

PROJECT MANUAL

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FEBRUARY 13, 2026

DOCUMENT 00 01 07 - SEALS PAGE

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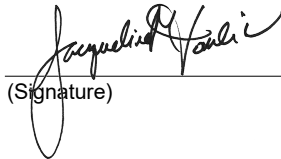
ARCHITECTURAL, LITTLE:

SEAL LOCATION:

NAME:

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(Signature)

14311

(Professional Number)



ARCHITECTUAL, REI:

SEAL LOCATION:

NAME:

MARK IAKOVENKO

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060855

(Professional Number)



PLUMBING:

SEAL LOCATION:

NAME:

C. Jacob Jones

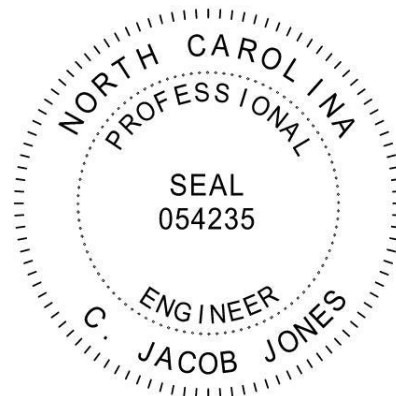
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MECHANICAL:

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NAME: C. Jacob Jones

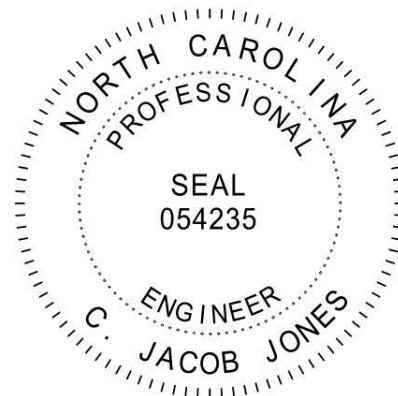
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ELECTRICAL:

SEAL LOCATION:

NAME:

BRENDEN ELLIOTT

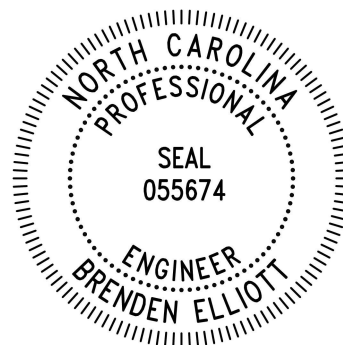
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Brenden Elliott

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055674

(Professional Number)



LANDSCAPE:

SEAL LOCATION:

NAME:

Hannah Barefoot

(Print)

Hannah Barefoot

(Signature)

2249

(Professional Number)



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NOTICE TO BIDDERS

Sealed proposals will be received by the County of Wake in the **Purchasing Department, Suite 2900, Wake County Justice Center, 301 McDowell Street, Raleigh, NC 27601**, up to **2:00 p.m., March 17th, 2026**, and immediately thereafter publicly opened and read for providing labor, material and equipment entering into the construction of **Holly Springs Comm Library Renovation**, located in **300 W Ballentine St, Holly Springs, NC 27540 (Wake County Bid RFB #26-020)**.

Complete plans and specifications for this project will be available starting on, February 16th, 2026 and can be obtained by requests to Little Diversified Architectural Consulting:

Jacqueline Tomlin, Jackie.tomlin@littleonline.com

Each Proposal shall be accompanied by a cash deposit, or a certified check drawn on some bank or trust company insured by the Federal Deposit Insurance Corporation, or a Bid Bond in an amount equal to not less than five percent (5%) of the Proposal. Said deposit to be retained by the Owner (referred to as Oblige on the Bond Form) as liquidated damages in event of failure of the successful Bidder to execute the Contract within ten (10) days after the award or to give satisfactory Surety as required by law.

The Bid Bond shall be conditioned that the surety will, upon demand, forthwith make payment to the Owner (referred to as Oblige on the Bond Form) upon the said bond if the Bidder fails to execute the contract.

A **non-mandatory** pre-bid site walk will be held at Wake County Holly Springs Community Library at **300 W Ballentine St, Holly Springs, NC 27540, NC at 2:00 pm on February 26th, 2026**.

Wake County provides minorities and women equal opportunity to participate in all aspects of its construction program consistent with NCGS §143-8. Bidders shall comply with the requirements of the Wake County Minority Business Enterprise Program, as outlined in Section 00 73 39 of the Project Manual.

No bid may be withdrawn for **sixty (60)** days after the scheduled closing time for bids.

The Owner reserves the right to reject any or all bids and to waive informalities.

Signed: COUNTY OF WAKE

By: Mark Forestieri, AIA
Director, Facilities Design & Construction

ARCHITECT: Little Diversified Architectural Consulting
410 Blackwell Street, Suite 10
Durham, NC 27701

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**WAKE COUNTY PREQUALIFICATION OF CONTRACTORS
FOR CONSTRUCTION CONTRACTS**

R-141020-32

**RESOLUTION UPDATING WAKE COUNTY PROCEDURES
AND POLICIES RELATING TO COUNTY CONSTRUCTION PROJECTS AWARDED
PURSUANT TO N.C.G.S. §143-128 ET SEQ.**

WHEREAS, it is the policy of Wake County to award construction contracts through an open competition in bidding, consistent with North Carolina General Statutes, based on an impartial selection of contractors, integrity in business practices, and skillful performance of public contracts; and

WHEREAS, the North Carolina General Assembly has recently amended Article 8 of N.C.G.S. Chapter 143, Public Contracts, to clarify the statutes related to the use of prequalification in public construction contracting; and

WHEREAS, N.C.G.S. §143-128 (b) requires that a county choosing to use a single-prime contract system must award such building contract to the lowest responsible bidder or bidders for the total project; and

WHEREAS, recent amendments to N.C.G.S. §143-135.8 (b) now state that a governmental entity may prequalify bidders for a particular construction or repair work project when the governmental entity is using one of the construction methods authorized in G.S. 143-128(a1) (1) through (3) and the board or governing body of the governmental entity adopts an objective prequalification policy applicable to all construction or repair work prior to the advertisement of the contract for which the governmental entity intends to prequalify bidders; and

WHEREAS, recent amendments to N.C.G.S. §143-135.8 (b) require that should a governmental entity elect to prequalify contractors for a certain project, that the objective prequalification policy adopted by a governmental entity pursuant to subdivision (b) (2) of this section shall meet all of the criteria stated in this statute; and

WHEREAS, it is the intent of Wake County, through the above stated prequalification process, to impartially evaluate a contractor, and to properly determine by its responsible business practices, work experience, manpower, and equipment that it is appropriately qualified and experienced to provide the construction, renovation and/or repair of Wake County facilities;

NOW THEREFORE, BE IT RESOLVED that the Wake County Board of Commissioners hereby directs the County Manager to establish policies and procedures for prequalifying contractors for County building projects which comport with the requirements of Article 8 of N.C.G.S. Chapter 143, Public Contracts, as it is from time to time amended.

Upon motion of Commissioner Paul Coble, seconded by Commissioner Rich Gianni, and upon roll call vote, the Board adopted the above resolution this 20th day of October 2014.

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PREQUALIFICATION PROCESS POLICY STATEMENT AND PURPOSE

It is the policy of Wake County to award construction contracts through an open competition in bidding, consistent with North Carolina General Statutes, based on an impartial selection of contractors, integrity in business practices, and skillful performance of public contracts.

It is the policy of the County to award public building construction and repair contracts to the lowest responsible, responsive bidder as provided by Article 8 of Chapter 143 of the North Carolina General Statutes.

It is the policy of the County to adopt an objective process for the prequalification of bidders on individual projects selected by the County and for all projects utilizing the Construction Management at Risk (CM at Risk) delivery method in accordance with North Carolina General Statute (N.C.G.S.) § 143-135.8.

It is the intent of this policy to impartially evaluate a contractor, and to properly determine by its responsible business practices, work experience, manpower, and equipment that it is appropriately qualified and experienced in the construction, renovation and/or repair of public facilities.

A. SCOPE

This Policy Applies to the Prequalification of Contractors. [Ref: N.C.G.S. §143-135.8]

The County shall be responsible for prequalifying individual contractors to bid on construction projects when the County believes prequalification is preferred. The County is not required to prequalify contractors for any particular project or projects. However, a contractor shall not be allowed to submit a bid on a construction project subject to prequalification, unless it has been prequalified in accordance with this policy.

Notwithstanding the fact that a contractor was prequalified, the County reserves the right to reject a contractor's bid if the County concludes that a contractor has not submitted the lowest responsible and responsive bid. The prequalification of a contractor shall not preclude the County from subsequently concluding that the contractor is not a responsible bidder pursuant to G.S. 143-129. All construction and repair contracts shall be awarded to the lowest responsible and responsive bidder, taking into consideration quality, performance, and the time specified in the proposals for the performance of the contract

B. APPLICATION

Firms who desire to bid on County projects requiring prequalification are required to complete an application by the deadlines established in the solicitation. An example of an application that may be used by the County is attached as Appendix A. The application used by the County or the CM at Risk may differ from the attached, but it must be approved by the County's Director of Facilities Design & Construction or his designee. The application shall, at a minimum, address the following items:

1. **Organizational Structure** – The firm shall provide a list of all owners, officers, partners, or individuals authorized to represent or conduct business for or sign legal documents for the firm. This list must include the full legal name, typed or printed in a clear legible form.

Firms experiencing changes in ownership, organizational structure, or material changes in assets must inform the County prior to the award of a contract. Failure of the firm to comply with this requirement may result in the termination of any contract awarded by the County.

2. **Classification** – The firm shall indicate the type(s) of work the firm's workforce and equipment normally perform, licensure, and other pertinent information. The firm shall provide its HUB (Historically Underutilized Business) status as classified by the NC State Dept of Administration HUB Office. Only those firms identified as HUB / MWBE by the NC DOA HUB Office will be considered as such.
3. **Experience** – The firm shall furnish information that documents the ability of the firm to undertake a project involving the type(s) of work for which prequalification is requested.
4. **Litigation/Claims** – Firms must provide information on its success at completing projects on time, including the payment of liquidated damages. The firm will be required to submit information regarding its litigation history, including litigation with owners.
5. **Capacity** – Firms shall demonstrate sufficient bonding capacity, insurance and resources for the project. Firms must provide relevant information on the personnel that will be directly responsible for the work, including the location of the office that will be primarily responsible for work. Firms shall also demonstrate an acceptable safety history for construction projects.
6. **Legal Authorization** – All firms must show that they are legally authorized to conduct business in the State of North Carolina and have all required licensure for the work to be performed.
7. **Submitting** – The application is to be submitted to the County by the deadline established in the notice of prequalification. The act of submitting the application does not permit the firm to submit a bid. Incomplete applications will be rejected or returned for further detail or correction in the sole discretion of the County. The application is to be signed, notarized, and delivered to the address indicated.
8. **Additional Information** – Depending on the specific project, firms may be asked to provide additional information, such as specific project reference forms completed by the representative designer and owner and/or a complete current annual audited statement (current within the previous 12-month period).

C. REVIEW OF APPLICATION – COUNTY BID PROJECTS

- 1. Prequalification Committee** - The County shall establish a committee to review prequalification applications submitted by contracting firms (“Prequalification Committee”). The County’s Prequalification Committee will review all information to determine the firm’s prequalification eligibility for the project.
- 2. Review of Applications** – The County’s Prequalification Committee shall use the County’s objective assessment process. The prequalification criteria shall not require the firm to have previously been awarded a construction or repair project by the County. The prequalification criteria used by the Prequalification Committee shall include prequalification scoring values and the minimum required score to be prequalified for the project. The County’s Prequalification Committee shall approve or deny the Applications in accordance with the prequalification criteria and scoring system.
- 3. Notice of Decision** – The firms shall be promptly notified of Wake County’s Prequalification Committee’s decision in writing, including the reason for denial, via e-mail. Notice shall be provided prior to the opening of bids for the project and with sufficient time for a firm to appeal a denial of prequalification and to submit a bid.

D. REVIEW OF APPLICATION – CM AT RISK PROJECTS

- 1. Prequalification Committee** - The Construction Manager at Risk and County staff shall agree upon the members of the Construction Manager at Risk’s Prequalification Committee. The Construction Manager at Risk’s Prequalification Committee will review prequalification applications submitted by the firms and will determine the firm’s prequalification eligibility for the CM at Risk project.
- 2. Review of Applications** – The Construction Manager at Risk’s Prequalification Committee and the County staff shall agree upon an objective assessment process with the criteria defined and associated weights assigned prior to any RFQ being reviewed. The Construction Manager at Risk and County staff shall develop prequalification criteria, including prequalification scoring values and the minimum required score to be prequalified for the project. The prequalification criteria shall not require the firm to have previously been awarded a construction or repair project by the Construction Manager at Risk or the County. The Construction Manager at Risk’s Prequalification Committee shall approve or deny the Applications in accordance with the prequalification criteria and scoring system.

3. **Notice of Decision** – The firms shall be promptly notified of the Construction Manager at Risk’s Prequalification Committee’s decision, including the reason for denial, via e-mail. Notice shall be provided prior to the opening of bids for the project and with sufficient time for the firm to appeal a denial of prequalification.

E. APPEALS PROCEDURE

A firm may appeal the denial of Prequalification as noted below:

1. **Written Appeal** – A written appeal may be filed via hand-delivery or e-mail to the applicable Prequalification Committee within three (3) business days (excluding County Holidays) of receipt of notice that the firm has been denied prequalification. The written appeal shall clearly articulate the reasons why the firm is contesting the denial and attach all documents and additional information supporting the firm’s position. The Prequalification Committee may contact the firm regarding clarifications of the information provided prior to ruling on the appeal. If the Prequalification Committee is satisfied that the firm should be prequalified, the firm shall be notified that it is prequalified to bid on the project and allowed to participate in the bid process. If the Prequalification Committee upholds its denial, the decision shall be final, and the firm shall be promptly notified of the decision in writing via e-mail within five (5) County business days.

In the event that the Prequalification Committee is unable to render a decision prior to the bid date, the firm shall be allowed to submit a bid on the project subject to a final decision on the appeal. If the firm’s bid is opened prior to a final decision on the appeal and the bid is not the lowest monetary bid for the project, the appeal shall be terminated and rendered moot.

2. **CM at Risk Projects** – For CM at Risk projects, the Director of Facilities Design & Construction shall notify the Construction Manager at Risk of its recommended decision. The Construction Manager at Risk shall review the recommended decision and issue a final decision to the County and firm. In the event the Construction Manager at Risk rejects a recommendation from the Director of Facilities Design & Construction to prequalify the firm, the Construction Manager at Risk shall provide a written explanation of the denial to both the Director of Facilities Design & Construction and the firm.
3. **General Rules for Appeals** – Firms submitting applications shall be provided an e-mail address for communication with the County on County bid projects or with the Construction Manager at Risk for CM at Risk projects during the appeal process. The firm shall provide at least two e-mail addresses for use by the County or Construction Manager at Risk in communicating with the firm for the applicable delivery method.

INSTRUCTIONS TO BIDDERS INFORMAL CONSTRUCTION CONTRACTS

For a Proposal to be considered, it must be in accordance with the following instructions:

1. PROPOSALS

Proposals must be made on the Bid Proposal Forms provided herein, and all blank spaces for Bids, Alternates and Unit Prices, applicable to bidder's work, shall be properly filled in. When requested Alternates are not Bid, the Proposal may be considered non responsive. The Bidders agree that Bids submitted on the specified Bid Proposal Forms, which are detached from specifications, will be considered and will have the same force and effect as if attached thereto. Numbers shall be stated both in writing and in figures for the Base Bids and Alternates.

Any modification to the Form of Proposal (including Alternates and/or Unit Prices) may disqualify the Bid and may cause the Bid to be rejected.

The Contractor shall fill in the Form of Proposal as follows:

- A. If the documents are executed by a sole Owner, that fact shall be evidenced by the word "Owner" appearing after the name of the person.
- B. If the documents are executed by a Partnership, that fact shall be evidenced by the word "Co-Partner" appearing after the name of the partner executing them.
- C. If the documents are executed on the part of a Corporation, they shall be executed by either the President or the Vice-President and attested by the Secretary or Assistant Secretary. In either case the title of the office of such person shall appear after their signatures. The seal of the Corporation shall be impressed on each signature page of the documents.
- D. If the Proposal is made by a Joint Venture, it shall be executed by each member of the Joint Venture in the above form for sole Owner, Partnership, or Corporation, whichever form is applicable.
- E. All signatures shall be properly witnessed.
- F. Proposal shall be addressed as indicated in the Advertisement for Bids and shall be delivered enclosed in an opaque sealed envelope, marked "Proposal" and bearing the name of Project, name and address of the Bidder, the Bidder's license number and, if applicable, the designated portion of the Work for which Bid is submitted.
- G. It shall be the specific responsibility of the Bidder to deliver this Bid to the proper official at the appointed place and prior to the announced time for the opening of Bids. Later delivery of a Bid for any reason, including delivery by the United States Mail, shall disqualify the Bid.

- H. Modifications of previously deposited Bids or requests for withdrawal will be acceptable only if delivered in writing to the place of the Bid opening prior to the time for opening Bids.
- I. Unit Prices quoted in the Proposal shall include overhead and profit and shall be the full compensation for the Contractor's cost involved in the work.
- J. All Bidders shall submit, attached to the bid, evidence of compliance with the Owners Minority Business Enterprise Program as outlined in Section 00 50 00, Minority Business Enterprise Documents, of the Project Manual.

2. EXAMINATION OF CONDITIONS

It is understood and mutually agreed that by submitting a Bid the Contractor acknowledges his careful examination of the Bidding Documents pertaining to the work, the location, accessibility and general character of the site of the work and all existing buildings and structures within and adjacent to the site; and has satisfied himself as to the nature of the work, the condition of existing buildings and structures, the conformation of the ground, the character, quality and quantity of the materials to be encountered; the character of the equipment, machinery, plant and any other facilities needed preliminary to and during prosecution of the work; the general and local conditions; the construction hazards; and all other matters, including but not limited to, the labor situation which can in any way affect the work under the Contract; and including all safety measures required by the latest edition of the Occupational Safety Health Act and all rules and regulations issued pursuant thereto. It is further mutually agreed that by submitting a Proposal, the Contractor acknowledges that he has satisfied himself as to the feasibility and meaning of the plans, drawings, specifications, and other Contract Documents for the construction of the work and that he accepts all the terms, conditions and stipulations contained therein; and that he is prepared to work in cooperation with the Owner and all other Contractors performing work on the site.

Reference is made to the Contract Documents for the identification of those surveys and investigative reports of subsurface or latent physical conditions at the site or otherwise affecting performance of the work which have been relied upon by the Licensed Professional who prepared the documents. Copies of all such surveys and reports are available to the Bidders, upon request. All Bidders are responsible for reviewing these documents prior to submission of their Bid Proposal.

Each Bidder may, at his own expense, make such additional surveys and investigations, as he may deem necessary to determine his Bid price for the performance of the work. Any on-site investigation shall be done at the convenience of the Owner. The Owner will honor any reasonable request for access to the site.

3. SUBSTITUTIONS

Material substitutions will be considered during the bidding phase until seven (7) days prior to the receipt of bids. No substitutions will be considered after seven (7) days prior to the receipt of Bids.

For proposed material substitutions submit the following information to the Licensed Professional who prepared the bidding documents:

- Name of manufacturer
- Address of manufacturer
- Phone number of manufacturer
- Trade name
- Model or catalogue designation
- Manufacturer's data including:
 - Performance and test data
 - Reference standards
 - Detailed comparison with specified product including:
 - Performance
 - Test results
 - Warranties
 - Gauge, thickness or strength or material finish
 - Other pertinent data
- Other information requested by the Licensed Professional who prepared the bidding documents

Submittals relating to substitutions, which are not fully complete by seven (7) days prior to the receipt of bids, will not be reviewed.

If the Licensed Professional who prepared the bidding documents accepts a material substitution, Contractors will be notified by Addendum.

4. ADDENDA

Any Addenda to bidding documents issued during the time of bidding will be sent to each Bidder, and are to be considered covered in the Bid Proposal. It is the Contractor's responsibility to ascertain prior to Bid time, which Addenda have been issued and confirm that his Bid Proposal includes any changes covered by the Addenda.

Should the Bidder find discrepancies in, or omissions from, the drawings or documents or should he be in doubt as to their meaning, he shall at once notify the Licensed Professional who prepared said drawings or documents. Neither the Owner nor the Licensed Professional who prepared the bidding documents will be responsible for any oral instructions.

The Bidder on his Bid Proposal shall acknowledge all Addenda. Failure to do so may disqualify the Bid and may cause the Bid to be rejected.

5. BID SECURITY

Each Proposal shall be accompanied by a cash deposit, or a certified check drawn on some bank or trust company insured by the Federal Deposit Insurance Corporation, or a Bid Bond in an amount equal to not less than five percent (5%) of the Proposal. Said deposit to be retained by the Owner (referred to as

Obligee on the Bond Form) as liquidated damages in event of failure of the successful Bidder to execute the Contract within ten (10) days after the award or to give satisfactory Surety as required by law.

The Bid Bond shall be conditioned that the surety will, upon demand, forthwith make payment to the Owner (referred to as Obligee on the Bond Form) upon the said bond if the Bidder fails to execute the contract.

6. RECEIPT OF BIDS

Bids and Bid Security shall be received in strict accordance with requirements of the North Carolina General Statutes. Prior to opening of any Bids on the Project, the Bidder will be permitted to change or withdraw his Bid as allowed by Item 1-H of these Instructions.

All copies of the Bid, the Bid security, if any, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and should be identified with the Project name, time and date of Bid Opening, the Bidder's name and address, Bidder's license number and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

7. OPENING OF BIDS

Upon opening, all Bids shall be read aloud. Once any Bid is opened, no Bids may be returned by the Owner to any Bidder.

A Bidder may withdraw its formal Bid after the Bids are opened without forfeiting its Bid deposit in certain limited circumstances. Withdrawal after opening is permitted only if all of the following conditions specified in North Carolina General Statutes §143-129.1 are met:

- A. The Bid was submitted in good faith.
- B. The price Bid "was based upon a mistake, which constituted a substantial error".
- C. Credible evidence is submitted showing that the error (1) was clerical nature as opposed to a judgment error, and (2) was actually due to an unintentional and substantial arithmetic error or an unintentional omission of a substantial quantity of work, labor, material or services made directly in the compilation of the Bid.
- D. The error can be clearly shown by objective evidence drawn from inspection of the original work papers, documents or materials used in the preparation of the Bid.
- E. The request to withdraw (1) is made in writing to the public agency that invited the Proposals, and (2) is made prior to the award of the Contract, but not later than seventy-two (72) hours after the opening of Bids.

8. REJECTION OF BIDS

The Owner reserves the unqualified right to reject any and all Bids. Reasons for rejection may include, but shall not be limited to, the following:

- A. If the Form of Proposal furnished to the Bidder is not used or is altered.
- B. If the Bidder fails to insert a price for all Bid items, Alternates and Unit Prices requested.
- C. If the Bidder adds any provisions reserving the right to accept or reject any award.
- D. If there are unauthorized additions or conditional Bids, or irregularities of any kind which tend to make the Proposal incomplete, indefinite, or ambiguous as to its meaning.
- E. If the Bidder fails to complete the Proposal forms where information is requested so the Bid may be properly evaluated by the Owner.
- F. If the Unit Prices contained in the Bid Schedule are unacceptable to the Owner.
- G. If the Bidder fails to comply with other instructions stated herein.
- H. If the Bidder fails to provide all documentation confirming compliance with the Wake County Minority Business Enterprise Program.
- I. If the bidder fails to use the bid bond form provided in the project manual.

9. BID EVALUATION

The award of the Contract will be made to the lowest responsible Bidder as soon as practical. Should the successful Bidder default and fail to execute a Contract, the Contract may be awarded to the next lowest and responsible Bidder.

Before awarding a Contract, the Owner may require the apparent low Bidder to qualify himself to be a responsible Bidder by furnishing any or all of the following data:

- A. The latest financial statement showing assets and liabilities of the company or other information satisfactory to the Owner.
- B. A listing of similar completed projects of similar size, with contact persons and telephone numbers.
- C. Permanent name and address of place of business.
- D. The number of regular employees of the organization and length of time the organization has been in business under present name and percentage of work typically performed by the contractor's firm.

- (1) Qualifications of key employees assigned to this Project.
- (2) References for key employees assigned to this Project.
- E. The name and home office address of the Surety proposed and the name and address of the responsible local claim agent.
- F. The names of members of the firm who hold appropriate trade licenses, together with license numbers.
- G. Complete list of all subcontractors and suppliers proposed.
- H. Any pending arbitration or mediation cases or lawsuits. This may include all arbitration, mediation and lawsuits settled or resolved within last ten (10) years.

Failure or refusal to furnish any of the above information if requested shall constitute a basis for disqualification of any Bidder.

In determining the lowest responsible Bidder, the Owner may consider the past performance of the Bidder on construction contracts for the County of Wake, Wake County Public School System, the State of North Carolina or other governmental agencies. Particular concern will be given to completion times, quality of work, cooperation with other Contractors, and cooperation with the Designer and Owner.

Should the Owner adjudge that the apparent low Bidder is not the lowest "responsible" Bidder by virtue of the above information, said apparent low Bidder will be so notified and his Bid Security shall be returned to him.

The Owner shall have the right to accept Alternates in any order or combination and to determine the low Bidder on the basis of the sum of the Base Bid and the Alternates accepted.

The Owner reserves the right to reject any and all Bids, to waive all technicalities and irregularities, and to make the award as considered to be in the best interest of the Owner.

10. PERFORMANCE BOND

The successful Bidder, upon award of Contract, shall furnish a Performance Bond in an amount equal to one hundred percent (100%) of the Contract price.

11. PAYMENT BOND

The successful Bidder, upon award of Contract, shall furnish a Payment Bond in an amount equal to one hundred percent (100%) of the Contract price.

12. PRE-BID CONFERENCE

Bidders are requested to attend a **Non-Mandatory** Pre-Bid Site Walk at the time and place stipulated in the Bidding Documents.

13. PROPOSALS TO BE BID

Single Prime Construction Work

Single Prime Heating and Ventilation and Air Condition Work

Single Prime Plumbing Work

Single Prime Electrical Work

14. INFORMATION TO BIDDER

All questions concerning the plans and specifications should be directed to the Licensed Professional who prepared said documents.

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Holly Springs Comm Library Renovation
RFB #26-020

BID PROPOSAL FORM

(USE THIS FORM ONLY. Bids submitted on anything other than the form(s) provided may be considered non-responsive and subject to rejection)

SINGLE PRIME CONSTRUCTION WORK
INFORMAL CONTRACT

BIDDERS NAME

_____ License Number: _____

The undersigned, as Bidder, hereby declares that the only person or persons interested in this Proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this Proposal or in the Contract to be entered into; that this Proposal is made without connection with any other person, company or parties making a Bid or Proposal; and that it is in all respects fair and in good faith without collusion or fraud.

The Bidder further declares that he has examined the site of the work and informed himself fully in regard to all conditions pertaining to the place where the work is to be done; that he has examined the specifications for the work and the Contract Documents relative thereto, including addenda, if any, and has read all special provisions furnished prior to the opening of bids; that he has satisfied himself relative to the work to be performed.

The Bidder proposes and agrees if this Proposal is accepted to contract with the County of Wake with a definite understanding that no money will be allowed for extra work except as set forth in the General Conditions and Contract Documents, for the sum of:

Base Bid _____ Dollars (\$ _____).

Should any of the alternates as described in the specifications be accepted, the amount written below shall be the amount to "add to" of "deduct from" the Base Bid. If to be "deducted from" Base Bid, put minus sign (-) in parentheses at head of alternate and plus sign (+) in parentheses if to be added. Refer to Section _____ for description of alternates.

Alternate No. 1 Lobby Renovations Dollars () (\$ _____)

Alternate No. 2 Roof Replacement Dollars () (\$ _____)

Alternate No. 3 Staff Entrance Canopy Dollars () (\$ _____)

The Bidder further proposes and agrees hereby to commence work under his Contract on a date to be specified in a written order of Wake County and shall fully complete all work there under within 136 consecutive calendar days from and including said date. Applicable liquidated damages shall be as stated in Supplementary General Conditions.

The undersigned acknowledges receipt of the following addenda issued during the time of bidding and includes the changes therein in this Proposal:

Addendum Number _____, Dated _____

Addendum Number _____, Dated _____

Addendum Number _____, Dated _____

Addendum Number _____, Dated _____

The undersigned agrees that this Proposal will not be withdrawn for a period of sixty (60) days.

The undersigned agrees to ensure compliance with the E-Verify requirements of the General Statutes of North Carolina, all contractors, including any subcontractors employed by the contractor(s), by submitting a bid, proposal or any other response, or by providing any material, equipment, supplies, services, etc., attest and affirm that they are aware and in full compliance with Article 2 of Chapter 64, (NCGS64-26(a)) relating to the E-Verify requirements.

