Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Comply with mounting and anchoring requirements specified in Section 26 05 48.16 "Seismic Controls for Electrical Systems."

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

D. Install fuses in fusible devices.

E. Comply with NECA 1.

3.3 IDENTIFICATION

A. Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

D. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.
b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each enclosed switch and circuit breaker 11 months after date of Substantial Completion.

c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

E. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as recommended by circuit breaker manufacturer. All electronic circuit breaker settings are to be provided by circuit breaker manufacturer.

END OF SECTION 262816

SECTION 265119 - LED INTERIOR LIGHTING

PART 1 - PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes the following types of LED luminaires:

1. Downlight.
2. Linear industrial.
3. Recessed linear.
4. Strip light.
5. Surface mount, linear.
6. Surface mount, nonlinear.
7. Suspended, linear.
8. Suspended, nonlinear.
9. Materials.
10. Finishes.
11. Luminaire support.

B. Related Requirements:

1. Section 26 09 23"Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color Rendering Index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. LED: Light-emitting diode.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaires.
4. Include emergency lighting units, including batteries and chargers.
5. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
6. Photometric data and adjustment factors based on laboratory tests IES LM-79 and IES LM-80.

    a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
    b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Samples: For each luminaire and for each color and texture with standard factory-applied finish.

D. Samples for Initial Selection: For each type of luminaire with custom factory-applied finishes.

1. Include Samples of luminaires and accessories involving color and finish selection.

E. Samples for Verification: For each type of luminaire.

1. Include Samples of luminaires and accessories to verify finish selection.

F. Product Schedule: For luminaires and lamps.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Luminaires.
2. Suspended ceiling components.
3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches of the plane of the luminaires.
4. Structural members to which equipment and or luminaires will be attached.
5. Initial access modules for acoustical tile, including size and locations.
6. Items penetrating finished ceiling, including the following:

    a. Other luminaires.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Access panels.
    f. Ceiling-mounted projectors.

7. Moldings.

B. Qualification Data: For testing laboratory providing photometric data for luminaires.

C. Seismic Qualification Certificates: For luminaires, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

D. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

E. Product Certificates: For each type of luminaire.

F. Product Test Reports: For each luminaire, for tests performed by a qualified testing agency.

G. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.7 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.

C. Provide luminaires from a single manufacturer for each luminaire type.

D. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

E. Mockups: For interior luminaires in room or module mockups, complete with power and control connections.

1. Obtain Architect's approval of luminaires in mockups before starting installations.
2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.9 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

A. Refer to Lighting Fixture Schedule on drawings for specific lighting fixture types and model numbers.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Standards:

1. ENERGY STAR certified.
2. California Title 24 compliant.
3. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.
4. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
5. UL Listing: Listed for damp location.
6. Recessed luminaires shall comply with NEMA LE 4.
7. User Replaceable Lamps:

    a. Bulb shape complying with ANSI C78.79.
    b. Lamp base complying with ANSI C81.61 or IEC 60061-1.

D. CRI of minimum 80. CCT of 3500 K or 4100 K as scheduled.

E. Rated lamp life of 50,000 hours to L70.

F. Lamps dimmable from 100 percent to 0 percent of maximum light output.

G. Internal LED driver.

H. Nominal Operating Voltage: 120 V ac.

1. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

I. Housings:

1. Extruded-aluminum housing and heat sink.
2. Powder-coat painted finish.

2.2 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

C. Diffusers and Globes:

1. Prismatic acrylic
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Glass: Annealed crystal glass unless otherwise indicated.
4. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

D. Housings:

1. Extruded-aluminum housing and heat sink.
2. Powder-coat painted finish.

E. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:

a. "USE ONLY" and include specific lamp type.
b. Lamp diameter, shape, size, wattage, and coating.
c. CCT and CRI for all luminaires.

2.3 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.4 LUMINAIRE SUPPORT

A. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage.

D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.

E. Flush-Mounted Luminaire Support:

1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

F. Wall-Mounted Luminaire Support:

1. Attached to structural members in walls.
2. Do not attach luminaires directly to gypsum board.

G. Ceiling-Mounted Luminaire Support:

1. Ceiling mount with two 5/32-inch-diameter aircraft cable supports adjustable to 120 inches in length.

H. Suspended Luminaire Support:

1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.

2. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
3. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and wire support for suspension for each unit length of luminaire chassis, including one at each end.
4. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

I. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.
2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.
3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

J. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

3.5 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.

1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
3. Adjust the aim of luminaires in the presence of the Architect.

END OF SECTION 265119