The undersigned further agrees that in the case of failure on his part to execute the said Contract and the Bond within ten (10) consecutive calendar days after written notice being given of the award of the Contract, the check, cash or Bid Bond accompanying this Bid shall be paid into the funds of Owner's Account set aside for this Project, as liquidated damages for such failure; otherwise the check, cash or Bid Bond accompanying this Proposal shall be returned to the undersigned.

Respectfully submitted this __ day
of _____, 20__

(Name of Firm or Corporation making Bid)

By: _____

WITNESS:

(Proprietorship or Partnership)



Affix Corporate Seal Above

Title: _____
(Owner, Partner, or Corporation
President or Vice President Only)

Address: _____

License Number: _____

ATTEST:

By: _____

Title: _____
(Corporation Secretary or Assistant Secretary Only)

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CONSTRUCTION AGREEMENT

FOR

WAKE COUNTY HOLLY SPRINGS COMM LIBRARY RENOVATION

THIS AGREEMENT, made as of the ____ day of _____, 20__, by and between _____, a corporation, hereinafter called the Contractor, and Wake County, a body corporate and politic and a political subdivision of the State of North Carolina, hereinafter called the Owner.

WITNESSETH:

That the Contractor and the Owner, for the consideration herein named, agree as follows:

1. SCOPE OF WORK - The Contractor shall furnish and deliver all of the materials, and perform all of the work required by this Agreement and the following enumerated documents, which are attached hereto and made a part hereof as if fully contained herein: General Conditions, Supplemental Conditions, Contract Construction Schedule, Specifications, Drawings entitled "Wake County Public Library" which Drawings are listed in the Specifications, Performance Bond, Labor and Material Payment Bond, Insurance Certificates, and the following addenda:

Addendum No. _____	Dated _____
Addendum No. _____	Dated _____
Addendum No. _____	Dated _____

All of the documents listed, referenced or described in this paragraph, together with Modifications made or issued in accordance herewith are the Contract Documents, and the work, labor, materials and completed construction required by the Contract Documents and all parts thereof is the Work. The Contractor shall perform the Work in the time, manner and form required by the Contract Documents. The Contract Documents constitute the entire agreement between Owner and Contractor.

2. The Contractor agrees to commence work not later than three (3) days after the commencement date specified in the Notice to Proceed. The Contractor agrees to complete fully all Work hereunder on the dates specified in the Contract Documents, as may be adjusted in accordance with the terms thereof. Time is of the essence with

respect to all dates specified in the Contract Documents as Completion Dates. Liquidated damages for failure(s) to complete in accordance with the provisions of this paragraph shall be computed and assessed against the Contractor in accordance with the Contract Documents.

3. The Owner hereby agrees to pay to the Contractor for the faithful performance of this Agreement, and the Contractor hereby agrees to perform all of the Work, for the sum of _____ Dollars (\$ _____) in the lawful money of the United States, subject to adjustments as provided for in the Contract Documents. Payment of the Contract Price shall be in accordance with Articles 20 and 21 of the General Conditions.

4. It is further mutually agreed between the parties hereto that if at any time after the execution of this Agreement and the Performance Bond and Labor and Material Payment Bond hereto attached for its faithful performance, the Owner shall deem the surety or sureties upon such Bonds to be unsatisfactory, or if, for any reason, such Bonds or either of them cease to be adequate to cover the performance of and payment for the Work, the Contractor shall, at its expense, within five (5) days after notice from the Owner so to do, furnish an additional bond or bonds in such form and amount and with such surety or sureties as shall be satisfactory to the Owner. In such event no further payment to the Contractor shall be deemed to be due under this Agreement until such new or additional security for the faithful performance of or payment for the Work shall be furnished in a manner and form satisfactory to the Owner.

5. Terms used in this Agreement which are defined in the Contract Documents shall have the meanings designated in those Contract Documents.

6. The laws of the State of North Carolina shall apply to the interpretation and enforcement of this Agreement. Any and all suits or actions to enforce, interpret or seek damages with respect to any provision of, or the performance or nonperformance of, this Agreement shall be brought in the General Court of Justice of North Carolina sitting in Wake County, North Carolina, or the United States District Court sitting in Wake County, North Carolina, and it is agreed by the parties that no other court shall have jurisdiction or venue with respect to such suits or actions.

7. To ensure compliance with the E-Verify requirements of the General Statutes of North Carolina, all contractors, including any subcontractors employed by the contractor(s), by submitting a bid, proposal or any other response, or by providing any material, equipment, supplies, services, etc, attest and affirm that they are aware and in full compliance with N.C.G.S. Chapter 64, Article 2 (N.C.G.S. 64-26(a)) relating to the E-Verify requirements.

8. By signing this agreement, Contractor certifies that as of the date of execution of this Agreement 1) it does not appear on the Final Divestment List created by the North Carolina State Treasurer pursuant to N.C.G.S. 143-6A-4 and published on the State Treasurer's website at www.nctreasurer.com/Iran and 2) it will not utilize any

subcontractor that appears on the Final Divestment List in the performance of duties under this Agreement.

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement as of the day and date first above written in a number of counterparts, each of which shall, without proof or accounting for other counterparts, be deemed an original contract.

CONSTRUCTION AGREEMENT

Contractor: (Trade or Corporate Name)

By: _____

Title: _____
(President)

ATTEST: (CORPORATION)

By: _____

Title: _____
(Corporate Secretary)

(CORPORATE SEAL)

WITNESS:

(Proprietorship or Partnership)

WAKE COUNTY
P. O. Box 550
Raleigh, N.C. 27602

County Manager or Designee

This instrument has been pre-audited in the manner required by the local Government Budget and Fiscal Control Act.

Wake County Finance Director

This instrument has been reviewed by Wake County Facilities, Design & Construction

Mark Forestieri
Director, Facilities Design & Construction

This instrument is approved as to Form.

Wake County Attorney

The person responsible for monitoring the contract performance requirements is

_____. _____ Department Head Initials

PAYMENT BOND

Date of Contract: _____

Date of Execution: _____

Name of Principal:
(Contractor) _____

Name of Surety: _____

Name of Contracting Body: County of Wake
P.O. Box 550
Raleigh, N.C. 27602

Amount of Bond: _____
Dollars (\$ _____)

Project: _____

KNOW ALL MEN BY THESE PRESENTS, that we, the PRINCIPAL and SURETY above named, are held and firmly bound unto the above named owner, hereinafter called "Owner", in the penal sum of the amount stated above, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal entered into a certain Contract with the Owner identified as shown above and hereto attached:

NOW THEREFORE, if the Principal shall promptly make payment to all persons supplying labor and material in the prosecution of the Work provided for in said Contract, and any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modification to the Surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representatives, pursuant to authority of its governing body.

PAYMENT BOND

Executed in Four (4) Counterparts.

CONTRACTOR:

By: _____

Title: _____
(Corporation President or
Vice President Only)

ATTEST: (Corporation)

(Corporation Secretary or Assistant
Secretary Only)

(CORPORATE SEAL)

SURETY COMPANY:

WITNESS: By: _____

(Attorney in Fact)

Title: _____

(SURETY CORPORATE SEAL)

COUNTERSIGNED:

(N.C. Licensed Resident Agent)

Name and Address-Surety Agency

Surety Company Name and N.C.
Regional or Branch Office Address

PERFORMANCE BOND

Date of Contract: _____

Date of Execution: _____

Name of Principal:
(Contractor) _____

Name of Surety: _____

Name of Contracting Body: County of Wake
P.O. Box 550
Raleigh, N.C. 27602

Amount of Bond: _____
Dollars (\$ _____)

Project: _____

KNOW ALL MEN BY THESE PRESENTS, that we, the PRINCIPAL and SURETY above named, are held and firmly bound unto the named Contracting Body, hereinafter called the Contracting Body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal entered into a certain Contract with the Contracting Body, identified as shown above and hereto attached:

NOW THEREFORE, if the Principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said Contract during the original term of said Contract and any extensions thereof that may be granted by the Contracting Body, with or without notice to the Surety, and during the life of any guaranty required under the Contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modifications to the Surety being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its countersigned representative, pursuant to authority of its governing body.

PERFORMANCE BOND

Executed in Four (4) Counterparts.

CONTRACTOR:

By: _____

Title: _____
(Corporation President or
Vice President Only)

ATTEST: (Corporation)

(Corporation Secretary or Assistant
Secretary Only)

(CORPORATE SEAL)

SURETY COMPANY:

WITNESS: By: _____

(Attorney in Fact)

Title: _____

(SURETY CORPORATE SEAL)

COUNTERSIGNED:

(N.C. Licensed Resident Agent)

Name and Address-Surety Agency

Surety Company Name and N.C.
Regional or Branch Office Address

Notice of Wake County Electronic Contracting Processes

All Wake County contracts are now executed and processed electronically. The successful lowest responsive responsible bidder upon award of the construction contract must be a registered Wake County vendor to start the electronic contract process. Any company not registered as a Wake County vendor, must register at the Self-Service Portal and enroll in EFT and be paid by direct deposit. The Vendor Registration portal may be found at:

<http://www.wakegov.com/finance/business/vendors/Pages/default.aspx>

Upon notification of contract award, contractor will be issued instructions for processing Performance and Payment Bonds, Certificates of Insurance, and issuance of the Construction Agreement.

Contracts will then be transmitted via DocuSign for signing, attesting, and execution.

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BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, _____,

(Bidder's Name)

_____, of _____

(Street Address)

(City, State, Zip)

hereinafter called the Principal, and _____ of

(Surety's Name)

_____, a Corporation duly organized, and existing under the laws of the State of _____ and authorized to transact business in the State of North Carolina, as Surety, hereinafter called the Surety, are held and firmly bound unto the County of Wake as Owner, hereinafter called the Obligee, in the Penal sum of five percent (5%) of the amount bid, good and lawful money of the United States of America, for the payment for which the Principal and the Surety, bind ourselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents. This bid bond is submitted in lieu of submitting cash, a cashier's check, or a certified check pursuant to G.S. 143- 129.

WHEREAS, the Principal has submitted a Bid for the construction of Holly Springs Comm Library Renovation.

(Project Name)

NOW THEREFORE, if the Obligee shall accept the Bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of said Bid, and give such bond or bonds as may be specified in the Bidding and Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and materials furnished in the prosecution thereof, then this obligation shall be null and void; but if the Principal fails to so execute such Contract and give such bonds as required by G.S. 143-129, this obligation shall otherwise remain in full force and effect and the Surety shall, upon demand, forthwith pay to the Obligee the full amount set forth in the first paragraph hereof.

SIGNED AND SEALED this ___ day of _____, 20__ in the presence of:

Witness _____

Witness _____

Principal (SEAL)

Surety (SEAL)

Title

Title

****USE OF BOND FORM OTHER THAN THIS MAY RESULT IN DISQUALIFICATION OF THE BIDDER****

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APPENDIX B
CONTRACTOR'S SALES TAX REPORT
N.C. STATE & LOCAL SALES TAXES PAID

OWNER: _____
CONTRACTOR: _____
ADDRESS: _____

PROJECT: _____
FOR PERIOD: _____
TO: _____

VENDOR	MATERIAL PURCHASED	ADDRESS	INVOICE NUMBER	DATE	INVOICE AMOUNT	N.C. TAX	COUNTY TAX	WAKE CO. TRANSIT TAX	NAME OF COUNTY

TOTALS _____

I hereby certify that, during the period stated above, North Carolina sales and use taxes were paid as listed above, with respect to building materials, supplies, fixtures, and equipment which have become a part of, or annexed to, a building or structure erected, altered or repaired for the County of Wake, and that the vendors from whom the property was purchased, the dates and numbers of the invoices covering the purchases, the total amount of the invoices of each vendor, the North Carolina sales and use taxes paid thereon, and the cost of property withdrawn from warehouse stock and North Carolina sales or use taxes paid thereon are as set forth above.

Sworn to and Subscribed before me, this ____ day of _____, 200__.

By: _____

Notary

My Commission expires _____.

Title: _____

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PROJECT CLOSE-OUT CHECK LIST

Project: Holly Springs Comm Library Renovation
Page 1

<u>TASK DESCRIPTION</u>	<u>COMPLETED</u>	<u>DATE</u>
A. General Requirements		
1. Certificate of Substantial Completion (AIA G704) (Executed by Designer, Contractor and Owner)	_____	_____
2. Inspections Certifications		
a. Certificate of Occupancy (By Building Inspections Officials)	_____	_____
b. Copy of Building Official Inspection Card (Showing required inspection approvals)	_____	_____
c. Regulatory Inspection Sign-Offs (as applicable)		
(1) General Contract	_____	_____
(2) Plumbing Subcontract	_____	_____
(3) Fire Protection Contract	_____	_____
(4) Mechanical Contract	_____	_____
(5) Electrical Contract	_____	_____
(6) Certification Reports for All Backflow Assemblies (Includes Plumbing, HVAC, Fire Protection as applicable)	_____	_____
(7) Well Water Quality Test Report (if applicable)	_____	_____
(8) Other Certifications as Required (NCDFS, NC DOT, NC Land Quality, Local Government, Utilities, Health Dept., Fireproofing Certification, Structural Steel Inspection Certification, etc.)	_____	_____
3. Closeout Reports & Documentation		
a. Owner Instruction and Training with Equipment and Systems (Memo/List of Attendees required for each session)	_____	_____
b. HVAC Test and Balance Report (Approval cover letter from Designer required)	_____	_____
c. Attic Stock Turnover (Transfer to Owner with Typed Inventory Required)	_____	_____
d. Keys & Permanent Hardware Changeover (Delivery of Final Keys and Cabinet to Owner; Memo of Hardware Changeover Date)	_____	_____

PROJECT CLOSE-OUT CHECK LIST

Project: Holly Springs Comm Library Renovation

Page 2

<u>TASK DESCRIPTION</u>	<u>COMPLETED</u>	<u>DATE</u>
e. Insurance Coverage Change Over	_____	_____
f. Utility Account Change Over		
(1) Electric Service	_____	_____
(2) Gas Service	_____	_____
(3) Water Service	_____	_____
(4) Other Utility Service	_____	_____
 B. Record Document Requirements		
1. As-built drawings		
a. Site/Civil	_____	_____
b. Architectural & Structural	_____	_____
c. Plumbing	_____	_____
d. Fire Protection	_____	_____
e. Mechanical	_____	_____
f. Electrical	_____	_____
g. Security	_____	_____
h. Other (Kitchen Equipment, etc.)	_____	_____
 2. Final Finish Schedule (updated with actual finishes and bound in with O+M Manual)	_____	_____
 3. Operation & Maintenance (O+M) Manuals (Approval cover letter from Designer required)	_____	_____
a. Product & Operations Data	_____	_____
b. Maintenance Information	_____	_____
c. Product Warranty Certificates/Maintenance Agreements	_____	_____
 3. Shop Drawings – Complete Set (With Architect's Review Stamp)	_____	_____
 4. Construction Site Documentation (Contractor's Job Log and Photographs)	_____	_____

PROJECT CLOSE-OUT CHECK LIST

Project: Holly Springs Comm Library Renovation

Page 3

<u>TASK DESCRIPTION</u>	<u>COMPLETED</u>	<u>DATE</u>
C. Final Accounting Requirements – by Contractor		
1. Contractor's Certification Of Completion Of Work	_____	_____
2. Affidavit of Release of Liens (AIA G706A)	_____	_____
3. Affidavit of Payment of Debts and Claims (AIA G706)	_____	_____
4. Consent of Surety to Final Payment (AIA G707)	_____	_____
5. Final Certified NC Sales Tax Report	_____	_____
6. Final MBE Documentation (MBE Form-6)	_____	_____
7. Final Request for Payment Certified by Designer	_____	_____
D. Final Accounting Requirements – by Designer		
1. Cover Letter of Approval of Roof Warranty	_____	_____
2. Cover Letter of Approval for O&M Manuals	_____	_____
3. Certification by Architect of Completed Final Punch List	_____	_____
4. Final Completion Certificate executed by Designer	_____	_____
5. Final Liquidated Damages analysis by Designer		
6. Record Drawings (electronic files + 3 reproducible sets of all drawings based on Contractor As-Builts)	_____	_____
E. Warranty Period		
1. Pre-Expiration Warranty Inspection (Inspection 30 days prior to warranty expiration date)	_____	_____

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SECTION 00 65 36 - CONTRACTOR'S GENERAL WARRANTY

WAKE COUNTY
HOLLY SPRINGS LIBRARY
300 WEST BALLENTINE STREET
HOLLY SPRINGS, NORTH CAROLINA 27540

The undersigned Contractor hereby warrants, in accordance with the applicable provisions and terms set forth in the Contract Documents, all materials and workmanship incorporated in this Project against any and all defects due to faulty materials or workmanship or negligence for a period of 12 months, or such longer periods as set forth in the Contract Documents, from the effective date of Substantial Completion. This Contractor further warrants all work incorporated in this Project to remain leakproof and watertight if applicable at all points for a period of 24 months from the effective date of Substantial Completion.

This Warranty shall be binding where defects occur due to normal usage conditions and does not cover willful or malicious damage, damage caused by acts of God or other casualty beyond the control of the Contractor.

This Warranty shall be in addition to other warranties and guarantees set forth in the Contract Documents, and shall not act to constitute a waiver of additional protection of the Owner afforded, where applicable, by consumer protection and product liability provisions of law, and these stipulations shall not constitute waiver of any additional rights or remedies available to the Owner under the law.

Signed: _____

Name: _____

Title: _____

Date: _____

(Corporate Seal)

Subscribed and sworn before me this

_____ day of _____, 20____.

(Notary Public)

END OF SECTION 00 65 36

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SECTION 00 65 37 - ASBESTOS-FREE WARRANTY

WAKE COUNTY
HOLLY SPRINGS LIBRARY
300 WEST BALLENTINE STREET
HOLLY SPRINGS, NORTH CAROLINA 27540

The undersigned Contractor hereby warrants that no asbestos-containing materials of any kind were used in the construction of Wake County Holly Springs Library, 300 West Ballentine Street, Holly Springs, North Carolina 27540.

Signed: _____

Name: _____

Title: _____

Date: _____

(Corporate Seal)

Subscribed and sworn before me this
_____ day of _____, 20____.

(Notary Public)

END OF SECTION 00 65 37

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GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

ARTICLE 1.

DEFINITIONS

- 1.1 Agreement - The Construction Agreement, these General Conditions, and any Supplementary Conditions.
- 1.2 AIA - The American Institute of Architects.
- 1.3 ASTM - The American Society for Testing and Materials.
- 1.4 Beneficial Occupancy – The point at which the Project can be occupied by the Owner for its intended purpose, upon achievement of Substantial Completion, as defined in 1.40.
- 1.5 Change Order - A written order to the Contractor signed by the Owner and the Designer authorizing an addition, deletion, or revision in the Work and/or an adjustment in the Contract Price and/or the Contract Time issued after execution of the Construction Agreement. See paragraph 14.1.
- 1.6 Completion Date - Those dates identified as Completion Dates in the Contract Construction Schedule or elsewhere in the Contract Documents.
- 1.7 Construction Agreement – The document executed by the Contractor and the Owner to formally memorialize their consent to the terms of the Agreement.
- 1.8 Construction Change Directive – A written order to the Contractor signed by the Owner and the Designer directing an addition, deletion, or revision in the Work after execution of the Construction Agreement, in circumstances when the parties have been unable to agree on an adjustment to the Contract Price or the Contract Time, but the Owner requests that the Contractor proceed with said Work subject to adjustment of the Contract Price and/or Contract Time under the procedures described herein.
- 1.9 Construction Manager(s) - The person or firm designated as the Construction Manager in the Contract Documents, or their authorized representatives. The Construction Manager(s), as referred to herein, will be referred to hereinafter as if each were of the singular number, masculine gender.
- 1.10 Contract Construction Schedule - That schedule described in Article 13 hereof and identified as the Contract Construction Schedule.
- 1.11 Contract Documents - All of the documents that make up the Agreement, plus the Drawings and Specifications that describe the scope of the Work, plus allowable Modifications to the Contract Documents.
- 1.12 Contract Price - The total monies payable to the Contractor under the Contract Documents pursuant to paragraph 15.1 of the Agreement.
- 1.13 Contract Time - The number of calendar days stated in, or computed from, the Contract Documents for the completion of the Work, or any portion thereof. See, particularly, Article 13 hereof and the Contract Construction Schedule. Time of completion as specified therein is of the essence. The time used and referred to on the Project will be that time which is



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observed in Raleigh, North Carolina, being Eastern Daylight Savings Time (EDT), Eastern Standard Time (EST), or other as designated by the Designer.

- 1.14 Contractor - The Contractor shall be that party identified as such in the Agreement.
- 1.15 Days - Unless otherwise indicated, the term "days" shall mean consecutive calendar days.
- 1.16 Daylight Hours - The hours or portions of hours between sunrise and sunset local time.
- 1.17 Designer(s) – The person or firm designated as the Designer in the Contract Documents, or their authorized representatives. The Designer(s), as referred to herein, shall mean architect, landscape architect, and/or engineer. They will be referred to hereinafter as if each were of the singular number, masculine gender.
- 1.18 Drawings - The Drawings are the graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location, and dimensions of the Work, and generally including plans, elevations, sections, details, schedules and diagrams. A list of the Drawings is contained in the Supplemental General Conditions.
- 1.19 Field Order - A written order issued by the Designer which clarifies or interprets the Contract Documents or orders minor changes in the Work in accordance with the Contract Documents. See paragraph 14.2.
- 1.20 Final Completion - The point at which the Contractor has, as determined by the Designer, completed the Work, with the exception of guaranty and warranty obligations, and becomes entitled, upon the recommendation of the Designer and determination by the Owner, to final payment.
- 1.21 The words "furnish," "furnish and install," "install," and "provide" or words with similar meanings shall be interpreted, unless otherwise stated, to mean furnish and install complete, in place and ready for service.
- 1.22 Liquidated Damages – See paragraph 13.18 of these General Conditions.
- 1.23 Modification - (A) a written amendment to the Contract Documents signed by the Owner and the Contractor and identified therein as such, (B) a Change Order, (C) Construction Change Directive, or (D) a Field Order. A Modification may only be issued after execution of the Agreement.
- 1.24 Notice of Award - The written notice by the Owner to the Contractor that the Contractor is the successful Bidder and that upon compliance with the conditions precedent to be fulfilled by the Contractor within the time specified, the Owner will execute and deliver the Agreement to him.
- 1.25 Notice to Proceed - See paragraph 13.3.
- 1.26 Owner - The Owner is the person designated as such in the Agreement.



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- 1.27 Owner's Authorized Representative - A person, or persons, employed by the Owner and designated from time to time by written notice to the Contractor to administer the Contract Documents, and to observe and monitor the Work on behalf of the Owner with authority and responsibility as herein specified.
- 1.28 Notice - The term "notice" or "written notice" as used herein shall mean and include all written notices, demands, instructions, and claims approvals and disapprovals furnished by the Owner or the Designer to obtain compliance with the requirements of the Contract Documents, as well as all written notices, demands, instructions and claims furnished by the Contractor as required by the Contract Documents. Where notice is required under the terms of the Contract Documents written notice shall always be required, and oral or "constructive" notice shall be insufficient and ineffective as notice. Email or other electronic delivery shall be insufficient and ineffective as notice unless specifically allowed by the Supplementary Conditions or a Modification to the Agreement. Written notice shall be deemed to have been duly served on the date that it is delivered in person to the individual or to a member of the firm, to an officer of the corporation for whom it is intended, to an authorized representative of such individual, firm, or corporation, or on the date that it is mailed by registered or certified mail, return receipt requested, addressed to the last business address of such individual, firm, or corporation known to the person giving the notice. Written notice may also be given by facsimile transmission, provided that proof of delivery is obtained. In the case of delivery in person, such delivery shall not be effective unless and until a written and signed receipt showing the date and time of delivery is obtained.
- 1.29 Project - The total construction of which the Work performed under the Contract Documents may be the whole or a part.
- 1.30 Project Expediter – As used herein, is an entity stated in the Contract Documents, designated to effectively facilitate scheduling and coordination of Work activities. For the purpose of a single prime contract, the single prime contractor is designated as the Project Expediter. For the purpose of a project involving separate prime contracts, the Contractor for general work shall be designated as the Project Expediter unless otherwise indicated in the Supplementary General Conditions. See paragraph 7.27.
- 1.31 Project Manager - That person designated by the Contractor in accordance with paragraph 7.2 who shall be in general charge of the Work and its performance and who shall have the authority set forth in the last sentence of paragraph 7.2.
- 1.32 Request for Information - A written communication from the Contractor to the Designer for any interpretation of, or information needed, required, or desired under the Contract Documents. The Owner reserves the right to determine the reasonable format and contents required for a Request for Information. In any Request for Information, the Contractor shall state a reasonable date by which a response is necessary in order to avoid delay in progress on the Work and shall make such request sufficiently in advance of such date as to avoid any such delay. The Designer shall respond in writing to the Request for Information by the date stated by the Contractor unless he cannot reasonably do so, in which case he shall prior to that date notify the Contractor of the date by which he can reasonably respond. The Contractor shall not be entitled to any additional time for the completion of the Work or any portion thereof by reason of the Designer's failure to respond



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if he has not submitted his Request for Information sufficiently in advance to allow the Designer a reasonable time within which to respond.

- 1.33 Request for Payment - The form, in the form of AIA Document G702 (latest ed.) or other published document approved by Owner, which is to be used by the Contractor in requesting progress payments and which is to include a Schedule of Values as required by the Contract Documents and an affidavit of the Contractor that progress payments theretofore received from the Owner on account of the Work have been applied by the Contractor to discharge in full all the Contractor's obligations incurred in connection with Work covered by all prior applications for payment. See paragraph 20.2.
- 1.34 Resident Superintendent - That person designated by the Contractor in accordance with paragraph 7.2 who has day-to-day responsibility for the prosecution of the Work and the obtaining of proper materials and equipment, and adequate labor and who shall have the authority set forth in the last sentence of paragraph 7.2.
- 1.35 Schedule of Values - Any breakdown of the Contract Price which may be required by the Contract Documents, and designated as such. See paragraph 20.1.
- 1.36 Specifications - That portion of the Contract Documents consisting generally of the written requirements for materials, equipment, construction systems, standards, and workmanship for the Work and performance of related services.
- 1.37 Subcontractor - A person, firm, or corporation who has entered into a direct contract with the Contractor to perform any of the Work at the Project.
- 1.38 Submittal - Shop drawings, product data, samples, and other documents required by the Contract Documents to be submitted by the Contractor to the Designer.
- 1.39 Submittal Register - See paragraph 13.2 of these General Conditions.
- 1.40 Substantial Completion - The point at which the Work, and Work by other Contractors on or in connection with the Project, as determined by the Designer, is sufficiently complete in accordance with the Contract Documents that it can be beneficially occupied by the Owner, and the Work can be utilized by the Owner for its intended use, and all necessary permits and permissions for Beneficial Occupancy and utilization having been obtained by the Contractor. All operations and maintenance manuals, Owner training, and as-built drawings must be submitted prior to Substantial Completion being achieved.
- 1.41 Sub-subcontractor - A person or entity that has a direct or indirect contract with a Subcontractor to perform any of the Work at the Project.
- 1.42 Work - The construction and services required by the Contract Documents, including all labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations.
- 1.43 All references in the Contract Documents to the masculine shall be interpreted as including the feminine or neuter and all references in the Contract Documents to the singular or the



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plural shall be interpreted as including the other, as may be appropriate in the reasonable interpretation of the Contract Documents.

ARTICLE 2. CORRELATION, INTERPRETATION AND INTENT OF CONTRACT DOCUMENTS

- 2.1 It is the intent of the Specifications and Drawings and other Contract Documents to describe a complete Project in accordance with the Contract Documents.
- 2.2 The Contract Documents are complementary; what is called for by one is as binding as if called for by all. If the Contractor finds a conflict, error or discrepancy in the Contract Documents, the Contractor shall notify the Designer in writing before proceeding with the Work affected thereby. In resolving such conflicts, errors and discrepancies, the Contract Documents shall be given preference in the following order: Construction Agreement, Modifications, Addenda, Supplemental Conditions, General Conditions, Specifications, and Drawings. Figure dimensions on Drawings shall govern over scale dimensions, and detailed Drawings shall govern over general Drawings. Any Work that may reasonably be inferred from the Contract Documents as being required to produce the intended result shall be supplied whether or not it is specifically called for. Work, materials or equipment described in words which, so applied, have a well known technical trade meaning shall be deemed to refer to such meaning and to incorporate any recognized standards which are a part of such meaning.
- 2.3 Miscellaneous items, accessories and work which are not specifically mentioned, but which are essential to produce a complete and properly operating installation, or useable structure or plant providing the indicated function shall be furnished and installed without change in the Contract Price. Such miscellaneous items and accessories shall be of the same quality standards, including material, style, finish, strength, class, weight and other applicable characteristics, as specified for the major component of which the miscellaneous item or accessory is an essential part, and shall be approved by the Designer before installation. This requirement is not intended to include major components not covered by or inferable from the Contract Documents.
- 2.4 The Work of all trades under the Contract Documents shall be coordinated by the Contractor in such a manner as to obtain the best workmanship possible for the entire Project and all components of the Work shall be installed or erected in accordance with the best practices of the particular trade.
- 2.5 The Contractor shall fully complete the Work and shall be responsible for all of the Work under the Contract Documents to which the Construction Agreement applies. If the Contractor is prevented from doing so by any limitation of the Contract Documents, the Contractor shall immediately give notice thereof to the Designer and the Owner in writing before proceeding with the construction in the area where the problem or limitation exists.
- 2.6 Standard specifications or manufacturers' literature, when referenced, shall be of the latest revision or printing unless otherwise stated and is intended to establish the minimum requirements acceptable.



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- 2.7 For those materials specified without the use of brand names, the Contractor shall submit within thirty (30) days after his receiving the Construction Agreement for signatures, any product that meets the express requirements of the Specifications.

Such Submittal shall include manufacturer's data, test reports, performance data and certifications, samples, erection details, and other applicable information as required to permit determination by the Designer whether such proposed products are suitable. The Designer shall be the sole judge as to the suitability of any proposed product. The burden of proof of quality rests with the Contractor.

- 2.8 The Contractor is required to examine and read the complete set of Contract Documents for information concerning the Work, because some of the Work for which the Contractor will be responsible may be indicated on or in documentation applying primarily to the Work of one or more other separate prime contractors. No allowance will be made for the Contractor's failure to become familiar with the complete set of project documents.

- 2.9 Contractor's requests for clarification or information shall clearly define the cause(s) of Contractor's request and, as appropriate, shall include Contractor's interpretation and Contractor's proposed solution.

ARTICLE 3. FAMILIARITY WITH WORK, CONDITIONS AND LAWS

- 3.1 The Contractor has investigated prior to bidding and is satisfied with all conditions affecting the Work, including but not restricted to those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electrical power, roads and uncertainties of weather, or similar physical conditions at the Project site, and the character of equipment and facilities needed prior to and during prosecution of the Work. The Contractor is satisfied as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from inspection of the Project site, including all exploratory work done by the Owner, as well as from information presented by the Contract Documents, or any other information made available to the Contractor prior to receipt of bids. Any failure by the Contractor to become acquainted with the available information shall not relieve the Contractor from the responsibility for estimating properly the difficulty or cost of successfully performing the Work.

- 3.2 The Contractor shall be entitled to rely upon all information furnished to the Contractor in writing by the Owner with respect to the Project site and to make all inferences from it that would reasonably be made by a contractor having knowledge and experience with similar work; however, the Contractor shall not be entitled to infer from Owner-supplied information any fact or condition which would not be inferred by a contractor having knowledge and experience with similar work and, if the Owner-supplied information is inadequate or insufficient in any respect, the Contractor shall be required to obtain independently such other information as a knowledgeable and experienced contractor would prudently obtain in order to evaluate any such condition.

- 3.3 The Contractor specifically acknowledges familiarity with all Federal, State, and local laws, ordinances, rules, and regulations which may in any manner affect those engaged or



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employed in the Work, or the materials or equipment in or about the Work, or in any way affect the conduct of the Work and agrees that the Contractor and the Contractor's employees, subcontractors, and suppliers will, at all times, comply with same. If the Contractor shall discover any provisions in the Contract Documents which are contrary to or inconsistent with any such law, ordinance, rule, or regulation, the Contractor shall immediately give notice thereof to the Designer and the Owner in writing, identifying any items of Work affected, and the Contractor shall not proceed until the Contractor has received written direction from the Designer with respect to these items. If the Contractor performs contrary to or inconsistently with any such law, ordinance, rule, or regulation without giving such notice, the Contractor shall bear all costs which are a consequence of such performance.

- 3.4 At times selected by the Designer after execution by the Contractor of the Construction Agreement, a pre-construction conference shall be scheduled and conducted for the benefit of the Project.

ARTICLE 4. BONDS

- 4.1 A performance bond in the full amount of the Contract Price shall be required of the Contractor to guarantee the faithful performance of the Work in compliance with the Contract Documents, in such form as may be required by law and approved by the Owner. The bond shall be dated the same date as the Construction Agreement and must be accompanied by a current copy of the power of attorney for the attorney-in-fact executing such bond on behalf of a surety company licensed to do business in the state of North Carolina.
- 4.2 A payment bond in the full amount of the Contract Price shall be required of the Contractor to guarantee the payment of all labor and material costs or claims in connection with compliance with the Contract. The payment bond shall be in such form as may be required by law and approved by the Owner. Said bond shall be dated and executed in the same manner as the performance bond in paragraph 4.1.

ARTICLE 5. INSURANCE AND INDEMNITY

5.1 CONTRACTOR PROVIDED INSURANCE

The Contractor shall, without limiting its obligations or liabilities, procure, pay for and maintain such insurance as is required by law and as is required by this Agreement to protect the Contractor and the Owner from claims for damages for bodily injury, including death, and from claims for property damage which may arise from the Contractor's or its representatives', consultants', Subcontractors', agents', or employees' operations under this Agreement. Such insurance shall be of the kinds and have limits of liability and coverages not less than the minimum limits hereinafter specified or required by law, whichever is greater. The Owner makes no representation as to the adequacy or sufficiency of such coverages. The following requirements shall in no way be construed to limit or eliminate the liability of the Contractor, which arises from performance of Work under the Agreement. The Contractor is strictly responsible for any losses, claims, and costs of any kind which exceed the Contractor's limits of liability, or which may be outside the coverage scope of the policies.



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The insurance specified shall be provided by an insurer approved by the Owner, authorized to do such business in the State of North Carolina, and on terms approved by the Owner. Insurance companies utilized shall have a minimum rating of A- and Class VII as evaluated by the most current A.M. Best Rating Guide. If the insurer has a Best Rating less than A- and Class VII, the Contractor must receive specific written approval from the Owner prior to proceeding with any Work under the Agreement. All agents and brokers shall hold valid licenses from the State of North Carolina. Before commencing mobilization to the Project site and not later than 7 days after the receipt of the Construction Agreement by the Contractor for signatures, the Contractor shall furnish to the Owner a certificate or certificates of insurance in a form satisfactory to the Owner. Upon request of the Owner, the Contractor shall provide the Owner with certified copies of the insurance policies required by this Article, including without limitation declaration pages, conditions, exclusions and endorsements, and confirmation that each policy premium has been paid for the required term of this Agreement. A copy of the umbrella policy shall be provided to the Wake County Finance Department. Certificates shall be signed by a person authorized by that insurer to bind coverage on its behalf. In the event of any such cancellation, non-renewal, reduction, restriction, or change in any insurance, the Contractor is obligated to replace such insurance within 7 days without a gap in coverage and file accordingly such notice with the Owner, and other interested parties. Failing immediate receipt of evidence of such replacement of insurance the Owner reserves the right to procure such insurance as the Owner considers desirable and the Contractor shall pay or reimburse the cost of the premium in respect thereof. It is expressly provided, however, that any action or inaction on the part of the Owner in this respect shall in no way change or reduce the Contractor's responsibilities and liabilities under this Agreement. Self-funded, policy fronting, or other non-risk transfer insurance mechanisms are not acceptable without prior written approval of the Owner. Full disclosure of such a program must be made prior to commencing mobilization to the Project site. Failure to make a full disclosure constitutes a material breach of the Agreement, justifying termination for default.

The Contractor shall name the Owner, the Designer, the Designer's consultants, and the Construction Manager as additional insureds under all its insurance contracts (except workers' compensation) with respect to and including without limitation liability arising out of activities performed by or on behalf of the Contractor, products and completed operations of the Contractor, and automobiles owned, hired, leased, or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to additional insureds.

For any claims related to this Project, the Contractor's insurance or self insurance shall be primary and noncontributory with respect to the Owner's insurance. Any insurance or self-insurance maintained by the Owner shall be excess and noncontributory with respect to the Contractor's insurance.

All policies of insurance shall contain a clause waiving rights of subrogation against the Owner, unless the Owner approves otherwise in writing.

Limits of coverage are not to be amended by deductible clauses of any nature without the express written consent of the Owner. The Contractor shall be solely responsible for any deductible assumptions that may exist in any insurance policies required under this



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Agreement. In addition, the Contractor shall be responsible and shall not be reimbursed for any losses arising from any risk or exposure not insured as required herein, or not covered as a result of a normal policy exclusion or that falls within the self insured retention, if Contractor self insured.

The Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

The claim provisions in the Contractor's insurance policies must specifically state the insurance company or Contractor's Third Party Administrator, if self insured, has both the right and duty to adjust a claim and provide defense.

The policies shall not contain any provision or definition which would serve to exclude or eliminate from coverage third party claims, including exclusions of claims for bodily or other injury to shareholders, partners, officers, directors, or employees of the insured, the premises owner, real estate manager, or the insured's Subcontractor, or any family relative of such persons.

If the policies contain any warranty stating that coverage is null and void (or words to that effect) if the Contractor does not comply with the most stringent regulations governing the Work, it shall be modified so that coverage shall be afforded in all cases except for the Contractor's willful or intentional noncompliance with applicable government regulations.

Any failure by any person to comply with reporting or other provisions of the policy including breach of warranties, shall not affect coverage provided to the Owner and its representatives, officials, and employees.

The insolvency or bankruptcy of the Insured or of the Insured's estate shall not relieve the insurance companies of their obligations under these policies. Any clauses to the contrary are unacceptable and must be stricken.

Failure to comply with these requirements shall be a material breach of this Agreement justifying termination for default.

5.1.1 Worker's Compensation and Employers' Liability Insurance

The Contractor and its Subcontractors shall procure and maintain Workers' Compensation Insurance in the amount and type required by the State of North Carolina and federal law for all employees employed under the Agreement who may come within the protection of Workers' Compensation Laws and covering all operations under the Agreement whether performed by the Contractor or by his Subcontractors. In jurisdictions not providing complete Workers' Compensation protection, the Contractor and his Subcontractors shall maintain employers' liability insurance in an amount, form, company, and agency satisfactory to the State of North Carolina and the Owner for the benefit of all employees not protected by Workers' Compensation Laws and covering all operations under the Agreement whether performed by the Contractor or by his Subcontractors.

The Contractor shall pay such assessments as will protect the Contractor and the Owner from claims under the Workers' Compensation Laws, workers' or workmen's compensation



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disability benefits, and other similar employee benefit acts. The current Experience Modification Factor shall be indicated on the Certificate of Insurance.

Coverage under this section shall be as required by federal and state Workers' Compensation and Occupational Disease Statutes, and shall have minimum limits as follows:

Coverage A:	Statutory, State of North Carolina
Employers' Liability:	Each Accident \$1,000,000
	Disease - Policy Limit \$1,000,000
	Disease - Each Employee \$1,000,000

Such insurance shall include Voluntary Compensation coverage, a Waiver of Subrogation in favor of the Owner as well as other endorsements that may be required by applicable jurisdictions, i.e. United States Longshoremen and Harbor Workers Act and maritime coverage (Jones Act).

5.1.2 Automobile Liability Insurance

The Contractor shall procure and maintain automobile insurance against liability for bodily injury and property damage as described below, that may arise with respect to the Work being performed under the Agreement, and as will provide protection from claims which may arise out of or result from the Contractor's performance of the Work and the Contractor's other obligations under the Agreement, whether such performance of the Work is by the Contractor, by any representative or Subcontractor, by anyone, both officially and personally, directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable.

This policy of insurance shall carry the following minimum Limit of Liability:

Combined Single Limit	\$1,000,000
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The policy of insurance shall contain or be endorsed to include the following:

- a) owned, hired, and non-owned automobile liability.
- b) If the policy contains a warranty stating that coverage is null and void (or words to that effect) if the transporter does not comply with the most stringent regulations governing the Work, it shall be modified so that coverage shall be afforded in all cases except for the transporter's willful or intentional noncompliance with applicable government regulations.

Any failure by any party to comply with reporting or other provisions of the policy including breach of warranties, shall not affect coverage provided to the Owner and its representatives, officials, and employees.

No subcontracting of waste hauling shall be permitted without prior, written approval of the Owner.



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5.1.3 General Liability

This policy must be written on an Occurrence basis, with the following minimum Limits of Liability:

General Aggregate per project	\$2,000,000.00
Products/Completed Operations Aggregate	\$2,000,000.00
Bodily Injury and Property Damage csl/each occurrence	\$1,000,000.00
Personal Injury and Advertising Injury	\$2,000,000.00

The policy of insurance shall contain or be endorsed to include the following:

- a) Blanket Contractual Liability covering Contractor's indemnification obligations under this Agreement, in accordance with ISO policy form CG 00 01. Modifications to the standard provision will not be acceptable if they serve to reduce coverage.
- b) Premises/Operations Liability.
- c) Explosion, collapse, and underground fault.
- d) Independent Contractors and Independent Subcontractors coverage.
- e) Broad Form Property Damage.
- f) Personal Injury
- g) Cross Liability/Severability of Interest clause.
- h) Employer's Stop-Gap Liability endorsement, if applicable.
- i) Amendment of the Pollution Exclusion Endorsement to allow coverage for bodily injury or property damage caused by heat, smoke, or fumes from a hostile fire.
- j) Designated General Aggregate Limit Endorsement if required by the Supplemental General Conditions.

Coverage shall remain continuously in effect and without interruption for at least 6 years from the date of the Notice of Award and shall include coverage for exposures arising from operations that have been completed. The Contractor shall furnish the Owner and each other additional insured listed in the Agreement to whom the Certificates have been issued, evidence satisfactory to the Owner of continuation of such insurance at the date of Preliminary Acceptance and each year thereafter.

5.1.4 Pollution Legal Liability (PLL)

Pollution Legal Liability coverage will be provided if required by the Supplementary General Conditions.

5.1.5 Umbrella Liability



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The Contractor shall maintain an occurrence basis (as distinguished from a "claims made" basis) Umbrella Liability policy (true follow form) over the underlying General Liability, Automobile Liability, and Employer's Liability, with the following limits of liability:

Each Occurrence	\$3,000,000
Aggregate	\$3,000,000

On a fully insured basis such coverage will be subject to a deductible no greater than \$10,000 per occurrence where coverage is not provided by the underlying insurance, but is provided by the Umbrella Liability policy.

The Contractor may use any combination of primary and umbrella insurance policies to comply with the insurance requirements, provided the resulting insurance is equivalent to the insurance stated herein.

All Occupational Disease exclusions must be deleted. Any Pollution Exclusion must be amended to allow coverage for bodily injury or property damage caused by spill, upset, overturn, heat, smoke, or fumes from a hostile fire.

5.1.6 Property Insurance

The Contractor shall purchase All Risk Property Insurance on a Completed Value Form in the names of the Owner, Contractor, Subcontractors, and sub-subcontractors as their interests may appear with limits as follows:

- a) Full insurance value of the Work, or
- b) Amount equal to the Contract Price for the Work, whichever is higher.

The Contractor is responsible for all physical damage to owned or rented machinery, tools, equipment, forms, and other items owned, rented or used by the Contractor and/or Subcontractor(s) in the performance of the Work. The insurance coverage evidencing such shall include a waiver of subrogation in favor of the Owner.

5.1.7 Valuable Papers And Records

The Contractor shall provide valuable papers and records insurance with coverage in an amount commensurate with project scope and set forth in the Supplementary General Conditions.

5.1.8 Claims

The Contractor shall notify the Owner within 24 hours of any claims or alleged claims received by the Contractor covered by any of the policies of insurance required in this Agreement. The Contractor shall provide a written copy of the claim or alleged claim to the Owner within 3 days of the Contractor's receipt of the claim or alleged claim. If a claim is



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settled to the satisfaction of the claimant, the Contractor shall submit a copy of the claimant's release to the Owner.

If a claim or alleged claim is rejected by the Contractor and/or its insurance company, the Contractor shall immediately report this fact to the Owner.

Should 30 days elapse after the claim or alleged claim has been received by the Contractor, and the Contractor is not able to report a settlement or rejection of the claim, it shall report to the Owner the steps being taken with respect to the claim.

Without limiting the foregoing, the Contractor shall notify in writing the county risk manager of any paid or incurred claims which may impair annual aggregate or general liability.

5.1.9 Deductibles and Self-insured Retentions

Any deductibles or self-insured retentions must be declared to and approved by the Owner. At the option of the Owner, either: the insurer shall reduce to a maximum of \$250,000 or eliminate such deductibles or self-insured retentions with respect to the Owner, or the Contractor shall provide evidence of collateral provided to insurers or procure a bond guaranteeing payment of losses and related investigations, claim administration, and defense expenses within the deductible or self-insured retention amount. Any self-insured retention or deductible amount on the policy shall not reduce the amount of collectible limits or liability.

5.1.10 Subcontractors

The Contractor shall include all Subcontractors as Insureds under its policies, or shall furnish separate certificates, policies, and endorsements for each Subcontractor the Contractor intends to use. If a Subcontractor does not take out insurance in his own name and the Contractor wishes to provide insurance protection for such Subcontractor and such Subcontractor's employees, the Contractor shall either (a) procure appropriate policies in the name of the Subcontractor, or (b) cause a rider or riders to be attached to the Contractor's policies which shall identify the Subcontractor thereby covered; provided, however, in the case of the latter option, such a rider need not be attached to the Contractor's workers' compensation policy if such policy by its terms is sufficiently broad to cover the employees of all Subcontractors performing Work under the Contract Documents. Except as otherwise approved by the Owner in writing, Limits of Liability and coverage scope must be at a minimum as stringent as required of the Contractor by the Contract Documents. All Work performed for the Contractor by any Subcontractor shall be pursuant to an appropriate agreement between the Contractor and the Subcontractor which shall contain provisions that waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered by insurance as provided herein. Insurance monies received from any loss shall be divided as the respective interest of the parties affected shall appear.

5.2 OWNER CONTROLLED PROJECT SPECIFIC INSURANCE



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In the event the Owner elects to purchase project-specific insurance affording coverage to the Contractor and Subcontractors, the terms and conditions of such coverage shall be set forth in the Supplementary Conditions.

5.3 CONTRACTOR AS JOINT VENTURE

If the Contractor is completing this Project on a joint venture basis, both joint venture partners retain all liabilities assumed by this Agreement, individually and collectively. This may include, but is not limited to, all premiums due, deductibles/self-insured retentions, coinsurance provisions, claim provisions, insurance policy conditions, and indemnification provisions hereunder.

Evidence of a Blanket Joint Venture Endorsement must be obtained from the General Liability and Contractor's Pollution Legal Liability carriers of each joint venture partner for a period of 6 years after completion of the Project, substantially as follows:

With respect to "your work", and the "products-completed operations hazard", you are an insured for your liability arising out of the conduct of any partnership or joint venture of which you were a partner or member, even though this partnership or joint venture is not shown as a Named Insured in the Declarations. This coverage is excess over any available liability purchased specifically to insure the partnership or joint venture. This coverage will not inure to the benefit of any other party except you."

5.4 INDEMNIFICATION

The Contractor, to the fullest extent not expressly prohibited by law, shall defend, indemnify, and save harmless the Owner, the Designer, the Construction Manager and their respective officials, officers, employees, and agents from and against any and all liabilities (foreseeable or unforeseeable), penalties, fines, forfeitures, demands, claims, causes of actions, suits, judgments, and costs and expenses incidental thereto, (including, without limitation, amounts paid pursuant to investigations, defense or settlements, and reasonable attorneys' fees), which any or all of them may hereafter suffer, incur, be responsible for, or pay out as a result of but not limited to:

- a) bodily injury (including sickness, disease, or death) to any person including but not limited to, the Contractor's employees or its representatives while on the site of the Project; or
- b) actual or alleged damage (including loss of use) to any property (public or private, including the Project or other property on the Project site); or
- c) contamination of or adverse effects on the environment arising directly or indirectly out of or in connection with the performance of the Work, including but not limited to any hazardous or toxic waste, substance, or constituent of any substance subject to regulation under CERCLA, RCRA, TSCA, and other Federal and state authorities that is spilled, released, threatening to release, or disposed of or destroyed by the Contractor or its Subcontractors on or off the site of the Project or while in transport to or from the site; or



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- d) any violation or alleged violation of laws and regulations, arising out of or in any way connected with the Work,

caused in whole or in part by the Contractor, any Subcontractor or supplier or any representatives of the Contractor. The Contractor shall not be required to indemnify the Owner against losses resulting from a breach of this Agreement by the Owner or its other agents and contractors, or resulting from negligence, misconduct or violation of laws on the part of the Owner or its other agents and contractors.

The Contractor further agrees to obtain, maintain, and pay for such liability insurance coverages and endorsements as will insure the provisions of this paragraph. Furthermore, the Contractor agrees to be liable for and to indemnify and reimburse the Owner for all legal fees and disbursements paid or incurred to enforce the provisions of this paragraph. The indemnification obligations under this paragraph shall not be limited in any way by the amount or type of damages, compensation or benefits payable under worker's compensation acts, disability benefit acts, other employment benefit acts, or the amount of insurance carried or recovered.

The Owner acknowledges that hazardous or toxic waste, material, chemicals, compounds or substances, or other environmental hazards, contamination or pollution, (referred to hereinafter as "environmental hazards") may be present at the Project site that were not created, generated, or released at the Project site by the Contractor or its Subcontractors, agents or employees, acting alone or in concert with others. Unless the remediation, abatement or handling of such environmental hazards is part of the scope of the Work under this Agreement, then upon the discovery of such environmental hazards, the Contractor shall immediately, and in no event more than three days later, give notice to the Owner of the environmental hazards before they are disturbed. The Owner and the Designer shall thereupon promptly investigate the environmental hazards, and make such changes in the Drawings and/or Specifications as they may find necessary to abate, remediate, isolate or handle the environmental hazards. Any increase or decrease in the Contract Price or the Contract Time resulting from such changes shall be adjusted in the manner provided herein for adjustments as to extra and/or additional Work and changes. It is agreed that the Contractor shall have no liability under this Agreement for any environmental hazards existing prior to the date that Work commences under this Agreement unless the Contractor or its Subcontractors, agents or employees, acting alone or in concert with others, by their own negligence or misconduct, release or expose the Owner or third parties to the environmental hazards.

The provisions of this paragraph shall survive the termination or cancellation or completion of this Agreement.

ARTICLE 6. OTHER RECORD DOCUMENTS AND SUBMITTALS

- 6.1 The Designer shall furnish to the Contractor the number of copies of Drawings and Specifications stated in the Supplementary General Conditions. Additional copies of Drawings and Specifications may be obtained at the cost of reproduction and handling.



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- 6.2 The Contractor shall submit to the Designer all Submittals required by the Contract Documents. The Contractor shall submit three (3) reproducible prints of all shop drawings plus the number of copies sufficient for his requirements. The Contractor shall submit samples in quantities required by the Contract Documents. The Contractor shall submit product data in five (5) copies, plus the number of copies sufficient for the Contractor's requirements. All shop drawings shall be reviewed by the Contractor and shall bear the Contractor's stamp of approval before being forwarded to the Designer. Submittals shall be submitted in such time as to cause no delay to the Work or any part thereof and in accordance with the Contract Construction Schedule and Submittal Register. The Designer shall review the submittal with reasonable promptness, noting desired corrections, if any. The Designer shall retain two (2) copies of the submittal and shall return the balance of the reviewed submittal to the Contractor for action. The Contractor shall furnish any corrected submittal to the Designer. The Designer shall retain two (2) copies of the corrected submittal and will return the balance of the reviewed submittal to the Contractor.

No substitutions will be accepted after the bids have been received. All substitutions prior to the receipt of bids shall be in accordance with the Contract Documents. Refer to Instructions to Bidders, Paragraph 3, Substitutions.

The Contractor acknowledges that the processing of shop drawings and other submittals is directly impacted by the clarity, completeness, and accuracy of said documents and that it is the Contractor's responsibility to (i) review and coordinate each submittal with all other related or affected Work and (ii) approve each submittal before submitting same to the Designer for approval.

- 6.3 No substitutions and no deviations from any requirement of the Contract Documents shall be deemed allowed unless the Contractor has specifically informed the Designer and the Owner in writing of such deviations at the time of submittal and the Designer and the Owner have given written and specific approval to the substitutions or deviations. In proposing a deviation or substitution the Contractor warrants to the Owner, notwithstanding any review, allowance or approval by the Designer or the Owner that the deviation or substitution is at least equal to or better in quality and for the purpose intended, and that Contractor shall not by reason of any such review, allowance or approval be relieved from any obligation or responsibility contained in the Contract Documents.
- 6.4 Review of submittal by the Designer shall not be construed as relieving the Contractor from responsibility for compliance with terms or designs of the Contract Documents nor from responsibility for errors of any sort in the submittal.
- 6.5 The Contractor shall keep one record copy marked "As-Built" of all Specifications, Drawings, Addenda, Modifications, and Submittals at the Project in good order and annotated at least monthly to show all changes made during the construction process. Such monthly annotations and their approval by the Designer shall be a condition precedent to approval by the Designer of each monthly Request for Payment. Said record copy shall be stored at the Project and fully protected from damage by fire or other hazard. This record copy shall be available to the Designer and Owner for inspection at all times and shall be delivered to the Designer for the Owner's purposes prior to the Designer's certifying Substantial Completion of the Work.



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- 6.6 At completion of the Project and before Final Payment, the Contractor shall assemble and deliver to the Owner one complete set of all as-built drawings and one complete set of all approved submittals, product data, and samples which were reviewed by the Designer. These drawings and submittals shall be on paper, or in electronic or other media if required by the Supplementary Conditions. These drawings and submittals shall be categorized and packaged as directed by the Designer.

ARTICLE 7. CONTRACTOR

- 7.1 The Contractor shall supervise and direct the Work efficiently and with the Contractor's best skill and attention. Except as may be set forth specifically in the Contract Documents, the Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction, and for safety precautions and programs in connection with the Work. The Contractor shall be responsible to see that the finished Work complies accurately with the Contract Documents.

- 7.2 The Contractor shall appoint a Project Manager and shall keep on the Project at all times during its progress a competent Resident Superintendent and necessary assistants who shall not be replaced without prior written approval by the Owner except under extraordinary circumstances, in which event immediate written notice shall be given to the Designer and the Owner. The Project Manager and the Resident Superintendent may be the same person or different persons. At any time, the Owner, in its sole and absolute discretion, may require the Contractor to replace the Project Manager or Resident Superintendent with an experienced and competent person or persons upon seven (7) days written notice from the Owner to the Contractor. Such replacement shall be at the Contractor's expense and at no cost to the Owner.

Both the Project Manager and the Resident Superintendent shall have authority to act on behalf of the Contractor, and instructions, directions or notices given to either of them shall be as binding as if given to the Contractor.

- 7.3 The Contractor shall provide sufficient competent and suitably qualified personnel, equipment, and supplies to lay out the Work and perform construction as required by the Contract Documents. The Contractor will at all times maintain good discipline and order at the site, and will comply with all applicable OSHA standards.

Any person employed by the Contractor, any Subcontractor, or any sub-subcontractor who, in the opinion of the Designer or the Owner, does not perform his Work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the Owner or Designer, be removed forthwith by the Contractor, Subcontractor, or sub-subcontractor employing such person without cost to the Owner, and shall not be employed again in any portion of the Work without the written approval of the Owner or Designer.

Should the Contractor fail to remove such person or persons or fail to furnish suitable and sufficient personnel for the proper prosecution of the Work within three (3) days after written order, the Owner may withhold further payment by written notice until compliance with such order.



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- 7.4 If, in the opinion of the Designer or the Owner, any Subcontractor on the Project is incompetent or otherwise unsatisfactory, he shall be replaced by the Contractor with no increase in the Contract Price if and when directed by the Designer or the Owner in writing.
- 7.5 The Contractor shall furnish all materials, equipment, labor, transportation, construction equipment and machinery, tools appliances, fuel, light, heat, and all other facilities and incidentals necessary for the execution, maintenance, initial operation, and completion of the Work, other than those specifically excluded by the Contract Documents and to be furnished by the Owner or others. When use or storage of hazardous materials or equipment or methods of more than ordinary risk are necessary in accomplishing the Work, the Contractor shall give the Owner and Designer reasonable advance notice.

If any materials are to be furnished or installed by the Owner or others under the terms of the Contract Documents, said materials shall be made available to the Contractor at the location(s) specified in the Contract Documents. All costs of handling, transportation from the specified location to the Project, storage, and installing of Owner-furnished materials shall be included in the Contract Price. The Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies which may occur during the Contractor's handling, storage, or use of such Owner-furnished material. The Owner shall deduct from any monies due or to become due the Contractor any cost incurred by the Owner in making good any such damage, loss, or deficiency.

All equipment which is proposed to be used in the Work shall be of sufficient size and in such mechanical condition as to meet the requirements of the Work and produce a satisfactory quality of work. Equipment used on any portion of the Work shall be such that no injury to previously completed Work, adjacent property, or existing facilities shall result from its use.

When the methods and equipment to be used by the Contractor accomplishing the Work are not prescribed in the Contract Documents, the Contractor shall be free to use any methods or equipment that will accomplish the Work in conformity with the requirements of the Contract Documents.

When the Contract Documents specify the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized by the Designer. If the Contractor desires to use a method or type of equipment other than specified in the Contract Documents, the Contractor may request authority from the Designer to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and of the reasons for desiring to make the change. If approval is given, it shall be on the condition that the Contractor shall be fully responsible for producing Work in conformity with the requirements of the Contract Documents. If, after trial use of the substituted methods or equipment, the Designer determines that the Work produced does not meet the requirements of the Contract Documents, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining Work with the specified methods and equipment at no additional cost to the Owner. The Contractor shall remove any deficient Work and replace it with Work of specified quality, or take such other corrective action as the Designer may direct. No change in the Contract Price or in Contract Time shall be made as a result of authorizing a change in methods or equipment under this paragraph.



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- 7.6 All materials and equipment shall be new, except as otherwise provided in the Contract Documents. When special makes or grades of material which are normally packaged by the supplier or manufacturer are specified or approved, such materials shall be delivered to the Project site in their original packages or containers with seals unbroken and labels intact.
- Materials shall be so stored as to assure the preservation of their quantity, quality and fitness for the Work. Stored materials, even though approved before storage, may again be inspected by the Designer or Owner prior to their use in the Work and shall meet the requirements of the Contract Documents at the time they are incorporated into the Work. Stored materials shall be located so as to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the Designer and the Owner. Materials to be stored at the Project or on the Owner's property shall not create an obstruction to the Owner's or other contractor's reasonable activities. Private property shall not be used for storage purposes without written permission of the owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the Contractor shall furnish the Owner a copy of the property owner's permission. All storage sites on private or the Owner's property shall be restored to their original condition by the Contractor at his entire expense, except as otherwise agreed to (in writing) by the owner or lessee of the property.
- 7.7 All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, or processor, except as otherwise provided in the Contract Documents.
- 7.8 The Contractor will be fully responsible for all acts and omissions of his Subcontractors and of persons directly or indirectly employed by them and of persons for whose acts any of them may be liable to the same extent that the Contractor is responsible for the acts and omissions of the Contractor's own employees. Nothing in the Contract Documents shall create any contractual relationship between any Subcontractor or supplier and the Owner or the Designer, or any obligation on the part of the Owner or the Designer to pay or see to the payment of any money due any such Subcontractor or material furnisher except as may otherwise be required by law. The Owner or the Designer may furnish to any Subcontractor or supplier, to the extent practicable, evidence of amounts paid to the Contractor on account of specific Work done.
- 7.9 The divisions and sections of the Specifications and the identifications of any Drawings shall not control the Contractor in dividing the Work among Subcontractors.
- 7.10 The Contractor agrees to bind specifically every Subcontractor to the terms and conditions of the Contract Documents for the benefit of the Owner and to furnish written evidence thereof to the Designer and the Owner within seven (7) days after written request by the Owner.
- 7.11 The Contractor shall attend job progress conferences and all other meetings or conferences as directed by the Designer. The Contractor shall be represented at these job progress conferences by a representative having the authority of the Project Manager and by such other representatives as the Designer may direct. Job progress conferences shall



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be open to Subcontractors, suppliers and any others who may contribute beneficially toward maintaining required job progress, and such personnel shall be encouraged by the Contractor to attend. It shall be the principal purpose of job progress conferences to effect coordination, cooperation and assistance in every practical way toward the end of maintaining progress of the Project on schedule and to complete the Work and the Project by the specified Completion Dates. The Contractor shall be prepared to assess progress of the Work as required in the Contract Documents and to recommend remedial measures for correction of progress as may be appropriate. The Designer shall preside as chairman and arrange for minutes to be taken and circulated.

In the event that the prosecution of the Work is discontinued for any reason, the Contractor shall notify the Designer and the Owner at least forty-eight (48) hours in advance of resuming operations.

Should the terms of the Contract Documents require completion of one or more portions of the Work for the Beneficial Occupancy of the Owner prior to completion of the entire Work, the Contractor shall complete such portion(s) of the Work on or before the date specified. Such completion shall include the obtaining of all government or other permits, permission, and/or approvals necessary to occupancy. The Contractor shall independently estimate the difficulties involved in arranging the Work to permit such Beneficial Occupancy and shall not claim any additional compensation or time extension by reason of any delay or increased cost due to completing such portion(s) of the Work. The Owner's possession and use of such portion(s) of the Work shall not be deemed an acceptance of any Work not completed in accordance with the Contract Documents. The Owner shall be responsible for the security, maintenance, utilities, and insurance of all portions of the Work completed and beneficially occupied by the Owner.

- 7.12 The Contractor shall pay all license fees and royalties, and assume all costs incident to the use of any invention, design process, or device which is the subject of patent rights or copyrights held by others, except for inventions, design processes, or devices specified by the Designer in the Contract Documents. The Contractor shall indemnify and hold harmless the Owner, the Designer, and anyone directly employed by either of them, from and against all claims, damages, losses and expenses, including attorney's fees and costs of defense, arising out of any infringement or alleged infringement of such rights during or after completion of the Work, and shall defend all such claims in connection with any actual or alleged infringement of such rights.
- 7.13 The Contractor shall secure and pay for all permits, including without limitation construction permits and licenses, and will pay all governmental charges and inspection fees necessary for the prosecution of the Work.
- 7.14 The Contractor shall give all notices and comply with all laws, ordinances, rules, and regulations applicable to the Work and shall protect and indemnify the Owner and the Owner's officers, agents, or servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or by the Contractor's employees, Subcontractors, sub-subcontractors, or their employees.



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- 7.15 The Contractor shall be responsible for the entire site of the Project and for its reasonable and necessary protection and security, as required by laws or ordinances governing such conditions, or by custom or sound construction practices, and shall share such responsibilities as may be agreed upon among them, or in the absence of such agreement, as may be directed by the Contract Documents, Owner, or Designer. The Contractor shall be responsible for any damage to the Owner's property, or that of others, by the Contractor or the Contractor's employees, Subcontractors, sub-subcontractors, or their employees or agents, and shall make good such damages. The Contractor shall be responsible for and pay for any such claims against the Owner.
- 7.16 The Contractor shall protect all landscaping designated to remain in the vicinity of the operations and barricade all walks, roads, and areas as necessary to keep the public away from the construction.
- 7.17 The Contractor shall provide cover and/or protect all portions of the Work and provide all materials necessary to protect the Work whether performed by the Contractor or any of the Subcontractors or sub-subcontractors. Any Work damaged through the lack of proper protection, or from any other cause, shall be repaired or replaced without extra cost to the Owner or extension to the Contract Time.

The Contractor shall maintain the Work during construction and until the Work is accepted. This maintenance shall constitute continuous and effective effort prosecuted day by day, with adequate equipment and forces so that the Work is maintained in satisfactory condition at all times. All costs of maintenance shall be included in the Contract Price and the Contractor will not be paid an additional amount for such effort. Should the Owner or Designer observe that the Contractor at any time has failed to maintain the Work as provided herein, the Designer may immediately notify the Contractor of such non-compliance. Such notification shall specify a reasonable time within which the Contractor shall be required to remedy such unsatisfactory maintenance condition. Should the Contractor fail to properly respond to the Designer's notification, the Owner may, at the Contractor's expense, take such action as it may deem appropriate to remedy the defective maintenance, including suspension of the Contractor's Work or any part thereof. Any such expense incurred by the Owner shall be deducted from monies due or to become due the Contractor.

Parking lots, streets, and walks connecting to the Project area shall be protected by the Contractor from deposits of mud, sand, stone, litter, or debris in any form.

Pedestrian traffic areas around the construction limits must be maintained in a clean and safe condition at all times with required barricades and covered walkways. When excavation or other operations outside the Project limits is required, the Contractor shall, immediately following that work, return the area to its original condition.

All catch basins and storm drain lines in the vicinity of the Project site shall be protected at all times from entry of dirt, rubble and other debris. The residue from the cleaning of trucks, wheelbarrows, concrete buggies, etc. must be prevented from entering the drainage system, and if cleaning is done, the residue must be contained and removed from the Project site with other refuse.



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- 7.18 No burning of refuse or debris shall be allowed inside or around the Project during the course of construction without written authority from authorities having jurisdiction and the Owner.
- 7.19 The Contractor shall provide for and maintain necessary safety measures and safety programs for the protection of all persons involved with the Work. Such measures and programs shall include the requirements of the most current edition of the CAGC Safety and Health Manual [or the AGC Accident Prevention Manual in Construction], or equivalent requirements, and shall fully comply with all Federal, State, and local laws, rules, regulations, and building code requirements relating to the prevention of accidents or injuries to persons on or about the location of the Work.
- All trenches, excavations, or other hazards in the vicinity of the Work shall be well barricaded, and properly lighted at night. When Work requires closing of an area normally used by the Owner or the public, the Contractor shall furnish, erect, and maintain temporary barricades, and properly light the area. The Contractor shall comply with any directions and public authorities in this respect.
- 7.20 The Contractor shall designate a responsible officer or employee as safety inspector, whose duties shall include accident prevention on the Project as well as implementation of the Contractor's safety measures and safety programs on the Project. The name of the safety inspector shall be made known to the Designer and the Owner at the pre-construction conference.
- 7.21 In emergencies affecting the safety of persons, the Work, or property at the Project site or adjacent thereto, the Contractor is obligated to act in the Contractor's discretion to prevent threatened damage, injury, or loss. As soon as practicable, the Contractor shall notify the Designer and Owner of such emergency. The Contractor shall give the Designer and the Owner prompt written notice of any significant changes in the Work or deviations from the Contract Documents caused by such emergency. If the Contractor believes that additional work done in an emergency entitles the Contractor to an increase in the Contract Price or an extension of the Contract Time, the Contractor may make a claim therefore as provided in Articles 14 and/or 15.
- 7.22 The Contractor shall at all times keep the premises free from accumulation of waste materials or rubbish caused by the Work. At least weekly and at the completion of the Work, the Contractor shall remove all waste materials and rubbish from and about the Project. At the completion of the Work, the Contractor shall remove all tools, construction equipment, machinery, and surplus materials. The Contractor shall leave the Work in condition for occupancy by the Owner such that no cleaning or other operations are required. Material cleared from the Project and deposited on adjacent property shall not be considered as having been disposed of satisfactorily. If the Contractor fails to keep the Project clean of waste materials or rubbish, fails to satisfactorily clean-up weekly or at the completion of the Work, the Owner may do so and the costs thereof may be deducted from any amounts due the Contractor.
- 7.23 Utilities, temporary facilities, and signs shall be provided as described in the Contract Documents. Absent a contrary direction in the Supplementary Conditions, the Contractor shall pay all bills for water, electricity, or other public utility service to the Project site.



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- 7.24 The Contractor shall indemnify and hold the Owner, the Designer, the Designer's consultants, and their officers, agents, and employees harmless against all costs, damages, and expenses, including attorney's fees and costs of defense, arising out of claims by any separate contractor or by any Subcontractor, sub-subcontractor, or supplier engaged by or employed by the Contractor or employed by any of the Subcontractors claiming through him, including without limitation damages, losses, and expenses arising out of or relating to any inconvenience, delay, interference, or other action or non-action of the Contractor or the Contractor's Subcontractors on the Project.

The Contractor acknowledges that should the Contractor or any of the Contractor's Subcontractors be damaged by any breach of contract by any other separate prime contractor on the Project, the Contractor may invoke applicable dispute resolution procedures with said other separate prime contractor or bring a direct civil action against said other separate prime contractor. The Contractor hereby expressly agrees that neither the Owner nor its officers, agents, or employees shall have any liability of any kind or nature whatsoever to the Contractor, its Subcontractors, sub-subcontractors, or suppliers arising out of or relating to any breach, inconvenience, delay, interference, or other action or non-action by any other separate prime contractor. The Contractor covenants not to sue the Owner for any loss or damage caused by any breach, inconvenience, delay, interference, or other action or non-action by any other separate prime contractor, notwithstanding whatever rights at law the Contractor might have to bring a civil action against the Owner for any breach, inconvenience, delay, interference, or other action or non-action of any other separate prime contractor. The Contractor agrees to look exclusively to the other prime contractor for relief or remedy.

Nothing contained herein or appearing anywhere in the Contract Documents shall obligate or require the Owner to exercise any right or privilege, or to take any action or to refrain from taking any action under any contract it may have with any other prime contractor or party to the Project for the benefit of the Contractor or any Subcontractor, sub-Subcontractor, or supplier claiming through the Contractor.

- 7.25 Prior to completion of the Work and Final Payment of the Contract Price, excepting only those portions of the Work deemed accepted in accordance with the Contract Documents, the Contractor shall have charge and care of the Work, and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the Work. The Contractor shall as required by the Owner replace, rebuild, repair, restore, and make good all injury or damage to any portion of the Work occasioned by any of the above causes before Final Completion and shall bear the expenses thereof.
- 7.26 In the event that the Work, or any portion thereof, is suspended at any time pursuant to an order of the Owner, the Contractor shall obey all instructions of the Owner regarding storage of materials, drainage, protection of the Work, and erection of temporary structures during the suspension period.
- 7.27 The Project Expediter for the Project shall be responsible for the coordination of the Work of itself and any other separate contractors, both as to space and time. The Project Expediter shall coordinate the implementation of the Contract Construction Schedule, all



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construction activities and close-out of the Project, including but not limited to all testing, inspection, certifications, and approvals required by public agencies.

The Contractor and the Project Expediter shall each be required to notify the Designer and the Owner promptly of any event or condition which could affect the conduct or progress of the Work and shall cooperate fully with all other contractors on the Project site.

- 7.28 The Owner hereby delegates to the Project Expediter all of its duties to coordinate and to expedite the Work not expressly reserved to the Owner by other provisions of the Contract Documents.
- 7.29 All Work performed pursuant to the Contract Documents shall conform in all respects to the North Carolina State Building Code and all other state, local, and national codes in effect at the time of and applicable to this Work.
- 7.30 The Contractor shall provide for and maintain necessary safety measures and safety programs for the protection of all persons at the Project site, and shall comply at all times with the requirements of the most current edition of the CAGC Safety and Health Manual [or the AGC Accident Prevention Manual in Construction], or the equivalent requirements of the Contractor's safety program, and shall fully comply with all Federal, State, and local laws, rules, regulations, and building code requirements so as to prevent accidents or injuries to persons on or about the Project site. The Contractor shall clearly mark or post signs warning of existing hazards, and shall barricade excavations, elevator shafts, stairways, and similar hazards. The Contractor shall protect against damage or injury resulting from falling materials, and shall maintain all protective devices and signs throughout the progress of the Work.
- 7.31 The Contractor shall adhere to the rules, regulations, and interpretations of the North Carolina Department of Labor's Occupational Safety and Health Standards for the Construction Industry (29 CFR Part 1926 as adopted in 13 NCAC 07F.0201, including 29 CFR Part 1910 General Industry Safety and Health Standards applicable to construction) and N.C. Gen. Stat. §95-126 through 155 (Occupational Safety and Health) as well as all revisions and amendments to such standards or statutes as may occur throughout the performance of the Work.
- 7.32 Any land disturbing activity performed by the Contractor in connection with the Project shall comply with all erosion control measures set forth in the Contract Documents and any additional measures which may be required in order to ensure that the Project is in full compliance with the Sedimentation Pollution Control Act of 1973, as implemented by Title 15 North Carolina Administrative Code, Chapter 4, Sedimentation Control, Subchapters 4A, 4B and 4C, as amended (15 NCAC 4A, 4B, and 4C), and as may be revised or amended in the future. Upon receipt of notice that a land-disturbing activity is in violation of said Act, the Contractor shall be responsible for ensuring that all steps or actions necessary to bring the Project in compliance with said Act are promptly taken. The Contractor shall be responsible for all penalties assessed pursuant to N.C. Gen. Stat. 113A-64 with respect to its Work, and shall indemnify and hold harmless the Owner from all costs and expenses, including attorney's fees and costs of defense arising out of or related to the enforcement of the Act against any party or person described in this Article.



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- 7.33 Any mechanical or electrical work such as sleeves, inserts, chases, etc. located in the Work of the Contractor for general work shall be built in by that Contractor. On multiple prime projects, the mechanical and electrical contractors shall set all sleeves, inserts, and other devices built into the structure in cooperation and under the supervision of the Contractor for general work. The responsibility for exact location of such items shall be that of the mechanical, plumbing, or electrical prime contractor.
- 7.34 The Contractor shall be responsible for permanently fixed service facilities and systems in use during progress of the Work and shall strictly adhere to the following procedures:
- a) Prior to acceptance of the Work by the Owner, the Contractor shall remove and replace any part of the permanent building systems damaged through use during construction.
 - b) Temporary filters shall be installed in each of the heating and air conditioning units, return air grilles, and other locations to prevent intrusion of dust, dirt, and debris during construction. Temporary filters shall be removed and replaced with new filters immediately prior to Substantial Completion.
 - c) Extra effort shall be maintained to keep the building clean and under no circumstances shall air systems be operated if finishing operations are creating dust in excess of what would be considered normal if the building were occupied.
 - d) When the permanent lighting system is used during construction, lamps shall be replaced and shall be new on the date of Substantial Completion.

ARTICLE 8. OWNER

- 8.1 The Owner shall issue communications and notices to the Contractor through the Designer to the extent contemplated by the Contract Documents.
- 8.2 In case of termination of the employment of the Designer, the Owner shall appoint as Designer a qualified person who shall have and assume all rights and duties held by the original Designer.
- 8.3 The Owner shall have the right to take possession of and use any portion of the Work notwithstanding the fact that the time for completion of such portion of the Work may not have expired, but such taking possession and use shall not be deemed an acceptance of any Work not completed in accordance with the Contract Documents.
- 8.4 A waiver on the part of the Owner of any breach of any part of the Contractor shall not be held to be a waiver of any other or subsequent breach.
- 8.5 The Owner shall pay all permanent acreage fees, governmental impact fees, and meter deposits for permanent utilities.

ARTICLE 9. CONSTRUCTION MANAGER



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- 9.1 The Owner may employ one or more Construction Managers for the purpose of assisting the Owner, Designer, and Contractor in developing and administering budgets and cost controls, in evaluating constructability and value engineering proposals, in establishing and maintaining a critical path method (CPM) schedule, in coordinating and/or expediting the Work with other projects being constructed by the Owner or others adjacent or near the Work, or for such other purposes as the Owner may deem appropriate. From time to time the Owner may identify such Construction Managers(s) to the Contractor in writing identifying any tasks assigned to such Construction Managers(s).

ARTICLE 10. DESIGNER

- 10.1 The Designer is charged with the responsibility of interpretation of the Contract Documents. The Designer's decisions relating to aesthetic matters shall be final.
- 10.2 All Work completed under the Contract Documents shall be subject to review by the Designer. No Work is to be covered without the Designer's review or prior authorization. Any Work so covered without the Designer's review or prior authorization shall be uncovered at the Contractor's expense. The Contractor shall notify the Designer in writing at least twenty-four (24) hours in advance of covering any Work.
- 10.3 The Designer shall not be responsible for the construction means, methods, techniques, sequences, procedures, or the safety precautions and programs incident thereto, and shall not be responsible for the Contractor's failure to perform the Work in accordance with the Contract Documents, but shall be entitled to enforce any requirements in the Contract Documents specifying particular means, methods, techniques, sequences, or procedures.
- 10.4 The Designer shall be an Owner's representative during the construction period. The duties, responsibilities and authority of the Designer as the Owner's representative during construction are as set forth in the Contract Documents.

ARTICLE 11. TESTING AND SURVEYING

- 11.1 Laboratory and field tests to determine compliance of construction with the Contract Documents shall be made by the Owner or testing consultants employed by the Owner except those required elsewhere in the Contract Documents to be paid for by the Contractor. The costs and expenses of providing samples for and assistance in any testing shall be borne by the Contractor and are included in the Contract Price. Any Work in which untested materials are used without approval or written permission of the Designer shall be removed and replaced at the Contractor's expense. Work found to be unacceptable or unauthorized will not be paid for and, if directed by the Designer shall be removed and replaced at the Contractor's expense. Unless otherwise designated, tests in accordance with the cited standard methods of ASTM or other generally recognized or specifically authorized methods which are current on the date of advertisement for bids shall be made at the expense of the Owner; provided, however, in the event that after such testing any Work is found to be defective or does not meet the requirements of the Contract Documents, the costs of retesting such Work and the costs of inspection services shall be paid by the Contractor. Samples shall be taken by a testing laboratory employed by the Owner. All materials being used are subject to inspection, tests, or rejection at any time prior to or during incorporation into the Work. Copies of all Owner test reports will be



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furnished to the Contractor at his written request. Copies of Contractor test reports shall be furnished to the Designer upon written request.

11.2 The Owner shall have the right to deduct the costs of additional testing as described in paragraph 11.1 from any money due the Contractor; or if no money is due the Contractor, the Owner shall have the right to recover these costs from the Contractor, from its sureties, or from both.

11.3 All layouts and surveying shall be accomplished by properly qualified personnel duly licensed in the State of North Carolina.

ARTICLE 12. SEPARATE CONTRACTS

12.1 It is expressly understood that the Owner may deploy the Owner's own employees or engage other separate prime contractors to perform Work as a part of the Project whose work will be performed simultaneously and sequentially with the performance of the Work by the Contractor. It shall be necessary for the Contractor to coordinate construction activities with such other contractors, particularly with respect to access to work areas, storage of materials, and use of elevators and other common facilities. The Contractor shall diligently and in good faith cooperate with the Owner, the Designer, and all other contractors with respect to such matters and shall regularly and faithfully attend any and all meetings called by the Owner or the Designer with respect to such matters. Any disputes between the Contractor and any other separate prime contractor with respect to such matters shall be resolved in accordance with the claim and dispute resolution procedures in the Agreement.

ARTICLE 13. CONTRACT TIME

13.1 Within fourteen (14) days after receipt of the Construction Agreement by the Contractor for signatures, the Project Expediter shall prepare and submit to the Designer and Owner for review and approval a preliminary progress schedule for the Work pursuant to the requirements stated in the Contract Documents.

13.2 Within fourteen (14) days after initial receipt of the Construction Agreement for signatures the Contractor shall submit to the Designer a Submittal Register listing all Submittals the Contractor is required to make or proposes to make under the Contract Documents, the dates on which the Contractor proposes to make such Submittals and the dates by which the Contractor reasonably requires a response from the Designer with respect to each Submittal. The dates submitted shall be incorporated into the Contract Construction Schedule as Completion Dates when they have been approved or modified by the Owner. The Designer shall not be required to review any Submittal from the Contractor until a Submittal Register acceptable to and approved by the Owner has been submitted by the Contractor.

13.3 Not later than thirty (30) days following execution and delivery of the Construction Agreement by Owner to Contractor, the Owner shall deliver to the Contractor a Notice to Proceed. The Notice to Proceed shall state a commencement date on which it is expected that the Contractor will begin the Work to be performed under the Agreement. The Contract Time shall be measured from said specified commencement date. The commencement



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date stated in the Notice to Proceed shall not be earlier than three (3) days after the Notice to Proceed is served on the Contractor.

If, other than by mutual agreement, said specified commencement date is more than thirty (30) days after the date of execution and delivery of the Agreement from Owner to Contractor and the Contractor believes said delay justifies an increase in Contract Price and/or an extension of Contract Time, the Contractor may make a claim therefore as provided in Article 14 and/or Article 15.

No Work shall be done prior to the date specified in the Notice to Proceed.

A final Contract Construction Schedule shall be submitted for approval by the Contractor, Designer, and Owner no later than fourteen (14) days after Notice to Proceed. No payments shall be due the Contractor until this schedule is approved by all parties.

- 13.4 The Contract Construction Schedule is a Contract Document. The Contractor represents that the Contract Construction Schedule has been reviewed in detail, that the Contractor participated in its preparation, that all of the activities which impact, limit, or otherwise affect the time of completion of the Work are shown in the Contract Construction Schedule and that all of the activities of others which impact, limit, or otherwise affect the start, duration, or completion of the Contractor's activities are also shown. The Contractor further represents that the Contractor can and will complete each activity within the time shown for that activity. Time is of the essence with respect to each such activity and Completion Date.
- 13.5 If the Contractor submits a construction schedule, progress report, or any other document that indicates or otherwise expresses an intention to achieve completion of the Work prior to any Completion Date required by the Contract Documents or prior to expiration of the Contract Time, no liability of the Owner to the Contractor for any failure of the Contractor to so complete the Work shall be created or implied.
- 13.6 If the Contractor, for reasons beyond the Contractor's control, is delayed in beginning any activity, the Contractor shall, nevertheless, have the same number of days as is shown in the Contract Construction Schedule for the activity, and the affected activity and any succeeding activity that is dependent upon that activity shall be adjusted accordingly; provided that at any time the Owner, by means of a Change Order, may require the Contractor to work overtime, to increase labor forces or to take any necessary or appropriate action to decrease the time required for any activity, and the Contractor shall be entitled to an adjustment in the Contract Price computed in accordance with Article 15 of these General Conditions.
- 13.7 At any time, the Owner may order the Contractor, on seven (7) days written notice, to begin any activity earlier than the starting date shown on the Contract Construction Schedule.
- 13.8 Should the Contractor fail to start any activity on the start date shown in the Contract Construction Schedule or as it may have been adjusted in accordance with paragraphs 13.5 or 13.6 above, or become delayed, the Contractor shall, without being entitled to any increase in the Contract Price or other compensation, work overtime, increase labor forces or take such other action as may be necessary or appropriate to complete the activity by



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the Completion Date shown on the Contract Construction Schedule, or as such Completion Date may have been adjusted.

- 13.9 The Designer and Owner or his Construction Consultant shall monitor progress of the Work at all times and the Contractor shall cooperate with such monitoring and provide any and all information with respect to the progress of the Work and scheduling as the Owner may reasonably require.
- 13.10 On a monthly basis, the Contractor shall revise the Contract Construction Schedule, showing any adjustments made in accordance with paragraphs 13.5 or 13.6, above, by any Change Order, the progress of the Work, and any days gained or days lost with respect to any activity, and shall furnish copies thereof to the Owner and Designer.
- 13.11 Should any monthly revision of any Contract Construction Schedule show that the Contractor is behind on any activity, the late completion of which could delay Substantial Completion of the Work, the Owner shall be entitled to withhold from the next Progress Payment due the Contractor an amount not exceeding the amount the Owner would be entitled to in Liquidated Damages, should Substantial Completion be delayed by the same number of days that the Contractor is currently behind schedule. If, subsequently, the Contractor's progress, as shown by any succeeding monthly revision to the Contract Construction Schedule, is such that the anticipated delay no longer exists, the Owner shall pay with the Progress Payment next due to the Contractor such amounts as have been withheld in accordance with this paragraph.
- 13.12 The Owner shall have the right to perform Work, hire and employ labor and craftsmen, rent equipment, subcontract with other parties, or do anything that the Owner deems necessary or appropriate to remedy or cure any delay by the Contractor in the progress of the Work. Such action by the Owner shall not, in any way, affect, void or limit any warranty, guaranty or other responsibility of the Contractor under the Contract Documents. Such action may be taken by the Owner only after three (3) days written notice to the Contractor. All costs incurred by the Owner in taking any such action shall be charged to the Contractor and deducted from any amounts remaining due under the Agreement.
- 13.13 The Contractor may be entitled to an extension of the Contract Time (but no increase in the Contract Sum) for delays arising from unforeseen causes beyond the control and without the fault or negligence of the Owner, the Contractor or the Contractor's Subcontractors as follows:
- a) Labor disputes and strikes that directly impact the critical path activities of the Contract Construction Schedule;
 - b) Acts of God, tornado, fire, hurricane, blizzard, earthquake, typhoon, or flood that damage completed Work or stored materials.
 - c) Acts of the public enemy; acts of the State, Federal, or local government in their sovereign capacities.
 - d) Abnormal inclement weather as defined in Article 13.14.



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- 13.14 On any day that the Contractor considers that the Project is delayed by adverse weather conditions, the Contractor shall identify in writing to the Designer and the Owner the adverse weather conditions affecting each activity, the specific nature of the activity affected, the number of hours lost, and the number of and identity (by responsibility or trade) of workers affected and shall obtain from the Designer written recognition of the delay. The time for performance of this Contract includes an allowance for a number of calendar days which may not be suitable for construction Work by reason of adverse weather. The Contract Time will be extended only if the number of calendar days of adverse weather recognized by the Designer exceeds the number of inclement weather days set forth below, and the Contractor demonstrates how this adverse weather impacts activities on the critical path of the Contract Construction Schedule.

<u>Month</u>	<u>Number of Inclement Weather Days</u>
January	10
February	10
March	10
April	9
May	10
June	9
July	11
August	10
September	8
October	7
November	8
December	9

- 13.15 If the Contractor believes that the progress of the Work has been adversely affected by adverse weather recognized by the Designer during a particular month, the Contractor shall submit a written request for extension of time to the Designer. Such a request for time extension of the Contract Time shall be submitted by the tenth (10th) day of the month following that month in which the adverse weather is encountered. The request shall include, but is not limited to, the following information:

- a) Detailed description of weather's effect on scheduled activities and its net effect on the critical path of the Project, and
- b) Weather records from the official weather station nearest the Project site and records of actual observation as contained in daily reports, correspondence, or other documentation.

- 13.16 The Contractor specifically recognizes that a delay by the Contractor in achieving any Completion Date can have the effect of delaying the Substantial Completion of the Project, that such delay in Substantial Completion of the Project will necessarily cause damages, losses, and expenses to the Owner, including, but not limited to and by way of illustration only, increased capitalized costs and interests for the Project, increased and extended Project overhead, Designer's and Consultant's fees, increased costs of construction, increased and extended operation costs of other facilities, and inefficiency and loss of productivity, and that such damages, losses, and expenses may not be readily identifiable or ascertainable at the time they are incurred or at any time. Therefore, and in recognition



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of these factors and the likelihood that actual damages from his delay will not be readily ascertainable, the Contractor agrees to pay to the Owner, as Liquidated Damages and not as a penalty, the sum identified in the Supplemental Conditions hereto as the Liquidated Damages per Day, for each day by which the failure to meet any Completion Date shown in the Contract Construction Schedule, adjusted in accordance with this Article, delays the Substantial Completion of the Project.

- 13.17 The Contractor shall not be entitled to any adjustment in the Contract Price or other compensation from the Owner for any delay in the completion of or progress on the Work that is caused by a force majeure condition or is otherwise not caused by the sole and direct act or omission of the Owner and the Owner's employees or agents.
- 13.18 The sum for Liquidated Damages is the amount stipulated in the Supplementary General Conditions per day per Prime Contractor as Liquidated Damages reasonably estimated in advance to cover the losses to be incurred by the Owner by reason of failure of said Contractor(s) to complete the Work within the time specified, such time being in the essence of this contract and a material consideration thereof.

ARTICLE 14. CHANGES IN THE WORK

- 14.1 Without invalidating the Contract Documents, the Owner may, at any time, or from time to time order additions, deletions, or revisions in the Work. Said additions, deletions, or revisions shall be authorized only by written Change Orders, Construction Change Directives or Field Orders. Upon receipt of a Change Order, Construction Change Directive or Field Order, the Contractor shall proceed with the Work involved. All such Work shall be executed under the applicable conditions of the Contract Documents. If any change causes an increase or decrease in the Contract Price and/or an extension or shortening of the Contract Time, adjustments shall be made as provided in Article 14 and/or Article 15.

In order to expedite the Work and avoid or minimize delay in the Work that might affect the Contract Price or Contract Time, the Designer may issue a Change Order in the form of a Construction Change Directive which when signed by the Owner and Designer, directs the Contractor to proceed promptly with the Work involved. Any claim for an adjustment in Contract Price or Time, if not defined in the Construction Change Directive, shall be promptly made in writing in accordance with the procedures defined in Article 15.2.

- 14.2 The Designer may authorize minor changes or alterations in the Work not involving change in the Contract Price or in the Contract Time and not inconsistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order. Such alterations shall not invalidate the Contract Documents nor release the surety. If the Contractor believes that any minor change or alteration authorized by the Designer entitles him to an increase in the Contract Price and/or an extension of Contract Time, he may make a claim therefore as provided in Article 14 and/or Article 15.
- 14.3 Except in an emergency endangering life or property, no change shall be made by the Contractor except upon prior written Change Order, Directive or Field Order authorizing such Change.



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- 14.4 Increases in the Contract Price and/or extensions of the Contract Time for additional Work performed by the Contractor shall only be in accordance with a written Change Order signed by the Owner and Designer. The Contractor shall not be entitled to additional time or to additional compensation for any Work performed or material supplied which is claimed to have been authorized or settled by an "oral" change, or by a "constructive" or "implied" change, or by a course of conduct, or by any action or non-action by the Owner, Designer, or any other persons, or by any means whatsoever other than by a written Change Order for such Work or material signed by the Owner and the Designer.
- 14.5 Changes in the Work resulting from emergency shall not invalidate the Contract Documents nor release the surety.
- 14.6 Neither the Owner nor the Designer shall be responsible for verbal instructions which have not been confirmed in writing, and in no case shall such instructions be interpreted as permitting a departure from the Contract Documents unless such instruction is confirmed in writing and supported by a proper Change Order, Construction Change Directive or Field Order, whether or not the cost is affected.
- 14.7 The Owner, in its sole discretion, may require that the Contractor notify the Contractor's sureties of any changes affecting the general scope of the Work or change in the Contract Price, and that the amount of applicable bonds shall be adjusted accordingly. If this requirement is exercised, the Contractor shall furnish proof of such adjustment to the Designer and the Owner.
- If this requirement is exercised, the Change Orders shall require written consent of the Contractor's surety. At the time of signing a Change Order, the Contractor shall be required to certify as follows:
- "I certify that all sureties have been notified that my contract has been altered by the amount of this Change Order, and that a copy of the approved Change Order will be mailed to all sureties upon its receipt by me."
- If this requirement is exercised, no payment to the Contractor on account of any Change Order shall become due or payable until written evidence of the surety's consent to the Change Order has been furnished to the Designer and to the Owner, and the furnishing of such written consent is a condition precedent to such payment.
- 14.8 The Contractor shall support all requests for Change Orders with a detailed cost breakdown showing cost of materials, labor, equipment, transportation, other items, Contractor's overhead and profit, and total cost, in accordance with methods defined in this Article, and, if the request seeks an extension of the Contract Time, with a time-related diagram which demonstrates specifically why an increase in construction time is needed.
- 14.9 When a request for a Change Order involves a Subcontractor, the Contractor shall provide quotation from same on Subcontractor's letterhead. The Subcontractor's quote shall list materials, equipment, and labor separately, and show overhead and profit in the manner provided in paragraph 14.8.

ARTICLE 15. CHANGE OF THE CONTRACT PRICE



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15.1 The Contract Price constitutes the total compensation payable to the Contractor for performing all Work under the Contract Documents. All duties, responsibilities, and obligations assigned to or undertaken by the Contractor shall be at his expense without change in the Contract Price. The Contract Price may only be changed by a Change Order.

15.2 Any claim for an adjustment in the Contract Price shall be in writing and written notice of any event, action, or non-action which may become the basis of a claim shall be delivered to the Owner and the Designer within three (3) days of the occurrence, or the beginning of the occurrence, of any such event, action or non-action giving rise to the claim. Such written notice is a condition precedent to the making of a claim, and such notice shall describe the basis of the potential claim with reasonable detail and clarity.

A claim shall be made in writing and shall be delivered to the Designer and the Owner no later than fourteen (14) days after such notice. The claim shall describe in detail the basis for the claim, with specific reference to any provisions of the Contract Documents, by paragraph, drawing number, or other specific identification, and shall state the amount claimed and how it is calculated. If the Contractor, at the time the claim is made, is unable to state the amount claimed with accuracy, the Contractor shall so state and provide the estimated amount and the basis on which the amount is to be calculated. At the earliest date practicable, but in no event more than thirty (30) days after Contractor's notice of claim, the Contractor shall supplement the claim with an accurate statement of the amount claimed and how it has been calculated. The Contractor shall provide, in writing, in support of the claim all such explanations, arguments, data, receipts, expert opinions, or other documents or information as the Contractor deems appropriate to be considered in support of the claim. A claim may properly be rejected by the Owner by reason of the Contractor's failure to submit adequate or accurate documentation or information, except that within seven (7) days after being given notice that the claim has been rejected on this basis, the Contractor may submit additional documentation or information. No claim for a change of the Contract Price shall be considered or granted (except solely at the discretion of the Owner) unless a claim is so made, nor shall the Contractor be entitled to any increase in the Contract Price unless the Contractor has given notice and made such a written claim within the times required. The Owner shall decide, after obtaining the advice of the Designer, whether an increase in Contract Price is warranted, and the amount of such increase shall be determined as provided in paragraph 15.4 through 15.5, below. Any change in the Contract Price resulting from any such claim shall be incorporated in a Change Order.

The Owner shall advise the Contractor of its decision with respect to the claim within fourteen (14) days of its receipt, or of the receipt of additional documentation or information if the absence of such has previously been the basis of rejection of the claim; provided, however, that if, in its sole discretion, the Owner deems that review or consideration of any part of the claim or any matter related thereto by its governing Board is necessary or appropriate, it shall so advise the Contractor and shall provide its decision to the Contractor within seven (7) days after such Board consideration, review or action. Any claim on which the Owner has not provided its decision to the Contractor within the applicable time period shall be deemed denied.



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If the Contractor is not satisfied with the decision of the Owner, the Contractor may within seven (7) days of receipt of the Owner's decision initiate the mediation process as described in Appendix A to the General Conditions of the Contract for Construction.

- 15.3 In determining the amount of a Contract Price adjustment, the parties shall apply the following methods, as appropriate:

(A) Change in Work: The Owner and Contractor shall negotiate in good faith and attempt to agree upon the value of any change (extra or decrease) in Work prior to the issuance of a Change Order covering said Work. Such Change Order shall set forth the corresponding adjustment to the Contract Price. In the event the Owner and the Contractor are unable to agree, the Owner shall grant an equitable adjustment in the Contract Price.

(B) Emergency Work: In the event of emergency endangering life or property, the Contractor may be directed by the Designer to proceed on a time and material basis, whereupon the Contractor shall so proceed and keep accurately, in such form as may be required by the Designer, a correct account of costs together with all proper invoices, payrolls, and supporting data therefore.

- 15.4 Where the Contract Price is to be adjusted, the following limitations shall apply in determining the amount of adjustment:

(A) In the case of extra or emergency work, the Contract Price shall not be increased by more than the reasonable, actual, and documented net cost of the extra or emergency work plus ten percent (10%) of such net cost on Work performed by the Contractor and five percent (5%) thereof on any subcontracted Work for overhead and profit combined.

(B) In the case of a decrease in Work, the Contract Price shall not be decreased by less than the net cost of the deleted Work plus five percent (5%) of such direct net cost for profit and overhead.

The term 'net cost' as used herein shall include, as applicable, and shall be limited to, all direct labor, direct material, direct equipment, labor burden, sales taxes, shipping and handling charges, permits and fees, and insurance and bond premium adjustments, if any, attributable to the change. All other items of cost shall be considered as overhead and covered by the percentages allowed in sections A and B of this paragraph.

The Contractor shall provide worksheets or tabulations describing the method by which the direct net cost was calculated, and shall provide all data needed to support the calculation of the direct net cost, all in a form acceptable to the Owner.

- 15.5 Where the Contract Price is to be adjusted by negotiation, the Owner may authorize and designate the Designer to negotiate with the Contractor on behalf of the Owner; provided, however, any agreement reached between the Contractor and Designer shall be subject to approval by the Owner.



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ARTICLE 16. UNFORESEEN CONDITIONS

- 16.1 Should the Contractor encounter unforeseen conditions at the Project site materially differing from those shown on the Drawings or indicated in the Specifications or differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Agreement, the Contractor shall immediately, and in no event more than three days later, give notice to the Owner of such conditions before they are disturbed. The Owner and the Designer shall thereupon promptly investigate the conditions and if they find that they materially differ from those shown on the Drawings or indicated in the Specifications, they shall at once make such changes in the Drawings and/or Specifications as they may find necessary. Any increase or decrease in the Contract Price resulting from such changes shall be adjusted in the manner provided herein for adjustments as to extra and/or additional Work and changes. However, neither the Owner nor the Designer shall be liable or responsible for additional work, costs, or changes to the Work that could have been reasonably determined from any reports, surveys, and analyses made available for the Contractor's review or that could have been discovered by the Contractor through the performance of its obligations pursuant to the Contract Documents.

ARTICLE 17. CORRECTION OF WORK BEFORE FINAL PAYMENT

- 17.1 The Owner has the authority to stop or suspend work, and the Designer has the authority to order Work removed or to order corrections of defective Work or Work not in compliance with the Contract Documents where such action may be necessary to ensure successful completion of the Work.

Any work, materials, fabricated items, or other parts of the Work which have been found by the Designer to be defective or not in accordance with the Contract Documents shall be condemned and shall be removed from the Project by the Contractor, and immediately replaced by new Work in accordance with the Contract Documents at no additional cost to the Owner. Work or property of the Owner or others damaged or destroyed by virtue of such condemned Work shall be made good at the expense of the Contractor.

Correction of condemned Work described above shall be commenced by the Contractor within twenty-four (24) hours after notice from the Designer or the Owner and shall be pursued to completion. Should the Contractor fail to proceed reasonably with the above-mentioned corrections, the Owner may, three (3) days after the notice specified in the preceding sentence, proceed with correction, paying the cost, including costs of uncovering such condemned Work, of such corrections from amounts due or to become due to the Contractor.

Condemned Work removed shall be the property of the Contractor and shall be removed from the Project by him within ten (10) days after notice to remove it, and if not then removed, thereafter may be disposed of by the Owner without compensation to the Contractor and the cost of such disposal shall be deducted from amounts due or to become due to the Contractor.



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Should the cost of correction of the Work and, if applicable, disposal of the condemned Work by the Owner exceed amounts due or to become due the Contractor, then the Contractor and the Contractor's sureties shall be liable for and shall pay to the Owner the amount of such excess.

ARTICLE 18. CORRECTION OF WORK AFTER SUBSTANTIAL COMPLETION; WARRANTIES AND GUARANTIES

18.1 Neither the final certificate, Final Payment, occupation of the premises by the Owner, nor any provision of the Contract Documents, nor any other act or instrument of the Owner or the Designer shall relieve the Contractor from responsibility for negligence, defective material or workmanship, or failure to comply with the Contract Documents.

18.2 The Contractor shall, at the Contractor's sole cost and expense, make all necessary repairs, replacements, and corrections of any nature or description, interior or exterior, structural or non-structural, that shall become necessary by reason of defective workmanship or materials which appear within a period of one (1) year from the date of Substantial Completion; provided, however that notwithstanding the preceding, if any longer guarantee period is specified for any particular materials or workmanship under the Contract Documents, or under any subcontract, or in connection with any manufactured unit which is installed in the Project, or under the laws of the State of North Carolina, the longer guarantee period shall govern.

18.3 If, within any guarantee period, repairs or changes are required in connection with the Work, which are rendered necessary as the result of the use of materials, equipment, or workmanship which are inferior, defective, or not in accordance with the terms of the Contract Documents, the Contractor shall, promptly upon receipt of notice from the Designer and without expense to the Owner:

- a) Completely repair or replace the Work so that it conforms to the Contract Documents;
- b) Correct all defects therein;
- c) Make good all damage which, in the opinion of the Designer, is the result of the use of materials, equipment, or workmanship which are inferior, defective, or not in accordance with the terms of the Contract Documents; and
- d) Make good any Work or material, or any equipment or contents disturbed in fulfilling any such guarantee.

If, in fulfilling the requirements of the Contract Documents or of any guarantee embraced therein or required thereby, the Contractor disturbs any work, facility, premises, or construction belonging to the Owner, the Contractor shall restore such disturbed work to a condition satisfactory to the Owner, and shall guarantee such restored work to the same extent as if it were Work under the Contract Documents.

If the Contractor, after notice, fails to proceed promptly to comply with the terms of the guarantee, the Owner may have the defects corrected, and the Contractor and the



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Contractor's sureties shall be liable for all expenses incurred. "Promptly" is defined as within twenty-four (24) hours for systems necessary to normal operation of the building and within seventy-two (72) hours for all other items. All special guarantees applicable to definite parts of the Work that may be shown in or required by Contract Documents shall be subject to the terms of this paragraph during the first year of the life of such special guarantee. Manufacturer's standard guarantees or warranties which do not comply with the time limit specified herein shall be extended by the Contractor automatically without further action on the part of the Owner or the Designer.

- 18.4 In the eleventh calendar month after the date of Substantial Completion, and at the request of the Owner, the Contractor, the Owner and the Designer shall make an inspection of the Work for the purpose of identifying defective workmanship and/or materials. If the Contractor, having been requested to do so by the Owner, fails to participate in such inspection, the Contractor shall be conclusively bound by any decision or ruling by the Designer as to any defective workmanship or material and as to the Contractor's responsibility for its repair or replacement.

ARTICLE 19. OWNER'S RIGHT TO DO WORK

- 19.1 If, during the progress of the Work or during any period of guarantee, the Contractor fails to prosecute the Work properly or to perform any provision of the Contract Documents, the Owner, after three (3) days written notice to the Contractor from the Designer, or from the Owner after Final Payment, may perform or have performed that portion of the Work and may deduct the cost thereof from any amounts due or to become due the Contractor. Notwithstanding any action by the Owner under this paragraph, all warranties and bonds given or to be given by the Contractor shall remain in effect or shall be given by the Contractor.
- 19.2 Should the cost of such action by the Owner exceed the amount due or to become due the Contractor, the Contractor and his sureties shall be liable for and shall pay to the Owner the amount of such excess.

ARTICLE 20. PARTIAL PAYMENTS

- 20.1 Within thirty (30) days after his initial receipt of the Construction Agreement for signatures, the Contractor shall submit to the Designer a Schedule of Values. The Schedule of Values shall indicate the value of the Work, including applicable overhead and profit, for each Division and section of the Project Specifications. The Designer and Owner shall be provided with the Contractor's estimate papers, Subcontractor agreements, supplier quotes, or other documents substantiating these values if so requested in writing by the Designer. The Contractor shall provide the requested documentation within seven (7) days after receipt of the Designer's written request. The Schedule of Values shall be subject to approval by the Owner, and if the Owner and the Contractor cannot agree upon the Schedule of Values, the Designer shall prepare it, and the Schedule of Values as prepared by the Designer shall be binding on the Owner and the Contractor. No Request for Payment shall be certified by the Designer until the Designer has issued approval of said Schedule of Values.



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20.2 Not later than the fifth (5th) day of each calendar month the Contractor shall submit to the Designer a Request for Payment for Work done during the previous calendar month. The Request for Payment shall be in form of AIA Document G702 (latest edition) and shall show substantially the value of Work done (including the value of material delivered to the Project or stored by the Contractor at another site, subject to the conditions hereinafter set forth) during the previous calendar month, and shall sum up the financial status of the Work with the following information:

- a) Total Contract Price, including any adjustment thereto made pursuant to the Contract Documents.
- b) Value of Work completed and materials properly stored to date.
- c) Less amount retained.
- d) Less previous payments.
- e) Current amount due.
- f) Balance remaining.

The Contractor, upon request of the Designer, shall substantiate the request with invoices, vouchers, payrolls, or other evidence.

20.3 When payment is requested or made on an account of stored materials, such materials must be stored on the Owner's property at such places and in such a manner as may be designated by the Designer. However, in the sole discretion of the Owner, with permission in writing from the Designer and Owner and under such circumstances as may be determined by the Owner, such materials may be stored in a bonded warehouse. The location and conditions for storage of such materials away from the Owner's property in a bonded warehouse shall be within the sole discretion of the Owner. Requests for Payment on account of stored materials shall be accompanied by paid invoices, bills of sale, warehouse receipts, or other documentary evidence establishing Owner's title to such materials, evidence that the stored materials are insured against loss and damage, and such other documentation as required by the Designer. Responsibility for the quantity, quality, and condition of such stored materials, whether stored on the Owner's property or away from the Owner's property, shall remain with the Contractor regardless of ownership or title. No payment shall be made on account of materials stored in a bonded warehouse unless the Contractor has acquired written permission from the Designer for such storage of materials and has complied with all conditions set forth in such permission regarding such storage of materials in a bonded warehouse.

20.4 Any Request for Payment received by the Designer on or before the fifth (5th) of the calendar month shall be certified for payment or returned for re-submission to the Contractor on or before the fifteenth (15th) of the calendar month. The Designer's certification shall be for the amount which was requested or that which the Designer has decided was justly due, and shall state in writing to the Contractor and Owner the reasons for withholding payment of any or all of the amount requested.



GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

- 20.5 The Designer may fail to certify all or part of any payment requested for any of the following reasons:
- a) Defective Work not corrected.
 - b) Suits, actions, or claims of any character filed against the Contractor, or due to the operations of the Contractor, or information or notice that a suit, action, or claim will be filed or has been made.
 - c) Information or notice that a Subcontractor or a supplier has not received payment.
 - d) The balance unpaid of the Contract Price is insufficient to complete the Work in the judgment of the Designer or Owner.
 - e) Damage to the Owner or another contractor.
 - f) Inability of the Contractor to meet a Completion Date, including an anticipated failure to meet a Completion Date entitling the Owner to withhold anticipated Liquidated Damages in accordance with paragraphs 13.16 and 13.18 hereof.
 - g) Failure to furnish Submittal as required by the Contract Documents on a timely basis in accordance with the Submittal Register.
 - h) Such other reason as to the Designer may appear prudent, proper, or equitable.

When grounds for withholding certification have been corrected, the Designer shall so certify to the Owner and the Owner shall make any payment due with respect to such certification as a part of his next payment after such certification.

- 20.6 No certificate issued or progress payment made shall constitute an acceptance of the Work or any part thereof.
- 20.7 The amount certified by the Designer for payment shall be ninety-five percent (95%) of the value of Work completed and materials stored since the Designer's last certification as shown on the Request for Payment, less any amounts not certified in accordance with paragraph 20.4, and this amount shall be paid by the Owner on or before the last business day of the month, but payment shall not be past due until not paid within fifteen (15) days thereafter.
- 20.8 After certification by the Designer that the Work is fifty percent (50%) complete, based on a determination that the Contractor's gross project invoices, excluding the value of materials stored off-site, equal or exceed fifty percent (50%) of the value of the Contract, (except the value of materials stored on-site shall not exceed twenty percent (20%) of the Contractor's gross project invoices for the purpose of determining whether the Project is fifty percent (50%) complete) and the Contractor has provided to the Owner the written consent of its sureties to the cessation of further percentage retention, the amount certified for payment with respect to subsequent Requests for Payment shall be one hundred percent (100%) of the value of Work completed and materials stored since the Designer's last certification as shown on the Request for Payment, less any amounts not certified in accordance with



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paragraphs 20.4 and 20.5; provided, however, that the aggregate of periodic payments shall not exceed ninety-seven and one half percent (97.5%) of the Contract Price. If the Owner determines that the Contractor's performance under the Contract is unsatisfactory, the Owner may resume withholding percentage retention from each subsequent periodic payment application up to the maximum amount of five percent (5%) of the Contract Price.

ARTICLE 21. FINAL PAYMENT

- 21.1 If the Work of the Contractor is limited to demolition, pilings, caissons and/or structural steel, the remaining unpaid balance of the Contractor's Contract Price, less a sum equal to five-tenths percent (0.5%) of the Contract Price, shall be paid within sixty days following receipt of the following documents, all of which must be received before payment shall become due: (i) request for payment from the Contractor; (ii) receipt of consent from the Contractor's surety to the payment; and (iii) approval or certification from the Designer that the work performed by the Contractor is acceptable and in accordance with the Contract Documents.
- 21.2 Except as set forth in paragraph 21.1, within forty five days after Substantial Completion of the Project, the remaining unpaid balance of the Contract Price shall be paid to the Contractor, less an amount equal to two and one-half times the value of punch list work or other work remaining to be completed or corrected, as reasonably estimated by the Owner.
- 21.3 Upon Substantial Completion, the Designer shall prepare and submit to the Contractor a deficiency list identifying all portions of the Work which are known by the Designer at that time to be incomplete or defective. Within thirty (30) days of receipt of this deficiency list, the Contractor shall complete and correct all items on that list along with all other Work required to achieve Final Completion of the Work. At any time prior to completion of the period of warranty, the Designer may submit to the Contractor a supplemental deficiency list, in which case the Contractor shall complete or correct any and all new items identified on the Supplemental deficiency list within the time period stipulated in paragraph 18.3.
- 21.4 Final Payment of any remaining balance of the Contract Price shall not be due to the Contractor until the Contractor achieves Final Completion of the Project.
- 21.5 The making and acceptance of Final Payment shall constitute a waiver of all claims by the Owner except:
- a) Claims arising from unsettled liens or claims against the Contractor.
 - b) Defective Work or materials appearing after Final Payment.
 - c) Failure of the Contractor to perform the Work in accordance with the Contract Documents.
 - d) As conditioned in the Performance Bond.
 - e) Claims made prior to Final Payment which remain unsettled.
 - f) Amounts due arising under Articles 18 and 28.



GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

- g) Claims for recovery of overpayment based upon incorrect measurement, estimate, or certificate.

21.6 The making and acceptance of Final Payment shall constitute a waiver of all claims by the Contractor except those claims previously made in writing pursuant to paragraph 15.2 and not finally resolved.

21.7 The Designer shall not authorize Final Payment until all of the Work under the Contract Documents has been certified by the Designer as completed, proper and suitable for occupancy and use, and has been approved by all federal, state and local agencies having jurisdiction.

21.8 The final Request for Payment shall be identified on its face as such and shall be presented by the Contractor to the Designer within thirty (30) days of completion of the Work. Final payment of the retained amount due the Contractor shall be made by the Owner within thirty (30) days after the later of (i) full and Final Completion of all Work required by the Contract Documents, and certification of such Work in accordance with paragraph 20.4; (ii) submission of the affidavits of other documentation required by Article 22; (iii) submission by the Contractor of a Request for Payment identified on its face as final and including the Designer's certification.

ARTICLE 22. CONTRACTOR, SUBCONTRACTOR AND SUPPLIER AFFIDAVIT

22.1 The Final Payment due the Contractor on account of the Contract Documents shall not become due until the Contractor has furnished to the Owner through the Designer: (A) an affidavit by the Contractor signed, sworn, and notarized to the effect that all payments for materials, services, or for any other reason in connection with the Work or performance of the Contract Documents have been satisfied and that no claims or liens exist against the Contractor in connection with the same; (B) affidavits from each Subcontractor and supplier signed, sworn, and notarized to the effect that (i) each such Subcontractor or supplier has been paid in full by the Contractor for all Work performed and/or materials supplied by him in connection with the Project, and (ii) that all payments for materials, services, and for any other reason in connection with the subcontract or supply contract have been satisfied and that no claims or liens exist against the Subcontractor or supplier in connection therewith; and (C) the written consent of the Contractor's sureties to Final Payment. In the event that the Contractor cannot obtain an affidavit, as required above, from any Subcontractor or supplier, the Contractor shall state in the Contractor's affidavit that no claims or liens exist against such Subcontractor or supplier to the best of the Contractor's knowledge, and that if any appear afterwards, the Contractor shall save the Owner harmless for all costs and expenses, including attorneys fees, on account thereof.

ARTICLE 23. ASSIGNMENTS AND SUBCONTRACTS

23.1 The Contractor shall not assign any portion of this Agreement nor subcontract the Work in its entirety without the prior written consent of the Owner. Except as may be required under terms of the bonds required by the Contract Documents, no funds or sums of money due or to become due to the Contractor under the Contract Documents may be assigned.



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ARTICLE 24. MEASUREMENTS

- 24.1 Before ordering material or doing Work which is dependent for proper size or installation upon coordination with building conditions, the Contractor shall verify all dimensions and shall be responsible for the correctness of same. No consideration will be given for any claim based on differences between the actual dimensions and those indicated in the Contract Documents. Any discrepancies between the Contract Documents and the existing conditions shall be referred to the Designer for adjustment before any Work affected thereby is begun.

ARTICLE 25. CONTRACTOR AND SUBCONTRACTOR RELATIONSHIPS

- 25.1 Within thirty (30) days after initial receipt of the Construction Agreement for signatures the Contractor shall submit to the Designer and Owner for acceptance a current list of the names of Subcontractors and such other persons and organizations (including those who are to furnish materials or equipment fabricated to a special design) proposed for any and all portions of the Work. The Contractor shall provide this list at this time even if the Contractor was required to submit a list of proposed Subcontractors with the Contractor's bid. The Designer shall promptly reply to the Contractor in writing stating whether or not the Owner or the Designer, after due investigation, has objection to any such proposed person or entity or if it needs additional information to evaluate the persons on the list. Failure of the Designer to reply within ten (10) days after the Contractor has furnished all required information shall constitute notice of no objection.

The Contractor shall not contract with any such proposed person or entity to whom the Owner or the Designer has made reasonable objection. If the Designer or Owner has reasonable objection to any such proposed person or entity, the Contractor shall submit a substitute to whom the Owner and the Designer have no reasonable objection. The Contractor shall make no substitution for any Subcontractor, person, or entity previously allowed without first notifying the Designer and Owner in writing and no substitution may be made if the Owner or Designer makes a reasonable objection to such substitution.

- 25.2 The Contractor agrees that the terms of the Contract Documents, including all portions thereof, shall apply to all Subcontractors of the Contractor as if they were the Contractor, and that the Subcontractors of the Contractor shall, by means of their subcontracts, be bound by all the terms of the Contract Documents including, but not limited to, Article 26 of these General Conditions.
- 25.3 Payments to Subcontractors shall be made in accordance with the provisions of N.C. Gen. Stat. §143-134.1.

ARTICLE 26. USE OF PREMISES

- 26.1 The Contractor shall confine apparatus, the storage of materials, the operations of workers, and the disposal of material to limits indicated by law, ordinances, permits, and directions of the Designer, if any.
- 26.2 The Contractor shall not load or permit any part of the Work to be loaded with a weight that will endanger its safety, intended performance, or configuration.



GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

- 26.3 The Contractor shall enforce all of the Designer's instructions, including, but not limited to, those regarding signs, advertisements, fires, and smoking.

ARTICLE 27. CUTTING, PATCHING AND FITTING

- 27.1 The Contractor shall do all cutting, fitting, and patching of the Work that may be required to make its several parts come together properly and fit it to receive or to be received by Work shown in or which can be reasonably implied from the Contract Documents.

ARTICLE 28. DISPUTE RESOLUTION

- 28.1 The laws of the State of North Carolina shall apply to the interpretation and enforcement of this Agreement. Any and all suits or actions to enforce, interpret, or seek damages with respect to any provision of, or the performance or nonperformance of, this Agreement shall be brought in the General Court of Justice of North Carolina sitting in Wake County, North Carolina, and it is agreed by the parties that no other court shall have jurisdiction or venue with respect to such suits or actions. Appendix A shall be a part of the Contract Documents. Prior to initiating an action under this Article, any party to this Agreement shall initiate the mediation process as provided in Appendix A to these General Conditions of the Contract for Construction.

- 28.2 Any person or firm that expressly or impliedly agrees to perform labor or services or to provide material, supplies, equipment, work, performance or payment bonds, insurance or indemnification for the construction of the Project or the Work shall be deemed a party to this Agreement solely for the purpose of this Article 28. The Contractor, by means of its subcontracts, shall specifically require its Subcontractors to be bound by this Article.

ARTICLE 29. TAXES

- 29.1 The Contractor has included in the Contract Price and shall pay all taxes assessed by any authority on the Work or the labor and materials used therein. The Contractor shall maintain all tax records during the life of the Project and furnish the Owner with a complete listing of all taxes paid by taxing authority, invoice number, date, amount, etc. in a form acceptable to the Owner. The Contractor is required to maintain a file showing taxes paid on the Project for three (3) years after Final Payment or turn said documents over to the Owner for his files.

- 29.2 The following is a list of requirements to be followed by the Contractor in maintaining proper records and reporting the North Carolina Sales and Use Tax and Local Sales and Use Tax. The Contractor shall comply fully with the requirements outlined below, in order that the Owner may recover the amount of the tax permitted under the law.

- a) It shall be the Contractor's responsibility to furnish the Owner documentary evidence showing the materials used and sales and use tax paid by the Contractor and each of his Subcontractors. Such evidence shall be transmitted to the Owner with each pay request regardless of whether taxes were paid in that period.



GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

- b) The documentary evidence shall consist of a certified statement by the Contractor and each of the Contractor's Subcontractors individually, showing total purchases of materials from each separate vendor and total sales and use taxes paid to each vendor. Certified statements must show the invoice number, or numbers, covered, and inclusive dates of such invoices.
- c) Materials used from Contractor's or Subcontractor's warehouse stock shall be shown in a certified statement at warehouse stock prices.
- d) The Contractor shall not be required to certify the Subcontractor's statements.

ARTICLE 30. OPERATION OF OWNER'S FACILITIES

- 30.1 The Contractor agrees that all Work done under the Contract Documents shall be carried on in such a manner so as to ensure the regular and continuous operation of the adjoining or adjacent facilities. The Contractor further agrees that the sequence of operations under the Contract Documents shall be scheduled and carried out so as to ensure said regular and continuous operation. The Contractor shall not close any areas of construction until so authorized by the Designer. The Contractor shall control operations to assure the least inconvenience to the public. Under all circumstances, safety shall be the most important consideration.

ARTICLE 31. THIRD PARTY BENEFICIARY CLAUSE

- 31.1 It is specifically agreed between the parties executing the Agreement that, with the specific exception set forth paragraph 7.24 hereof, and that exception only, the Contract Documents and the provisions therein are not intended to make the public, or any member thereof, a third-party beneficiary of the Agreement, or to authorize anyone not a party to the Contract Documents to maintain a suit for personal injuries or property damage pursuant to the terms of provisions of the Contract Documents.

ARTICLE 32. MEASUREMENT OF QUANTITIES

- 32.1 All Work completed under the Contract Documents shall be measured by the Contractor using United States customary units of measurement. The method of measurement and computations to be used in determination of quantities of material furnished and of Work performed under the Contract Documents shall be those methods set forth in the Contract Documents or, if not specifically set forth therein, the method generally recognized as conforming to good engineering practice.

ARTICLE 33. TERMINATION BY THE OWNER FOR CAUSE

- 33.1 If the Contractor fails to begin or complete the Work under the Contract Documents within the time specified, or fails to perform the Work with sufficient labor and equipment or with sufficient materials to insure the prompt completion of said Work, or shall perform the Work unsuitably or shall discontinue the prosecution of the Work for three (3) days, or if the Contractor shall become insolvent, be declared bankrupt, commit any act of bankruptcy or insolvency, allow any final judgment to stand against the Contractor or its affiliated



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companies unsatisfied for a period of forty-eight (48) hours, make an assignment for the benefit of creditors, or for any other cause whatsoever shall not carry on the Work in an acceptable manner, the Owner may give notice in writing to the Contractor and the Contractor's sureties of such delay, neglect, or default, specifying the same, and if the Contractor within a period of three (3) days after such notice shall not proceed in good faith and with reasonable speed to correct such delay, neglect, or default in accordance with such notice, the Owner shall have full power and authority, to the extent permitted by law, without violating the Contract Documents, to take the prosecution of the Work out of the hands of the Contractor, to appropriate or use any or all materials and equipment at the Project as may be suitable and acceptable, and may enter into an agreement for the completion of the Work or pursue such other methods as in the Owner's opinion shall be necessary or appropriate for the completion of the Work in an acceptable manner. All costs and charges incurred by the Owner in proceeding in accordance with the preceding sentence, including attorney's fees, and all costs incurred by the Owner in completing the Work shall be deducted from any money due or which becomes due the Contractor. If such costs and expenses incurred by the Owner shall be less than the sum which would have been payable under Contract Documents if it had been completed by the Contractor, then the Contractor shall be entitled to receive the difference, but if such costs and expenses shall exceed the sum which would have been payable under the Contract Documents, the Contractor and the Contractor's surety shall be liable to the Owner for and shall pay to the Owner the amount of such excess.

ARTICLE 34. TERMINATION OR SUSPENSION BY THE OWNER FOR CONVENIENCE

- 34.1 The Owner may, without cause, order the Contractor to terminate, suspend, delay, or interrupt the Work in whole or in part for such period of time as the Owner may determine.
- 34.2 If the Contractor is subsequently ordered by the Owner to resume the Work, any cost or expenses to which the Contractor may be entitled by reason of the suspension, delay, or interruption shall be recovered by means of a Change Order in accordance with Articles 13 and 14 hereof and the Contract Construction Schedule shall be adjusted in accordance with Article 13 hereof.
- 34.3 The Owner shall terminate the Work or portion thereof by written notice when the Contractor is prevented from proceeding with the Work as a direct result of an executive order of the President with respect to the prosecution of war or in the interest of national defense.
- 34.4 In the event of termination by the Owner under this Article, the Contractor shall be entitled to receive the reasonable and documented direct costs incurred prior to termination, including the cost of materials purchased for the Work which purchases cannot be canceled or which material cannot reasonably be used by the Contractor on other work, and the cost of closing down the Project in a safe and efficient manner, plus ten percent (10%) thereof for overhead and profit, subject to the following conditions:
 - a) When the Contract is terminated before completion of all items of Work, payment shall be made for the actual number of units or items of Work completed at the applicable contract prices, or as mutually agreed for items of Work partially complete. If a mutual agreement cannot be reached, the Owner shall have the



GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

authority to make such equitable adjustment as it deems warranted and the Final Payment shall be made accordingly.

- b) Reimbursement for organization of any Work and moving equipment to and from the job shall be considered when not otherwise provided for in the Contract Documents where the volume of completed Work is too small to compensate the Contractor for those expenses under unit prices. If a mutual agreement cannot be reached, the Owner will have the authority to make such equitable adjustments as it deems warranted and the Final Payment will be made accordingly.
- c) Materials obtained by the Contractor for the Work that have been inspected and accepted by the Designer and that are not incorporated in the Work shall, at the request of the Contractor, be purchased from the Contractor at the Contractor's actual cost as shown by receipted bills and actual costs records at such points of delivery as may be determined by the Owner.
- d) No payment shall be made by Owner to Contractor except as herein above provided. No claim for loss of anticipated profits shall be considered or allowed.
- e) Termination of the Contract shall not relieve the Contractor of his responsibilities for any completed portion of the Work nor shall it relieve his sureties of their obligation for and concerning any just claims arising out of the Work performed.

The Contractor shall not be entitled to any other compensation, including compensation for lost profit, lost opportunity, or any other direct or consequential cost, loss, or damage.

ARTICLE 35. MINORITY BUSINESS ENTERPRISE PROGRAM

- 35.1 The Contractor shall at all times comply with the latest edition of the Wake County Minority Business Enterprise Policy. All documentation substantiating compliance with the requirements of this program shall be delivered to the Owner as stipulated in the Contract Documents. A copy of the Wake County Minority Business Enterprise Policy is included in the Project Manual.

ARTICLE 36. GENERAL

- 36.1 If any provision of the Agreement shall be declared invalid or unenforceable, the remainder of the Agreement shall continue in full force and effect.
- 36.2 The titles to Articles herein are for convenience only, are not substantive parts of the General Conditions, and are not to be considered in interpreting the Contract Documents.

END OF GENERAL CONDITIONS OF THE
CONTRACT FOR CONSTRUCTION

COUNTY OF WAKE HOLLY SPRINGS COMM LIBRARY RENOVATION

SUPPLEMENTARY GENERAL CONDITIONS

GENERAL

These Supplementary Conditions contain changes and additions to the project "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION", as published herein. 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 the Article, Paragraph, Subparagraph or Clause shall remain in effect.

ARTICLE 1 - DEFINITIONS

Paragraph 1.13: At the end of the existing paragraph, add the following:

The Contract Time is 136 consecutive calendar days, beginning on the Date of Commencement as specified in the written Notice-to-Proceed.

Paragraph 1.18: Delete the last sentence in its entirety and substitute the following in lieu thereof:

“A list of the Drawings is contained in the “Supplementary General Conditions.”

The Drawings applicable to this Contract are as follows:

CS COVER SHEET

G001 GENERAL INFORMATION AND SHEET INDEX
G002 BUILDING CODE SUMMARY
G111 LIFE SAFETY PLAN - LEVEL 01

L200 LANDSCAPE PLAN
L300 SITE DETAILS
L301 LANDSCAPE DETAILS
L100 LAYOUT AND MATERIALS PLAN

A010 INTERIOR PARTITIONS - TYPES
A011 INTERIOR PARTITIONS - DETAILS
AD111 DEMOLITION PLAN
AD121 DEMOLITION CEILING PLAN
A111 FLOOR PLAN - LEVEL 01
A121 REFLECTED CEILING PLAN - LEVEL 01
A220 PERSPECTIVES
A412 ENLARGED RESTROOM PLANS AND ELEVATIONS
A451 INTERIOR ELEVATIONS
A452 INTERIOR ELEVATIONS
A531 CEILING DETAILS
A821 MILLWORK DETAILS
A822 MILLWORK DETAILS

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A823 MILLWORK DETAILS
A851 FURNITURE PLAN - LEVEL 01
A900 DOOR SCHEDULE, TYPES, AND DETAILS

XR101 ROOF PLAN
XR102 ROOF PLAN
XR301 ROOF SYSTEMS
XR501 DETAILS
XR502 DETAILS

P001 PLUMBING COVER SHEET
PD101 PLUMBING DEMOLITION FLOOR PLAN
P111 PLUMBING DRAINAGE PLAN - LEVEL 01
P121 PLUMBING PIPING PLAN - LEVEL 01
P501 PLUMBING DETAILS

M001 MECHANICAL GENERAL NOTES & LEGEND
MD111 MECHANICAL DUCT DEMOLITION FLOOR PLAN
M111 MECHANICAL DUCTWORK PLAN
M121 MECHANICAL PIPING PLAN
M501 MECHANICAL DETAILS
M502 MECHANICAL DETAILS
M601 MECHANICAL SCHEDULES
MZ01 HVAC ZONE PLAN

E000 ELECTRICAL COVERSHEET
ED111 ELECTRICAL DEMOLITION PLAN - LEVEL 01
ED121 LIGHTING DEMOLITION PLAN - LEVEL 01
E111 POWER PLAN - LEVEL 01
E121 LIGHTING PLAN - LEVEL 01
E122 LIGHTING CONTROL PLAN - LEVEL 01
E131 MECHANICAL POWER PLAN - LEVEL 01
E500 ELECTRICAL DETAILS
E501 ELECTRICAL DETAILS
E600 LIGHTING FIXTURE SCHEDULE
E610 MECHANICAL EQUIPMENT POWER SCHEDULE
E700 POWER RISER DIAGRAM

FA000 FIRE ALARM COVERSHEET
FAD111 FIRE ALARM DEMOLITION PLAN - LEVEL 01

ARTICLE 3. FAMILIARITY WITH WORK, CONDITIONS AND LAWS

Paragraph 3.3: At the end of the existing paragraph, add the following paragraph:

“To ensure compliance with the E-Verify requirements of the General Statutes of North Carolina, all contractors, including any subcontractors employed by the contractor(s), by submitting a bid, proposal or any other response, or by providing any material, equipment, supplies, services, etc., attest and affirm that they are

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aware and in full compliance with Article 2 of Chapter 64, (NCGS64-26(a)) relating to the E-Verify requirements.”

“By signing this agreement, Contractor certifies that as of the date of execution of this Agreement 1) it does not appear on the Final Divestment List created by the North Carolina State Treasurer pursuant to N.C.G.S. 143-6A-4 and published on the State Treasurer's website at www.nctreasurer.com/Iran and 2) it will not utilize any subcontractor that appears on the Final Divestment List in the performance of duties under this Agreement.”

Add the following paragraph:

- “3.5 A **non-mandatory** Pre-Bid Site Walk will be held at **300 W Ballentine St Holly Springs, NC 27540 at 2:00 pm, local prevailing time, on February 26th, 2026**. Purpose of conference is for prospective Bidders to familiarize themselves with the site and to ask questions pertaining to the Contract Documents. Bidders are reminded that no oral interpretations of meaning of Drawings and Specifications can be made. Conflicts in documents, if any, will be resolved by written addendum. (Reference “Instructions to Bidders, Paragraph 4.)

ARTICLE 5. INSURANCE AND INDEMNITY

Paragraph 5.1.2: In addition to all other endorsements required by the General Conditions, if the Contractor is required to transport, dispose of or otherwise handle hazardous or toxic waste, material, chemicals, compounds or substances, the policy of insurance shall be further endorsed to include the following:

Insurance Service Office (ISO) Form #CA 00 01 06 92 or its equivalent, amending exclusion 11 in the following manner:

- i. Delete section a. (1) a.: (Pollution) "being transported or towed by, or handled for movement into, onto or from, the covered auto."
- ii. Delete section a. (1) b.: "Otherwise in the course of transit by the insured."

The Contractor and transporter must comply with all applicable DOT and EPA requirements.

Paragraph 5.1.4: Add the following Paragraph [as necessary if the Contractor or its Subcontractor is required to consolidate, transfer, transport, dispose of, store or otherwise handle hazardous or toxic waste, material, chemicals, compounds or substances at any location]:

“Pollution Legal Liability (PLL)

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A PLL policy must be provided for the Project. Coverage must be sudden and non-sudden, and include:

- a) Bodily injury, sickness, disease, mental anguish, or shock sustained by any person, including death;
- b) property damage including physical injury to or destruction of tangible property including the resulting loss of use thereof, cleanup costs, and the loss of use of tangible property that has not been physically injured or destroyed; and
- c) Defense including costs, charges, and expenses incurred in the investigation, adjustment, or defense of claims for such compensatory damages.

The Owner must be named as Additional Insured, and a Non-Owned Disposal Site Endorsement must be provided, scheduling the appropriate landfill.

Minimum PLL limits of coverage shall be:

Per Loss	\$1,000,000
All Losses	\$2,000,000

ARTICLE 6. OTHER RECORD DOCUMENTS AND SUBMITTALS

Paragraph 6.1: At the end of the existing paragraph, add the following:

The Architect will furnish free of charge one PDF electronic copy of the plans and specifications to the GC. The GC shall be responsible for the cost of printing and handling for all other requested paper copies from the printer.

Paragraph 6.6: Special requirements for submittal and record document media:

In addition to the contractor providing one complete set of all the as-built drawings on paper and one complete set of all approved submittals and product data on paper, the contractor shall provide the architect with pdf copies on a flash drive of both.

Before final payment the contractor shall provide the completed closeout checklist

ARTICLE 7. CONTRACTOR

Paragraph 7.2: Use this paragraph in lieu of the existing paragraph: [to be used for larger projects which require Project Manager on site and Resident Superintendent on site.]

“The Contractor shall keep on the Project at all times during its progress a competent Project Manager and a competent Resident Superintendent and necessary assistants

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who shall not be replaced without prior written approval by the Architect except under extraordinary circumstances, in which event immediate written notice shall be given to the Architect and the Owner. The Project Manager and Resident Superintendent shall each have a minimum of ten (10) years experience on projects of similar scope and complexity with job responsibilities equivalent to those required on this Project. At any time, the Owner, in its sole discretion, may require the Contractor to replace the Project Manager and Resident Superintendent or both with an experienced and competent person or persons upon seven (7) days written notice from the Owner to the Contractor. Such replacement shall be at the Contractor's expense and at no cost to the Owner. The Project Manager shall be the Contractor's representative at the Project and shall have full authority to act on behalf of the Contractor and to receive any and all notices or instructions given pursuant to the Contract Documents."

Paragraph 7.13: Amend with the addition of the following paragraph:

"The General Contractor shall secure and pay for all building permits, including plumbing, electrical, HVAC and for the permit from the office of the Fire Marshall. Wake County building permit fees are waived for Wake County Capital Improvement Plan (CIP) projects; building permit fees are not the responsibility of the Contractor. Site plan review and/or development fees, if necessary, will be paid by others and is not the responsibility of the Contractor."

ARTICLE 10. DESIGNER

Add the following paragraphs:

- "10.5 As a part of its Basic Services under the Owner-Designer Agreement, the Designer will conduct a single site visit to determine Substantial Completion of the Work. If, after the performance of said site visit, the Designer determines that the Work is not substantially complete, successive site visits to determine Substantial Completion will be deemed Additional Services under the Owner-Designer Agreement. The Contractor shall be liable to the Owner for any Designer's fees incurred as a result of any such Additional Services of the Designer. Any funds due under this paragraph may be deducted by the Owner from the amounts due the Contractor for such additional Designer's fees and paid directly to the Designer. Should the cost for such Additional Services of the Designer exceed the amount due or to become due to the Contractor, then the Contractor and his sureties shall be liable for and shall pay to the Owner the amount of any such excess.
- "10.6 As a part of its Basic Services under the Owner-Designer Agreement, the Designer will conduct a single site visit to determine Final Completion of the Work. If, after the performance of said site visit, the Designer determines that the Work is not complete, successive site visits to determine Final Completion of the Work will be deemed Additional Services under the Owner-Designer Agreement. The Contractor shall be liable to the Owner for any Designer's fees incurred as a result of any such Additional

COUNTY OF WAKE HOLLY SPRINGS COMM LIBRARY RENOVATION

Services of the Designer. Any funds due under this paragraph may be deducted by the Owner from the amounts due the Contractor for such additional Designer's fees and paid directly to the Designer. Should the cost for such Additional Services of the Designer exceed the amount due or to become due to the Contractor, then the Contractor and his sureties shall be liable for and shall pay to the Owner the amount of any such excess."

ARTICLE 13 - CONTRACT TIME

Paragraph 13.18: Add the following:

"If the Contractor fails to achieve Substantial Completion of the Work within the Contract Time and as otherwise required by the Contract Documents, the Owner shall be entitled to retain or recover from the Contractor, as Step One Liquidated Damages and not as a penalty, the following per diem amount commencing upon the first day following expiration of the Contract Time and continuing until the actual date of Substantial Completion. Such liquidated damages are hereby agreed to be a reasonable pre-estimate of damages the Owner will incur as a result of delayed Substantial Completion of the Work:

Five Hundred Dollars (\$500) per consecutive calendar day

If the Contractor fails to achieve Final Completion of the Work within thirty (30) consecutive calendar days of the actual date of Substantial Completion of the Work, the Owner shall be entitled to retain or recover from the Contractor, as Step Two Liquidated Damages and not as a penalty, the following per diem amount commencing upon the first day following the actual date of Substantial Completion and continuing until the actual date of Final Completion. Such liquidated damages are hereby agreed to be a reasonable pre-estimate of damages the Owner will incur as a result of delayed Final Completion of the Work:

Two-Hundred Fifty Dollars (\$250) per consecutive calendar day

The Owner shall vacate the Lobby for construction from June 15 through July 15 (the "Lobby Vacate Period"). The Contractor shall complete all Work in the Lobby restrooms, including new restroom construction, finishes, painting, and associated work, as well as all painting and work in high-bay Lobby spaces, within the Lobby Vacate Period. The Contractor shall obtain a Temporary Certificate of Occupancy for the Lobby, and all Lobby restrooms shall be fully functional and available for public use, no later than July 15. Any Lobby Work required to be performed after July 15, including installation of long-lead items such as lighting or HVAC equipment, shall be performed outside of normal building operating hours and coordinated in advance with the Owner and Authority Having Jurisdiction, or shall be performed within occupied Lobby areas only when fully separated by temporary screening and protection, as approved by the Owner and Authority Having Jurisdiction. Compliance with this interim milestone is a material requirement of the Contract, and the Contractor shall include all labor, sequencing, coordination, inspections, premium time, and other

COUNTY OF WAKE HOLLY SPRINGS COMM LIBRARY RENOVATION

efforts necessary to satisfy these requirements within the Contract Time. If the Contractor fails to achieve the interim milestone described herein by July 15, the Owner shall be entitled to retain or recover from the Contractor, as liquidated damages and not as a penalty, the sum of Five Hundred Dollars (\$500) per calendar day for each day the interim milestone is not achieved, commencing on July 16 and continuing until the interim milestone is achieved.

The Owner may deduct liquidated damages described above from any unpaid amounts then or thereafter due the Contractor under this Agreement. Should the amount of any liquidated damages exceed the amount due or to become due to the Contractor, then the Contractor and his sureties shall be liable for and shall pay to the Owner the amount of any such excess.”

ARTICLE 29 – TAXES

Paragraph 29.1: Add the following to the existing paragraph:

“The Contractor is to use the Sales Tax Reporting Form attached to the contract documents for reporting taxes paid.

ARTICLE 36. GENERAL

Add the following paragraph:

“36.3 Any specific requirement in this Contract that the responsibilities or obligations of the Contractor also apply to a Subcontractor is added for emphasis and is also hereby deemed to include a Subcontractor of any tier. The omission of a reference to a Subcontractor in connection with any of the Contractor’s responsibilities or obligations shall not be construed to diminish, abrogate, or limit any responsibilities or obligations of a Subcontractor of any tier under the Contract Documents or the applicable subcontract.”

END OF SUPPLEMENTARY GENERAL CONDITIONS

COUNTY OF WAKE HOLLY SPRINGS COMM LIBRARY RENOVATION

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**PART 1 – WAKE COUNTY MINORITY AND WOMEN BUSINESS ENTERPRISE RESOLUTIONS
FOR CONSTRUCTION CONTRACTS
ORIGINAL RESOLUTION FEBRUARY 29, 1988**

1.1 R-02-52

**RESOLUTION UPDATING WAKE COUNTY PROCEDURES
AND POLICIES RELATING TO COUNTY CONSTRUCTION PROJECTS AWARDED
PURSUANT TO N.C.G.S. §143-128 ET SEQ.**

WHEREAS, the North Carolina General Assembly has recently amended Article 8 of N.C.G.S. Chapter 143, Public Contracts, to increase the threshold for public contracts which must be bid, and to make other changes related to construction methods, construction management and minority business participation, and

WHEREAS, Wake County has adopted resolutions directing the County Manager to prepare and maintain minority and women business enterprise programs for all construction projects funded by Wake County (R-88-20) and establishing a verifiable percentage goal for minority business in awarding construction contracts the costs of which exceed one hundred thousand dollars (\$100,000) (R-90-13), and

WHEREAS, recent amendments to N.C.G.S. §143-129(a) have increased the threshold amount of public construction contract which must be bid from one hundred thousand dollars (\$100,000) to three hundred thousand dollars (\$300,000), and

WHEREAS, N.C.G.S. §143-128(a1) has increased the permissible methods that public bodies may use in awarding construction contracts, and

WHEREAS, N.C.G.S. §143-128.2 now requires more extensive efforts and detailed record keeping related to minority business participation in construction projects,

NOW, THEREFORE, BE IT RESOLVED by the Wake County Board of Commissioners

Section 1. That Resolutions R-90-13 and R-88-20 be amended to provide that the County Manager be directed to establish policies and procedures for bidding and awarding County building projects which comport with the requirements of Article 8 of N.C.G.S. Chapter 143, Public Contracts, as it is from time to time amended, and which are consistent with the policies contained in those Resolutions.

1.2 R-90-13

RESOLUTION TO ESTABLISH A VERIFIABLE PERCENTAGE GOAL FOR PARTICIPATION BY MINORITY BUSINESS IN THE AWARDING OF BUILDING CONSTRUCTION CONTRACTS AWARDED PURSUANT TO N.C.G.S. §143-128

WHEREAS, N.C.G.S. §43-128(c) requires each county to adopt, after notice and a public hearing, an appropriate verifiable percentage goal for participation by minority businesses (as defined in that statute) in the total value of work for building contracts the costs of which exceed one hundred thousand dollars (\$100,000) and which are awarded pursuant to N.C.G.S. §143-128; and

WHEREAS, N.C.G.S. §143-128(c)(3) requires a county awarding a building contract the cost of which exceeds one hundred thousand dollars (\$100,000) under a separate prime or separate specification contract system to adopt written guidelines specifying actions that will be taken by the county to ensure a good faith effort in the recruitment and selection of minority businesses for building contracts awarded under the separate prime or separate specification contract system; and

WHEREAS, N.C.G.S. §143-128(c)(4) requires a county awarding a building contract the costs of which exceeds one hundred thousand dollars (\$100,000) under a single-prime contract system to adopt written guidelines specifying the action that the prime contractor must take to ensure a good faith effort in the recruitment and selection of minority businesses for building contracts awarded under the single prime contract system; and requires that action taken by the prime contractor must be documented in writing by the contractor to the County; and

WHEREAS, N.C.G.S. §143-128(b) requires that a county choosing to use a single-prime contract system must also seek bids for a building contract the cost of which exceeds one hundred thousand dollars (\$100,000) under a separate prime or separate specification contract system and must award such building contract to the lowest responsible bidder or bidders for the total project; and

WHEREAS, N.C.G.S. §143-128(d) requires the county to award public building contracts the costs of which exceed one hundred thousand dollars (\$100,000) without regard to race, religion, color, creed, national origin, sex, age or handicapping condition; and

WHEREAS, notice of the public hearing was duly published and the public hearing required by N.C.G.S. §143-128(c) was held February 19, 1990;

NOW THEREFORE, BE IT RESOLVED BY the Wake County Board of Commissioners

Section 1. That Wake County shall have a verifiable goal of ten percent (10%) for participation by minority businesses in building construction contracts awarded pursuant to N.C.G.S. §143-128.

Section 2. That for each such building contract put out for bids under the separate specification or the single prime contract systems, notice of the contract shall be transmitted to

the Minority Business Development Agency in Raleigh, North Carolina and the North Carolina Institute of Minority Economic Development in Durham, North Carolina (hereinafter "minority agencies").

Section 3. That for each such building contract put out for bids under the separate specification or single prime contract systems, documents related to the contract shall be available for inspection at a convenient and accessible location of which minority agencies shall receive notice.

Section 4. That for any such building contract put out for bids under the separate specification contract system, the County shall maintain records with respect to:

- a. those contractors or subcontractors that bid or otherwise respond to notice of the project,
- b. those contractors or subcontractors awarded contracts as part of the project, and
- c. the percentage of work on the project that is to be performed by minority businesses.

Section 5. That for any such building contract put out for bids under the single prime contract system, the single prime contractor shall:

- a. notify appropriate minority businesses of the portion of the project which will be subcontracted by the single contractor and solicit bids from those minority agencies.
- b. submit with his bids records with respect to:
 1. those minority subcontractors notified of the project and of those elements of the project for which subcontracts will be let, and
 2. those minority subcontractors that bid or otherwise respond to notice of the project, and
 3. those minority subcontractors awarded contracts as part of the project, and
 4. the percentage of work on the project that is to be performed by minority businesses.

Section 6. That these policies shall be a part of the request for proposals for any such contract, and noncompliance by any single prime bidder shall be grounds for declaring the bid non-responsive.

Section 7. The County Manager is hereby authorized to impose additional requirements, not inconsistent with the requirements of this resolution and pursuant to the resolution of this Board enacted February 29, 1988, the purposes of which are to promote the goal and intent of this resolution.

Commissioner Heater moved the adoption of the foregoing resolution. Commissioner Ward seconded the motion and, upon vote, the motion passed unanimously this the 19th day of February, 1990.

1.3 R-88-20

**WAKE COUNTY, NORTH CAROLINA MINORITY AND WOMEN BUSINESS
ENTERPRISE RESOLUTION FOR CONSTRUCTION CONTRACTS**

WHEREAS, the Board of County Commissioners of Wake County, North Carolina desires that all segments of the population of Wake County have equal opportunity to compete for contracting and subcontracting work offered by the County; and

WHEREAS, it is in the best interest of Wake County to develop and maintain as large a pool of qualified, prospective contractors to draw upon as possible;

WHEREAS, it is the judgment of the Wake County Board of Commissioners that the County has a compelling interest to implement a minority/women business enterprise program to ensure the representative participation of all segments of the population in the County's economy; and

NOW, THEREFORE, BE IT RESOLVED that the Board of County Commissioners of Wake County declares that it is their policy to provide minorities and women equal opportunity to participate in all aspects of the County's construction program consistent with Chapter 143, Article 8 of the General Statutes of the State of North Carolina.

BE IT FURTHER RESOLVED that the Board of Commissioners of Wake County hereby directs the County Manager to prepare and maintain a minority and women business enterprise program for all construction projects funded by the County.

Upon motion of Commissioner Stout, seconded by Commissioner Zieverink, and upon roll call vote, the Board adopted the above resolution this 29th day of February 1988

PART 2 – MINORITY BUSINESS ENTERPRISE PARTICIPATION IN WAKE COUNTY BUILDING CONSTRUCTION AND REPAIR CONTRACTS

2.1 POLICY STATEMENT

It is the policy of the County to encourage minorities to participate in its building construction, renovation and repair projects.

It is further the policy of the County to prohibit illegal discrimination against any person or business enterprise and to conduct its building construction, renovation and repair programs so as to prevent such discrimination.

It is the policy of the County in concert with other local, state and federal agencies and with the assistance of minority groups and agencies, to seek and identify qualified minority business enterprises (MBEs) and to offer them the opportunity to participate, and to encourage them to participate, in the County's building construction and repair programs. Under this policy, the County adopts the definition of MBEs contained in N.C.G.S. § 143-128.2.

It is the policy of the County to provide information and opportunities to minority business enterprises that are available to other business enterprises, and to establish procedures providing MBEs access to information and opportunities available to other business enterprises.

It is the intent of this policy to secure contractors' participation and ensure competition. Nothing in this policy shall be construed to require contractors or the County to award contracts or subcontracts or to make purchases of materials or equipment from minority business contractors or minority-business subcontractors who do not submit the lowest responsible, responsive bid or bids.

The County will award public building construction and repair contracts to the lowest responsible, responsive bidder as provided by Article 8 of Chapter 143 of the North Carolina General Statutes.

2.2 SCOPE: This Policy Applies To Minority Business, Minority Persons, and Socially and Economically Disadvantaged Individuals. [Ref: N.C.G.S. §143-128.2(g)]

A. A Minority Business (MBE) is a business:

1. In which at least fifty-one percent (51%) is owned by one or more minority persons or socially and economically disadvantaged individuals, or in the case of a corporation, in which at least fifty-one percent (51%) of the stock is owned by one or more minority persons or socially and economically disadvantaged individuals, and
2. Of which the management and daily business operations are controlled by one or more of the minority persons or socially and economically disadvantaged individuals who own it.

- B. A Minority Person¹ is a person who is a citizen or lawful permanent resident of the United States, and who is:
1. Black, that is, a person having origins in any of the black racial groups in Africa;
 2. Hispanic, that is, a person of Spanish or Portuguese culture with origins in Mexico, South or Central America, or the Caribbean Islands, regardless of race;
 3. Asian American, that is, a person having origins in any of the original peoples of the Far East, Southeast Asia and Asia, the Indian subcontinent, the Pacific Islands;
 4. American Indian or Alaskan Native, that is, a person having origins in any of the original peoples of North America; or
 5. Female.
- C. A Socially and Economically Disadvantaged Individual is defined by 15 U.S.C. 637 as a socially disadvantaged individual whose ability to compete in the free enterprise system has been impaired due to diminished capital and credit opportunities as compared to others in the same business area who are not socially disadvantaged. In determining the degree of diminished credit and capital opportunities, the federal government considers factors such as assets and net worth. This category includes members of economically disadvantaged Indian tribes.

2.3 VERIFIABLE GOALS FOR MINORITY BUSINESS ENTERPRISE PARTICIPATION²

- A. County Funded Building Construction or Repair Projects costing \$5000 or more.
1. The County has established a verifiable goal of ten percent (10%) for participation by minority businesses in building construction and repair projects covered by this section. [Ref: N.C.G.S. §143-128.2 (a)]
- B. For Building Construction or Repair Projects Using State Appropriations or Other State Grant Funds Where the Project Cost is Equal to or Greater than One Hundred Thousand Dollars (\$100,000), the County shall use the State's verifiable goal of ten percent (10%) for participation by minority business in building construction and repair projects covered by this section. [Ref: N.C.G.S. §143-128.2 (a)]

PART 3 – REGULATIONS AND PROCEDURES FOR IMPLEMENTING MINORITY BUSINESS ENTERPRISE PARTICIPATION POLICY

3.1 INFORMAL BUILDING PROJECTS: Building construction and repair projects costing more than Five Thousand Dollars (\$5,000), but less than Three Hundred Thousand Dollars (\$300,000).

¹ For building projects funded in whole or in part with federal funds, Hasidic Jews are also considered minority persons.

² Projects funded in whole or in part with federal funds will comply with applicable federal thresholds regarding Minority and Woman Owned Business Enterprises participation.

A. County Responsibilities:

1. Notify Minority Business Enterprises of bidding opportunities by one of the following methods:
 - a) Advertise the project at the Raleigh/Durham/Triad Minority Business Development Center or similar institution, or;
 - b) Advertise the project in an identified Minority Business Enterprise targeted newspaper(s) or;
 - c) Attempt to contact Minority Business Enterprises totaling at least 30% of the total number of vendors contacted [Ref.: N.C.G.S. §143-129. (b)]
2. Record all contractors contacted, along with the list of contractors provided with bidding documents.
3. Identify Minority Business firms contacted and record their minority category.
4. Record all contractors submitting bids, along with the amount of each bid.
5. Within five (5) days of project completion, submit a completed “Informal Construction Project Report Form” to the Wake County Finance Department.
6. The Wake County Finance Department will collect store, and report data and forms referenced in this Section 00600. See Section 3.3

B. Contractor Responsibilities:

1. The Contractor will provide the following documentation, Wake County Form MBE-6, at contract closeout and prior to final payment by the county.
 - a) A list of minority business’s used on the project, identifying the businesses name, type of work performed, and minority category.
 - b) List the dollar amount paid to each minority business and the percentage it represents of the final project value.

3.2 **FORMAL BUILDING PROJECTS:** Building construction and repair projects costing Three Hundred Thousand Dollars (\$300,000) or more.

A. County Responsibilities:

1. Advertise Building Projects. When soliciting bids for formal building construction and repair projects, the county must

- a) Advertise or post notice of bid opportunities to MBE and other potential bidders in trade publications (or whatever it is that we use now) and MBE targeted publications, plans review rooms or newspaper(s) with general circulation at least fourteen (14) days prior to the scheduled bid opening date. [Ref: N.C.G.S. §143-128.2(e)(3)]
 - b) Include the following in each advertisement or notice published: (i) a description of the work for which the bid is being solicited; (ii) the date, time, and location where bids are to be submitted; (iii) the name of the individual within the public entity who will be available to answer questions about the project; (iv) where bid documents may be reviewed; (v) notice of the date, time, and location of the prebid conference. [Ref: N.C.G.S. §143-128.2(e)(3)]
2. Hold a prebid conference prior to bid opening for each project and assure a County representative is in attendance. [Ref: N.C.G.S. §143-128.2(e)(2)]
3. Allow contractors to obtain, at least 10 days before the bid date, a complete set of Bidding Documents by providing a refundable deposit as outlined in the project Advertisement or published notice. Deposits will be refunded as stipulated in the Bidding Documents. [Ref: N.C.G.S. §143-128.2(e)(2)]
4. Include in the bidding documents for each project the following forms and a statement that all contractors submitting bids must include all applicable forms, fully completed, and that failure to file required forms with bids may be grounds for rejection of the bid. [Ref: N.C.G.S. §143-128.2. (c)(1)b.]
 - a) Wake County Form MBE-1, identifying minority business participation;
 - b) Wake County Form MBE-2, affidavit listing contractor's good faith efforts to meet the 10% goal for MBE participation, including any advertisements, solicitations, and evidence of other specific actions to recruit minority businesses for participation in the project;
 - c) Wake County Form MBE-3, affidavit evidencing contractor's intent to perform all contract work with its own workforce; and
 - d) A copy of the County's MBE policy and procedures.
5. Maintain all public records created for each project, including all records and documentation relating to MBE procedures, for a period of three years from the date of project completion. See Section 3.3. [Ref: N.C.G.S. §143-128.2(i)]
6. In any building or repair project financed in whole or in part with federal funds, the County must include a statement that all federal guidelines associated with the source of the federal funds must be complied with. For example, projects funded by HUD must comply with all requirements of 24 CFR §135.

B. Contractor Responsibilities:

1. All bidders on formal building construction or repair projects shall undertake a good faith effort to recruit minority businesses and provide documentation of meeting the minimum requirements of N.C. Gen. Stat. § 143-128.2.
 - a) Failure to comply with these procedural requirements and requirements for submittal of information in the Request for Proposals may render the bid non-responsive and may result in rejection of the bid. [Ref: N.C.G.S. §143-128.2.(c)(1)]
 - b) All contractors, including first-tier subcontractors on construction manager at risk projects, that do not propose to do all of the contract work with their own workforce must advertise for minority subcontractor, vendors and suppliers at least ten days prior to submission of the contractor's bid. [Ref: N.C.G.S. §143-128.2.(f)(1)]
2. Each bidder, including first-tier subcontractors for construction manager at risk projects, must submit a completed Wake County Form MBE-1 and Wake County Form MBE-2. A contractor, including a first-tier subcontractor on a construction manager at risk project, that performs all of the work under a contract with its own workforce may submit a Wake County Form MBE-3 in lieu of Wake County Form MBE-2 otherwise required under this subsection. [Ref: N.C.G.S. §143-128.2.(c)]
3. The apparent lowest responsible, responsive bidder, must submit the following documents within 72 hours after notification of being the low bidder:
 - a) Form Wake County Form MBE-4, an affidavit that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than 10% of the total cost of the contract; or
 - b) Form Wake County Form MBE-5, documentation of good faith effort to recruit MBE participation in the project, including any advertisements, solicitations, and evidence of other specific actions demonstrating recruitment of minority businesses for participation in the project. [Ref: N.C.G.S. §143-128.2.(c)(1)]
4. Within 30 days after the award of the contract, or sooner if stipulated in the Bidding Documents, the contractor shall provide to the County with a list of all subcontractors that the contractor will use on the project. [Ref: N.C.G.S. §143-128.2.(c)(2)]
5. During the construction of a project, if it becomes necessary to replace an MBE subcontractor, the prime contractor shall advise the Owner in writing. No MBE subcontractor may be replaced with a different subcontractor except for the following:
 - a) If the subcontractor's bid is later determined by the contractor or construction manager at risk to be nonresponsible or nonresponsive, or the listed subcontractor refuses to enter into a contract for the complete performance of the bid work; or

- b) With the approval of the County for good cause. [Ref: N.C.G.S. §143-128.2.(d)]

Prior to substituting a subcontractor, the contractor shall identify the substitute subcontractor and inform the County, in writing, of its good faith efforts to replace with another MBE Subcontractor. Good faith efforts as set forth in N.C.G.S. § 143-131(b) apply to the selection of a substitute subcontractor. [Ref: N.C.G.S. §143-128.2(d)]

- 6. Prior to the final payment being due to the contractor Wake County Form MBE 6, which provides certification of actual work performed by Minority Businesses, must be submitted

3.3 COUNTY RECORD KEEPING PROCEDURES FOR MONITORING CONTRACTOR COMPLIANCE ON COUNTY BUILDING CONSTRUCTION AND REPAIR PROJECTS.

- A. **FORMAL CONTRACTS.** The County shall maintain for three years from project completion date all records with respect to:

- 1. Those contractors notified or solicited for each building construction or repair projects, noting all that are minority businesses and their minority category.
- 2. Those contractors that bid or otherwise responded to advertisements or notices of building construction or repair projects, noting all that are minority businesses and their minority category.
- 3. Prime contracts awarded, the amount of the contracts, identity of those that are minority business.
- 4. The subcontractors utilized on projects, identity of minority subcontractors, type work performed by minority subcontractors amount paid minority businesses as reported by the prime contractor(s) awarded the bid.
- 5. The percentage of work on the project performed by minority businesses as reported by the prime contractor. [Ref: N.C.G.S. §143-128.2(i)]

- B. **INFORMAL CONTRACTS:** Documents required to be kept by the County under this section will be maintained in the County Finance Department.

- 1. The requirements for record keeping for Informal Contracts is the same as for Formal Contracts listed above.

3.4 COMPLAINT PROCEDURES.

A. Formal and Informal Contracts:

1. Alleged violations of the provisions of this MBE plan by any party should be reported in writing to the County Manager or his/her designee.
2. The County Manager or his/her designee shall review all facts available and respond in writing. Unresolved complaints may be presented to the Board of County Commissioners. The decision rendered by the Board will be final.

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Attach to Bid

Wake County Form MBE-1 (2002)

Identification of Minority Business Participation

I, _____ (Bidder)

do hereby certify that on this project we will use the following minority business enterprises as construction subcontractors, vendors, suppliers or providers of professional services.

[illegible]

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

The total value of minority business contracting will be (\$)_____.

Attach to Bid

Wake County – Form MBE-2 (2002)

Listing of the Good Faith Effort

Affidavit of _____
(Name of Bidder)

I have made a good faith effort to comply under the following areas checked:

Bidders must earn at least 50 points from the good faith efforts listed for their bid to be considered responsive. (1 NC Administrative Code 30 I.0101)

- ☐ ☐ **1 – (10 pts)** Contacted minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor, or available on State or local government maintained lists, at least 10 days before the bid date and notified them of the nature and scope of the work to be performed.
- ☐ ☐ **2. – (10 pts)** Made the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bids are due.
- ☐ ☐ **3 - (15 pts)** Broken down or combined elements of work into economically feasible units to facilitate minority participation.
- ☐ ☐ **4 - (10 pts)** Worked with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- ☐ ☐ **5 - (10 pts)** Attended prebid meetings scheduled by the public owner.
- ☐ ☐ **6 - (20 pts)** Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.
- ☐ ☐ **7 - (15 pts)** Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- ☐ ☐ **8 - (25 pts)** Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- ☐ ☐ **9 - (20 pts)** Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
- ☐ ☐ **10 - (20 pts)** Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash flow demands.

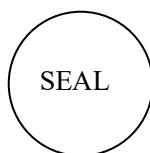
The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority Business Participation schedule conditional upon scope of contract to be executed with the Owner. Substitution of contractors must be in accordance with GS 143-128.2(d). Failure to abide by this statutory provision will constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of the minority business commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____



State of North Carolina, County of _____

Subscribed and sworn to before me this _____ day of _____ 20 _____

Notary Public _____

My commission expires _____

Attach to Bid Only if Bidder Performs All Work With Own Workforces

Wake County Form MBE-3 (2002)

Intent to Perform Contract with Own Workforce

Affidavit of _____
(Name of Bidder)

I hereby certify that it is our intent to perform 100% of the work required for the project

(Name of Project)

In making this certification, the Bidder states that the Bidder does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform all elements of the work on this project with his/her own current work forces; and

The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement.

The undersigned hereby certifies that he or she has read this certification and is authorized to bind the Bidder to the commitments herein contained.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____



State of North Carolina, County of _____

Subscribed and sworn to before me this _____ day of _____ 20____

Notary Public _____

My commission expires _____

Wake County Form MBE-4 (2002)

Portion of the Work to be Performed by Minority Firms

**** (NOTE: THIS FORM IS NOT TO BE SUBMITTED WITH THE BID PROPOSAL) ****

If the portion of the work to be executed by minority businesses as defined in GS143-128.2(g) is equal to or greater than 10% of the bidders total contract price, then the bidder must complete this affidavit. This affidavit shall be provided, to the Owner, by the apparent lowest responsible, responsive bidder within 72 hours after notification of being the apparent low bidder.

Affidavit of _____ I do hereby certify that on the
(Bidder Name)

(Project Name)

Project ID# _____ Amount of Bid \$ _____

I will expend a minimum of _____ % of the total dollar amount of the contract with minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below.

Attach additional sheets if required

Name and Phone Number	*Minority Category	Work description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____



State of North Carolina, County of _____

Subscribed and sworn to before me this _____ day of _____ 2002

Notary Public _____

My commission expires _____

Wake County Form MBE-5 (2002)

Good Faith Efforts

**** (NOTE: THIS FORM IS NOT TO BE SUBMITTED WITH THE BID PROPOSAL) ****

If the goal of 10% participation by minority business is not achieved, this affidavit shall be provided, to the Owner apparent lowest responsible, responsive bidder within 72 hours after notification of being the apparent low bidder.

Affidavit of: _____

(Bidder)

I do certify the attached documentation as true and accurate representation of my good faith efforts.

(Attach additional sheets if required)

Name and Phone Number	*Minority Category	Work Description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

Documentation of the Bidder's good faith efforts to meet the goals set forth in these provisions. Examples of documentation include, but are not limited to, the following evidence:

- A. Copies of solicitations for quotes to at least three (3) minority business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to be subcontracted, location where bid documents can be reviewed, representative of the Prime Bidder to contact, and location, date and time when quotes must be received.
- B. Copies of quotes or responses received from each firm responding to the solicitation.
- C. A telephone log of follow-up calls to each firm sent a solicitation.
- D. For subcontracts where a minority business firm is not considered the lowest responsible sub-bidder, copies of quotes received from all firms submitting quotes for that particular subcontract.
- E. Documentation of any contacts or correspondence to minority business, community, or contractor organizations in an attempt to meet the goal.
- F. Copy of pre-bid roster.
- G. Letter documenting efforts to provide assistance in obtaining required bonding or insurance for minority business.
- H. Letter detailing reasons for rejection of minority business due to lack of qualification.
- I. Letter documenting proposed assistance offered to minority business in need of equipment, loan capital, lines of credit, or c joint pay agreements to secure loans, supplies, or letter of credit, including waiving credit that is ordinarily required.

Failure to provide the documentation as listed in these provisions may result in rejection of the bid and award to the next lowest responsible and responsive bidder.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____



State of North Carolina, County of _____

Subscribed and sworn to before me this _____ day of _____ 20 _____

Notary Public _____

My commission expires _____

Wake County FORM MBE-6 (2002)

CERTIFICATION of Actual Work Performed by Minority Businesses

NOTE: THIS FORM IS TO BE SUBMITTED PRIOR TO FINAL PAYMENT BEING DUE THE CONTRACTOR

Affidavit of _____
(Contractor Name)

(Project Name)

Project ID# _____ Final Contract Amount \$ _____

I do hereby certify that _____% of the total dollar amount of the contract was performed with minority business. Such work was subcontracted to the firms listed below.

Attach additional sheets if required

Name and Phone Number	*Minority Category	Work description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

The undersigned hereby certifies that above information is correct to the best of his/her knowledge, information and belief.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____



State of North Carolina, County of _____

Subscribed and sworn to before me this _____ day of _____ 2002

Notary Public _____

My commission expires _____

APPENDIX A
TO GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION
DISPUTE RESOLUTION PROCEDURES FOR WAKE COUNTY BUILDING
CONSTRUCTION RENOVATION AND REPAIR PROJECTS

Table of Rules

Rule

- 1. Initiating Mediated Settlement Conferences**
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 - B. Initiating the Dispute Resolution Process
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RULE 1. INITIATING MEDIATED SETTLEMENT CONFERENCES

- A. Purpose of Mandatory Settlement Conferences.** Pursuant to G.S. §143-128(f1) and 143-135.26(11), these Rules are promulgated to implement a mediated settlement program designed to focus the parties' attention on settlement rather than on claim preparation and to provide an opportunity for orderly settlement negotiations to take place. Nothing herein is intended to limit or prevent the parties from engaging in settlement procedures voluntarily at any time prior to or during commencement of the dispute resolution process.
- B. Initiating the Dispute Resolution Process**
- 1) Any party to a County public construction contract (referred to herein generally as the "Contract") governed by Article 8. Ch. 143 of the General Statutes and identified in G.S. § 143-128(f1) and who is a party to a dispute arising out of the Contract and the construction process in which the amount in controversy is at least \$15,000 may submit a written request to the County for mediation of the dispute.
- 2) Prior to submission of a written request for mediation to the County, the parties should give notice of any and all claims in accordance with their respective contracts, obtain decisions on the claims as required or allowed by their respective contracts, and attempt to resolve the dispute according to the terms and conditions in their respective contracts. The Mediator may adjourn any mediated settlement conference if the Mediator believes, in his or her sole discretion, that the parties have not satisfied all of the terms and conditions of their respective contracts and that doing so will enhance the prospects for a negotiated settlement.
- C. Condition Precedent to Litigation.** Before any party to a Contract may commence a civil action against the County seeking remedies for breach or non-performance of the Contract by the County, said party must first initiate the dispute resolution process under these rules and attend the mediated settlement conference.

RULE 2. SELECTION OF MEDIATOR

- A. Mediator Listing.** A list of Mediators acceptable to the County is attached to and incorporated by reference into these Rules. The party requesting mediation shall select a Mediator from the designated list. If the County fails to provide a list of acceptable mediators, the list of Mediators shall be deemed to be the list of mediators certified by the North Carolina Dispute Resolution Commission to conduct mediated settlement conferences in the North Carolina Superior Courts.
- B. Selection of a Mediator.** The party requesting mediation shall select a Mediator from the County's list of Mediators and shall file, with the County, a Notice of Selection of Mediator within 21 days of the request for mediation. Such notice shall state the name, address, and phone number of the Mediator selected. If the Mediator selected is not available or declines to participate for any reason, the requesting party shall select another person from the County's list of Mediators. If the party requesting mediation does not select and designate a mediator within 21

days of the request for mediation, the County shall have the right in its absolute discretion to appoint a mediator from its list of Mediators.

- C. **Disqualification of Mediator.** Any party may request replacement of the Mediator for good cause. Nothing in this provision shall preclude Mediators from disqualifying themselves.

RULE 3. THE MEDIATED SETTLEMENT CONFERENCE

- A. **Where Conference is to be Held.** Unless all parties and the Mediator otherwise agree, the mediated settlement conference shall be held in Wake County. The Mediator shall be responsible for reserving a place, making arrangements for the conference, and giving timely notice of the time and location of the conference to all attorneys, unrepresented parties and other persons or entities required to attend.
- B. **When Conference is to be Held.** The mediation shall be completed within 90 days after selection of the Mediator.
- C. **Request to Accelerate or Extend Deadline for Completion.** Any party or the Mediator may request the County to accelerate or extend the deadline for completion of the conference. Such request shall state the reasons the extension is sought and shall be served by the moving party upon the other parties and the Mediator. Objections to the request must be promptly communicated to the County and to the Mediator.

The County, with the concurrence of the designated Mediator, may grant the request by adjusting the time for completion of the conference.

- D. **Recesses.** The Mediator may recess the mediation conference at any time and may set times for reconvening. If the Mediator determines the time and place where the conference is to reconvene before the conference is recessed, no further notice is required to persons present at the conference.
- E. **Project Delay.** The mediated settlement conference that results from a construction contract dispute shall not be cause for the delay of the construction project.

RULE 4. DUTIES OF PARTIES AND OTHER PARTICIPANTS IN FORMAL DISPUTE RESOLUTION PROCESS

- A. **Attendance.**
 - 1. All parties to the dispute must designate an official representative to attend the mediation. .
 - 2. “Attendance” means physical attendance, not by telephone or other electronic means. Any attendee representing a party must have authority from that party to bind it to any agreement reached as a result of the mediation.

3. Attorneys representing parties may attend the mediation, but are not required to do so.
 4. Sureties and insurance company representatives are required to physically attend the mediation unless the Mediator and all of the other parties to the mediation excuse their attendance or consent to their attendance by telephone or other electronic means.
 5. The parties who attend a duly scheduled mediation conference shall have the right to recover their share of the Mediator's compensation from any party or parties who fail to attend the conference without good cause.
- B. Finalizing Agreement.** If an agreement is reached in the conference, the terms of the agreement shall be confirmed in writing and signed by all parties.
- C. Mediation Fees** charged by the Mediator shall be paid in accordance with G.S. § 143-128(f1).
- D. Failure to compensate Mediator.** Any party's failure to compensate the Mediators in accordance with G.S. § 143-128(f1) shall subject that party to a withholding of said amount of money from the party's monthly payment by the County.

Should the County fail to compensate the Mediator, it shall hereby be subject to a civil cause of action from the Mediator for the 1/3 portion of the Mediator's total fee as required by G.S. § 143-128(f1).

RULE 5. AUTHORITY AND DUTIES OF MEDIATORS

A. Authority of Mediator.

1. **Control of Conference.** The Mediator shall at all times be in control of the conference and the procedures to be followed.
2. **Private Consultation.** The Mediator may communicate privately with any participant or counsel prior to and during the conference. The fact that private communications have occurred with a participant shall be disclosed to all other participants at the beginning of the conference.
3. **Scheduling the Conference.** The Mediator shall make a good faith effort to schedule the conference at a time that is convenient with the participants, attorneys and Mediator. In the absence of agreement, the Mediator shall select the date for the conference.
4. **Determining good cause for a party's failure to appear at a scheduled mediation conference.**

B. Duties of Mediator.

1. The Mediator shall define and describe the following at the beginning of the conference:
 - a. The process of mediation.
 - b. The difference between mediation and other forms of conflict resolution.
 - c. The costs of the mediated settlement conference.
 - d. That the mediated settlement conference is not a trial, the Mediator is not a judge, and the parties retain their legal rights if they do not reach settlement; however, the Mediator will advise all parties that failure to appear at mediation without good cause may result in imposition of sanctions and may be asserted as a bar to lawsuits by claimants who have failed to exhaust this administrative remedy.
 - e. The circumstances under which the Mediator may meet and communicate privately with any of the parties or with any other person.
 - f. Whether and under what conditions communications with the Mediator will be held in confidence during the conference.
 - g. The inadmissibility of conduct and statements as provided by G.S. §7A-38.1(1).
 - h. The duties and responsibilities of the Mediator and the participants.
 - i. That any agreement reached will be reached by mutual consent.
2. Disclosure: The Mediator has a duty to be impartial and to advise all participants of any possible bias, prejudice or partiality.
3. Declaring Impasse: The Mediator may determine at any time during the mediation conference that an impasse exists and that the conference should end.
4. Reporting Results of Conference. The Mediator shall submit a written report to the County and the other parties within 10 days of the conference stating whether or not the parties reached an agreement. The Mediator's report shall indicate the absence of any party from the mediated settlement conference without permission or good cause.
5. Scheduling and Holding the Conference. It is the duty of the Mediator to schedule the conference and conduct it prior to the deadline of completion set by the rules. The Mediator shall strictly observe deadlines for completion of the conference unless said time limit is changed by agreement of the parties.

RULE 6. COMPENSATION OF THE MEDIATOR

- A.** The parties shall compensate the Mediator for mediation services at the rate proposed by the Mediator and agreed to by the parties at the time the Mediator is selected. .

RULE 7. RULE MAKING

- A. These Rules may be amended by the County at any time. Amendments will not affect mediations where claims and/or requests for mediation have been filed at the time the amendment takes effect

RULE 8. DEFINITIONS

- A. “County” shall mean the County of Wake, North Carolina
- B. “Project Designer” is that person or firm stipulated as project designer in the Contract Documents for the project.
- C. “Claim” is a demand or assertion by a party seeking adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract. The term “Claim” also includes other disputes and matters in question between the parties to a Contract involved in the County’s building construction renovation and repair projects arising out of or relating to the Contract or the construction process. Claims must be initiated by a written notice. The responsibility to substantiate Claims shall rest with the party making the Claim.
- D. “Good Cause” generally includes any circumstance beyond the control of a party, which prevents that party from meeting obligations. When good cause is asserted as an excuse for a party’s failure to appear at a mediation conference or to otherwise comply with the requirements of these Rules, the Mediator, in his or her sole discretion, will determine whether good cause exists to excuse the party’s failure to appear or otherwise comply with these rules.

RULE 9. TIME LIMITS

- A. Any time limit provided for by these Rules may be waived or extended at the sole discretion of the County, if no Mediator has been selected, and at the discretion of the County with concurrence of the Mediator if a Mediator has been selected.

MEDIATOR LIST

Name	Bar #	Address	Phone	Fax	Email
David M. Barnes	12854	PO Box 10096 Raleigh, NC 27605	919-783-2812	919-783-1075	dmbarnes@poynerspruill.com
Robert Beason	5502	PO Box 52270 Durham, NC 27717	919-419-8979	919-403-8533	rbeason@beasonellis.com
William A. Blancato	12729	633 W. 4 TH Street, Suite 150 Winston-Salem, NC 27101	336-725-9416	336-725-5129	blancato@bdl-law.com
Richard T. Boyette	7623	PO Box 27808 Raleigh, NC 27611	919-828-5100	919-828-2277	rtb@cshlaw.com
Jacqueline R. Clare	10277	1011 Vance Street Raleigh, NC 27608	919-755-9979	919-755-9512	jclare@mindspring.com
Thomas C. Duncan	1255	PO Box 989 Greensboro, NC 27402	910-379-1390	910-379-1198	duncan@hillevans.com
Sidney Smith Eagles	1271	PO Box 27525 Raleigh, NC 27611	919-755-8771	919-755-8800	sid.eagles@smithmoorelaw.com
Rene Stemple Ellis	DC/PA	PO Box 52270 Durham, NC 27712	919-417-9979	919-403-8533	rellis@beasonellis.com
Marshall Gallop	6626	PO Box 7100 Rocky Mount, NC 27804	252-937-2200	252-937-8100	mgallop@bwsb.com
Allen Holt Gwyn		PO Box 20744 Greensboro, NC 27420	336-691-9222	336-691-9259	ahgwyn@cgspllc.com
Jonathan R. Harkavy	5238	PO Box 29269 Greensboro, NC 27429	336-370-4200	336-274-8490	jharkavy@aol.com
Joseph R. John	2361	11800 Black Horse Run Raleigh, NC 27613	919-676-8796	919-676-8796	jo638sr@aol.com
J. Anderson Little	6730	PO Box 16205 Chapel Hill, NC 27514	919-967-6611	919-967-3212	jandersonlittle@nc.rr.com
James D. Llewellyn	2732	PO Box 567 Atlantic Beach, NC 28512	252-559-2714	252-726-1973	judgelew@embarqmail.com
Charles K. McCotter		PO Box 12800 Newbern, NC 28561-2800	252-635-1005	252-635-5050	ckm@justice.com
Peter M. McHugh	6269	915 Country Club Drive Reidsville, NC 27320	336-361-9557	336-361-9569	pmchugh@triad.rr.com
Charles E. Nichols	10448	PO Box 20389 Raleigh, NC 27619-0389	919-787-8800	919-781-0811	nichols@manningfulton.com
Jeffrey B. Parsons	16006	PO Box 30933 Raleigh, NC 27622	919-789-9242	919-789-9242	jparsons@cgspllc.com
J. Dickson Phillips	8941	PO Drawer 4825 Chapel Hill, NC 27515	919-967-8989	919-419-1429	dphillips@lapgh.com
Lacy M. Presnell	7272	PO Box 10867 Raleigh, NC 27605	919-782-1441	919-782-2311	lpresnell@bdppa.com

MEDIATOR LIST

Name	Bar #	Address	Phone	Fax	Email
John L. Shaw	3950	PO Box 10096 Raleigh, NC 27605	919-783-6400	919-783-1075	jshaw@poynerspruill.com
Edwin M. Speas	4112	PO Box 10096 Raleigh, NC 27607	919-783-6400	919-783-1075	espeas@poynerspruill.com
Odes L. Stroupe	4983	3105 Glenwood Ave., Suite 300 Raleigh, NC 27612	919-881-0338	919-881-9548	stroupe@bcs-law.com
Arthur A. Vreeland	6899	4 Parkmont Court Greensboro, NC 27408	336-288-7500	336-288-7500	aavreeland@aol.com
Charles P. Younce	4891	PO Box 3486 Greensboro, NC 27402	336-379-0123	336-379-9894	cyounce@jymmlaw.com
Julia F. Youngman	21320	PO Box 33550 Raleigh, NC 27636	919-865-7000	919-865-7010	julie_youngman@elliswinters.com

SECTION 01 10 00 - SUMMARY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Owner-furnished products.
 - 4. Access to site.
 - 5. Work restrictions.
 - 6. Specification and Drawing conventions.

1.3 PROJECT INFORMATION

- A Project Identification: Wake County Holly Springs Library.
 - 1. Project Location: 300 West Ballentine Street, Holly Springs, North Carolina 27540.
- B Owner: Wake County.
 - 1. Owner's Representative: Sarah Richter.
- C Architects:
 - 1. Little Diversified Architectural Consulting.
 - a. Architect's Representative: Jackie Tomlin.
- D Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:
 - 1. Little Diversified Architectural Consulting:
 - a. Mechanical and Plumbing Representative: Jacob Jones.
 - b. Electrical Representative: Brendon Elliott.
 - c. Landscape Representative: Hannah Barefoot.
 - d. Representative: Madison Sweitzer.
- E Web-Based Project Software: Project software will be used for purposes of managing communication and documents during the construction stage.
 - 1. See Section 01 31 00 Project Management and Coordination for requirements for using web-based Project software.
- F Web-Based Project Software: Project software will be used for purposes of managing communication and documents during the construction stage.
 - 1. See Section 01 31 00 Project Management and Coordination for requirements for using web-based Project software.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A The work of the Project is defined by the Contract Documents and consists of the following:
 - 1. Major renovation to existing Library including removal of existing exterior doors and replacing or infilling and providing an opening for a new exterior door.
 - 2. During the month of August, the Owner will be replacing the Library's HVAC system (under a separate contract and not Work of this Contract). The Contractor will be required to rent, arrange delivery, set-up, provide operation support as necessary, and arrange the return of air-cooled spot coolers for temporary cooling for the unoccupied Library and occupied Lobby and Restrooms. A lump sum allowance as specified in Section 01 21 00 Allowances has been established for these coolers.
- B Type of Contract:
 - 1. Project will be constructed under a single prime contract.

- C United States Sanctions on Russia: In support of the US Sanctions on Russia, the use of products and materials from Russian companies or companies on Russian sanctions list, or that are associated with the Russian Government, are prohibited from use.

1.5 WORK UNDER OWNER'S SEPARATE CONTRACTS

- A Work with Separate Contractors: Cooperate fully with Owner's separate contractors, so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under Owner's separate contracts.

1.6 ACCESS TO SITE

- A Restricted Use of Site: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B Limits on Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Limits on Use of Site: Confine construction operations to areas indicated.
 - 2. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.7 COORDINATION WITH OCCUPANTS

- A Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
 - 2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.8 WORK RESTRICTIONS

- A Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B On-Site Work Hours: Limit work to normal business working hours as required by Authority Having Jurisdiction, Monday through Friday, unless otherwise indicated.
- C Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
 - 1. Notify Architect and Owner not less than three days in advance of proposed utility interruptions.
 - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 - 1. Notify Architect and Owner not less than three days in advance of proposed disruptive operations.
 - 2. Obtain Owner's written permission before proceeding with disruptive operations.

- E Restricted Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

- A Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations scheduled on the Drawings.
 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 10 00

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SECTION 01 21 00 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances. Types of allowances include the following:
 - 1. Lump-sum cash allowances.
 - 2. Quantity allowances.
 - 3. Contingency cash allowances.
- B. Related Requirements:
 - 1. Section 01 10 00 Summary.
 - 2. Section 01 22 00 Unit Prices.

1.3 DEFINITIONS

- A. Allowance is a quantity of work or dollar amount established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

1.4 SELECTION AND PURCHASE

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

1.5 ACTION SUBMITTALS

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

1.6 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.7 LUMP-SUM CASH ALLOWANCES

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

1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.
 - D. At Project closeout, credit unused amounts remaining in the lump sum cash allowance to Owner by Change Order.
- 1.8 QUANTITY ALLOWANCES
- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.
 - B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.
 - C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.
- 1.9 CONTINGENCY CASH ALLOWANCES
- A. Use the contingency cash allowance to cover minor, unforeseen items of work arising during construction and only as directed by Architect with approval by the Owner.
 1. This allowance will not cover errors or omissions by the Contractor.
 - B. At Project closeout, credit unused amounts remaining in the contingency cash allowance to Owner.
- 1.10 ADJUSTMENT OF ALLOWANCES
- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
 3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
 - B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No. 01: Lump-Sum, Cash Allowance, Data and Low-Voltage Infrastructure: Include the sum of \$35,000.00 to provide an allowance in the bid price for the selected General Contractor to perform a separate bid once the Project commences. The results of the data and low-voltage infrastructure bid will be deducted from this allowance.
- B. Allowance No. 02: Lump-Sum, Cash Allowance, Building Security System: Include the sum of \$81,000.00 to provide an allowance in the bid price for the selected General Contractor to perform a separate bid once the Project commences. The results of the building security bid will be deducted from this allowance.
- C. Allowance No. 03: Lump-Sum, Cash Allowance, Interior Signage: Include the sum of \$50,000.00 to provide an allowance in the bid price for the selected General Contractor to perform a separate bid once the Project commences. The results of the building security bid will be deducted from this allowance.
- D. Allowance No. 04: Lump Sum Cash Allowance: Include the sum of \$30,000.00 for temporary cooling equipment to maintain the unoccupied Library space the Occupied Lobby and Restrooms at 75 deg F and 60 percent relative humidity during an approximate 1 month air-handler shutdown this summer due to a separate HVAC replacement project.
- E. Allowance No. 05: Contingency Cash Allowance: Include a contingency allowance of \$40,000.00 for use according to Owner's written instructions.
 - 1. Allowance is intended for permitting costs, additional quantities of defined unit price items, or minor, unforeseen items of work arising during construction.
- F. Allowances, Roof Repair (Alternate No. 2):
 - 1. RR Allowance No. 01: Quantity Allowance: Include repair of 800 SF of corroded steel deck (Corrosion Degree 1) with coating.
 - a. Coordinate quantity allowance adjustment with corresponding unit-price requirements in Section 01 22 00 Unit Prices.
 - 2. RR Allowance No. 02: Quantity Allowance: Include repair of 800 SF of steel deck (Corrosion Degree 2) with steel plates.
 - a. Coordinate quantity allowance adjustment with corresponding unit-price requirements in Section 01 22 00 Unit Prices.
 - 3. RR Allowance No. 03: Quantity Allowance: Include replacement of 800 SF of deteriorated steel deck (Corrosion Degree 4).
 - a. Coordinate quantity allowance adjustment with corresponding unit-price requirements in Section 01 22 00 Unit Prices.
 - 4. RR Allowance No. 04: Quantity Allowance: Include replacement of 100 BF of deteriorated wood blocking.
 - a. Coordinate quantity allowance adjustment with corresponding unit-price requirements in Section 01 22 00 Unit Prices.
 - 5. RR Allowance No. 05: Quantity Allowance: Include replacement of 250 SF of deteriorated plywood.
 - a. Coordinate quantity allowance adjustment with corresponding unit-price requirements in Section 01 22 00 Unit Prices.
 - 6. RR Allowance No. 06: Contingency Cash Allowance: Include a contingency allowance of \$83,175.00.

END OF SECTION 01 21 00

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SECTION 01 22 00 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.

1.3 DEFINITIONS

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

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- C. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

- A. Unit Prices, Roof Repair (Alternate No. 2).
 - 1. RR Unit Price No. 1: Steel Deck Repair.
 - a. Description: Repair corroded steel deck (Corrosion Degree 1) with coating. Refer to Section 05 01 30 Steel Roof Deck Repair and Securement.
 - b. Method of Measurement: Quantities will be verified by Architect in the field.
 - c. Unit of Measurement: Square Foot (SF).
 - 2. RR Unit Price No. 2: Steel Deck Repair.
 - a. Description: Repair steel deck (Corrosion Degree 2) with steel plates. Refer to Section 05 01 30 Steel Roof Deck Repair and Securement.
 - b. Method of Measurement: Quantities will be verified by Architect in the field.
 - c. Unit of Measurement: Square Foot (SF).
 - 3. RR Unit Price No. 3: Steel Deck Overlay.
 - a. Description: Overlay deteriorated steel deck (Corrosion Degree 3) with steel deck. Refer to Section 05 01 30 Steel Roof Deck Repair and Securement.
 - b. Method of Measurement: Quantities will be verified by Architect in the field.
 - c. Unit of Measurement: Square Foot (SF).
 - 4. RR Unit Price No. 4: Steel Deck Replacement.
 - a. Replace deteriorated steel deck (Corrosion Degree 4). Refer to Section 05 01 30 Steel Roof Deck Repair and Securement.
 - b. Method of Measurement: Quantities will be verified by Architect in the field.
 - c. Unit of Measurement: Square Foot (SF).
 - 5. RR Unit Price No. 5: Wood Blocking Replacement.
 - a. Replace deteriorated wood blocking. Refer to Section 06 10 00 Rough Carpentry.
 - b. Method of Measurement: Quantities will be verified by Architect in the field.

- c. Unit of Measurement: Board Foot (BF).
- 6. RR Unit Price No. 6: Plywood Replacement.
 - a. Replace deteriorated plywood. Refer to Section 06 10 00 Rough Carpentry.
 - b. Method of Measurement: Quantities will be verified by Architect in the field.
 - c. Unit of Measurement: Square Foot (SF).

END OF SECTION 01 22 00

SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

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

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other work of the Contract.
- C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 1: Lobby Renovations.
 - 1. Base Bid: No renovation scope for Library Lobby.
 - 2. Alternate: Include renovation to Library Lobby with specified materials required for the work and as indicated on the Drawings.
- B. Alternate No. 2: Roof Replacement.
 - 1. Base Bid: Existing roof to remain.
 - 2. Alternate: Provide new roof with specified materials required for the work and as indicated on the Drawings.
- C. Alternate No. 3: Staff Entrance Canopy.
 - 1. Base Bid: No canopy.
 - 2. Alternate: Provide canopy as specified in Section 10 73 16 Metal Canopies and as indicated on the Drawings.

END OF SECTION 01 23 00

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SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section includes administrative and procedural requirements for substitutions.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

- A Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use form acceptable to Architect.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
 - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
 - h. Research reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - i. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.

- k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
- l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
- 3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Forms of Acceptance: Change Order or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

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

1.6 PROCEDURES

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

1.7 SUBSTITUTIONS

- A Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
 - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B Substitutions for Convenience: Not allowed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 25 00

SUBSTITUTION REQUEST

(During the Bid Period)

Project: _____ Substitution Request Number: _____

From: _____
To: _____ Date: _____

A/E Project Number: _____
Re: _____ Contract For: _____

Specification Title: _____ Description: _____
Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____
Manufacturer: _____ Address: _____ Phone: _____
Trade Name: _____ Model No.: _____

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

A/E's REVIEW AND ACTION

- ☐ Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: _____

Date: _____

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

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SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 MINOR CHANGES IN THE WORK

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

1.4 PROPOSAL REQUESTS

- A Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use forms acceptable to Architect.
- B Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect].
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Include costs of labor and supervision directly attributable to the change.
 - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - 6. Comply with requirements in Section 01 25 00 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
- C Proposal Request Form: Use AIA Document G709 for Proposal Requests.

1.5 CHANGE ORDER PROCEDURES

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

1.6 CONSTRUCTION CHANGE DIRECTIVE

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

END OF SECTION 01 26 00

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

- A Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule. Include the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
 - 3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
 - 4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
 - 5. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract, as described in Section 01 10 00 Summary.
- B Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's Project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Arrange schedule of values consistent with format of AIA Document G703.
 - 3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.

- g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment.
4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
9. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Owner's representative and Architect and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
 1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.
- C Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- D Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Owner's representative and Architect will return incomplete applications without action.
 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

- E Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F Transmittal: Submit signed and notarized original copies of each Application for Payment to Owner's representative and Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- H Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
 5. Products list (preliminary if not final).
 6. Schedule of unit prices.
 7. Submittal schedule (preliminary if not final).
 8. List of Contractor's staff assignments.
 9. List of Contractor's principal consultants.
 10. Copies of building permits.
 11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 12. Initial progress report.
 13. Report of preconstruction conference.
 14. Certificates of insurance and insurance policies.
 15. Performance and payment bonds.
 16. Data needed to acquire Owner's insurance.
- I Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
 3. Completion of required sustainable design documentation as directed by Sustainable Design Coordinator for the project.
- J Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Evidence of completion and acceptance of sustainable design documentation review by GBCI for certification award.
 3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 4. Updated final statement, accounting for final changes to the Contract Sum.
 5. AIA Document G706.
 6. AIA Document G706A.
 7. AIA Document G707.
 8. Evidence that claims have been settled.
 9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 10. Final liquidated damages settlement statement.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 29 00

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. RFIs.
 - 4. Digital project management procedures.
 - 5. Project meetings.
- B Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

1.3 DEFINITIONS

- A BIM: Building Information Modeling.
- B RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
 - 1. Post copies of list in project meeting room, in temporary field office, in web-based Project software directory, and in prominent location inbuilt facility. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 1. Preparation of Contractor's construction schedule.
 2. Preparation of the schedule of values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.

1.6 COORDINATION DRAWINGS

- A Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B Coordination Drawing Organization: Organize coordination drawings as follows:
 1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.

5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
 7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
 8. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
 9. Review: Architect will review coordination drawings to confirm that in general the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
 10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 33 00 Submittal Procedures.
- C Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format: DWG, operating in Microsoft Windows operating system.
 2. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format.
 3. BIM File Incorporation: Develop and incorporate coordination drawing files into BIM established for Project.
 - a. Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.

1.7 REQUEST FOR INFORMATION (RFI)

- A General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.

9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.
1. Attachments shall be electronic files in PDF format.
- D Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 26 00 Contract Modification Procedures.
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- E RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Software log with not less than the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- F On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1.8 PROJECT WEB SITE

- A Web-Based Project Software: Use Architect's web-based Project software site, Newforma, for purposes of hosting and managing Project communication and documentation until Final Completion.
1. Web-based Project software site includes, at a minimum, the following features:

- a. Compilation of Project data, including Contractor, subcontractors, Architect, architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
- b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
- c. Document workflow planning, allowing customization of workflow between project entities.
- d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
- e. Track status of each Project communication in real time, and log time and date when responses are provided.
- f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
- g. Processing and tracking of payment applications.
- h. Processing and tracking of contract modifications.
- i. Creating and distributing meeting minutes.
- j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
- k. Management of construction progress photographs.
- l. Mobile device compatibility, including smartphones and tablets.

1.9 PROJECT MEETINGS

- A General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of 10 working days prior to meeting.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B Preconstruction Conference: Architect will schedule and conduct Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
 1. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.
 - c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Use of web-based Project software.
 - h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFIs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - n. Sustainable design requirements.
 - o. Preparation of Record Documents.

- p. Use of the premises and existing building.
 - q. Work restrictions.
 - r. Working hours.
 - s. Owner's occupancy requirements.
 - t. Responsibility for temporary facilities and controls.
 - u. Procedures for moisture and mold control.
 - v. Procedures for disruptions and shutdowns.
 - w. Construction waste management and recycling.
 - x. Parking availability.
 - y. Office, work, and storage areas.
 - z. Equipment deliveries and priorities.
 - aa. First aid.
 - bb. Security.
 - cc. Progress cleaning.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Sustainable design requirements.
 - i. Review of mockups.
 - j. Possible conflicts.
 - k. Compatibility requirements.
 - l. Time schedules.
 - m. Weather limitations.
 - n. Manufacturer's written instructions.
 - o. Warranty requirements.
 - p. Compatibility of materials.
 - q. Acceptability of substrates.
 - r. Temporary facilities and controls.
 - s. Space and access limitations.
 - t. Regulations of authorities having jurisdiction.
 - u. Testing and inspecting requirements.
 - v. Installation procedures.
 - w. Coordination with other work.
 - x. Required performance results.
 - y. Protection of adjacent work.
 - z. Protection of construction and personnel.
 - 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Procedures for completing and archiving web-based Project software site data files.
 - d. Submittal of written warranties.
 - e. Requirements for completing sustainable design documentation.
 - f. Requirements for preparing operations and maintenance data.
 - g. Requirements for delivery of material samples, attic stock, and spare parts.
 - h. Requirements for demonstration and training.
 - i. Preparation of Contractor's punch list.
 - j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - k. Submittal procedures.
 - l. Coordination of separate contracts.
 - m. Owner's partial occupancy requirements.
 - n. Installation of Owner's furniture, fixtures, and equipment.
 - o. Responsibility for removing temporary facilities and controls.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E Progress Meetings: Conduct progress meetings at regular intervals.
 1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Status of sustainable design documentation.
 - 6) Deliveries.

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

- 16) Change Orders.
- 17) Pending changes.
- 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 31 00

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SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 1. Startup construction schedule.
 2. Contractor's Construction Schedule.
 3. Construction schedule updating reports.
 4. Daily construction reports.
 5. Material location reports.
 6. Site condition reports.
 7. Unusual event reports.

1.3 DEFINITIONS

- A Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 2. Predecessor Activity: An activity that precedes another activity in the network.
 3. Successor Activity: An activity that follows another activity in the network.
- B Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.
- C CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E Event: The starting or ending point of an activity.
- F Float: The measure of leeway in starting and completing an activity.
 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A Format for Submittals: Submit required submittals in the following format:
 1. Prepare submittals as PDF files, or other format indicated by the Architect's software website, Newforma.
- B Startup construction schedule.
 1. Submittal of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

- D Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.
- E CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - 1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
 - 2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
 - 3. Total Float Report: List of activities sorted in ascending order of total float.
 - 4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.
- F Construction Schedule Updating Reports: Submit with Applications for Payment.
- G Daily Construction Reports: Submit at weekly intervals.
- H Material Location Reports: Submit at monthly intervals.
- I Site Condition Reports: Submit at time of discovery of differing conditions.
- J Unusual Event Reports: Submit at time of unusual event.
- K Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

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

1.6 COORDINATION

- A Coordinate Contractor's Construction Schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
 - 1. Use Scheduling component of Project website software specified in Division 01 Section "Project Management and Coordination," for current Windows operating system.

- B Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.
 - 1. In-House Option: Owner may waive requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
 - 2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- C Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- D Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 - 2. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
 - 3. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 - 4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 - 5. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- E Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - 1. Phasing: Arrange list of activities on schedule by phase.
 - 2. Work under More Than One Contract: Include a separate activity for each contract.
 - 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 - 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 - 5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 - 6. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use-of-premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 - 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.

- k. Curing.
 - l. Startup and placement into final use and operation.
 - 8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Substantial Completion.
 - F Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion, and the following interim milestones:
 - 1. Temporary enclosure and space conditioning.
 - G Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
 - H Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
 - 1. Unresolved issues.
 - 2. Unanswered Requests for Information.
 - 3. Rejected or unreturned submittals.
 - 4. Notations on returned submittals.
 - 5. Pending modifications affecting the Work and the Contract Time.
 - I Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
 - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate final completion percentage for each activity.
 - J Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.
 - K Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.
 - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.
- 1.8 STARTUP CONSTRUCTION SCHEDULE
- A Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within seven days of date established for the Notice to Proceed.
 - B Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

1.9 GANTT-CHART SCHEDULE REQUIREMENTS

- A Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice to Proceed.
 - 1. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

1.10 CPM SCHEDULE REQUIREMENTS

- A General: Prepare network diagrams using AON (activity-on-node) format.
- B Startup Network Diagram: Submit diagram within 14 days of date established for the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C CPM Schedule: Prepare Contractor's Construction Schedule using a time-scaled CPM network analysis diagram for the Work.
 - 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for the Notice to Proceed.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.
 - 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 - 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 - 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule to coordinate with the Contract Time.
- D CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
 - 1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing and inspection.
 - j. Commissioning.
 - k. Punch list and final completion.
 - l. Activities occurring following final completion.
 - 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 - 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 - 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

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

1.11 REPORTS

- A Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors at Project site.
 - 2. List of separate contractors at Project site.
 - 3. Approximate count of personnel at Project site.
 - 4. Equipment at Project site.
 - 5. Material deliveries.
 - 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 - 7. Testing and inspection.
 - 8. Accidents.
 - 9. Meetings and significant decisions.
 - 10. Unusual events.
 - 11. Stoppages, delays, shortages, and losses.
 - 12. Meter readings and similar recordings.

13. Emergency procedures.
 14. Orders and requests of authorities having jurisdiction.
 15. Change Orders received and implemented.
 16. Construction Change Directives received and implemented.
 17. Services connected and disconnected.
 18. Equipment or system tests and startups.
 19. Partial completions and occupancies.
 20. Substantial Completions authorized.
- B Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
1. Material stored prior to previous report and remaining in storage.
 2. Material stored prior to previous report and since removed from storage and installed.
 3. Material stored following previous report and remaining in storage.
- C Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- D Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 32 00

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SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 INFORMATIONAL SUBMITTALS

- A Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Submit photos on CD-ROM or thumb-drive by or uploading to web-based project software site. Include copy of key plan indicating each photograph's location and direction.
 - 2. Identification: Provide the following information with each image description in file metadata tag:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date photograph was taken.
 - f. Description of location, vantage point, and direction.
 - g. Unique sequential identifier keyed to accompanying key plan.

1.4 QUALITY ASSURANCE

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

1.5 FORMATS AND MEDIA

- A Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels. Use flash in low light levels or backlit conditions.
- B Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- C Metadata: Record accurate date and time from camera.
- D File Names: Name media files with date and sequential numbering suffix.

1.6 CONSTRUCTION PHOTOGRAPHS

- A General: Take photographs with maximum depth of field and in focus.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B Preconstruction Photographs: Before commencement of demolition starting construction, take photographs of Project site, including existing items to remain during construction, from different vantage points, as directed by Architect.
 - 1. Take 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
 - 2. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

- C Periodic Construction Photographs: Take photographs weekly. Select vantage points to show status of construction and progress since last photographs were taken.
- D Final Completion Construction Photographs: Take 20 or more photographs after date of Substantial Completion for submission as Project Record Documents. Architect will inform photographer of desired vantage points.
- E Additional Photographs: Architect may request photographs in addition to periodic photographs specified.
 - 1. Three days' notice will be given, where feasible.
 - 2. In emergency situations, take additional photographs within 24 hours of request.
 - 3. Circumstances that could require additional photographs include, but are not limited to, the following:
 - a. Special events planned at Project site.
 - b. Immediate follow-up when on-site events result in construction damage or losses.
 - c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
 - d. Substantial Completion of a major phase or component of the Work.
 - e. Extra record photographs at time of final acceptance.
 - f. Owner's request for special publicity photographs.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 32 33

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

1.3 DEFINITIONS

- A Action Submittals: Written and graphic information that requires Architect's responsive action.
- B Informational Submittals: Written information that does not require Architect's approval. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL SCHEDULE

- A Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 - 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal Category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
 - g. Scheduled dates for purchasing.
 - h. Scheduled date of fabrication.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.5 SUBMITTAL FORMATS

- A Submittal Information: Include the following information in each submittal:
 - 1. Project name.
 - 2. Date.
 - 3. Name of Architect.
 - 4. Name of Contractor.
 - 5. Name of firm or entity that prepared submittal.
 - 6. Names of subcontractor, manufacturer, and supplier.
 - 7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals.

8. Category and type of submittal.
 9. Submittal purpose and description.
 10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
 11. Drawing number and detail references, as appropriate.
 12. Indication of full or partial submittal.
 13. Location(s) where product is to be installed, as appropriate.
 14. Other necessary identification.
 15. Remarks.
 16. Signature of transmitter.
- B Options: Identify options requiring selection by Architect.
- C Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.
- D Submittals for Web-Based Project Software: Prepare submittals as PDF files, or other format indicated by the Architect's software website, Newforma.

1.6 SUBMITTAL PROCEDURES

- A Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Web-Based Project Software: Prepare submittals in PDF form, and upload to Newforma website. Enter required data in web-based software site to fully identify submittal.
- B Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C Submittals Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
1. Final Submittals to be completed prior to 50 percent application of payment approval.
- D Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal.
1. Initial Review: Allow 7 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Allow 10 days for processing each resubmittal.
 4. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- E Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.

- f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Unique identifier, including revision number.
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Other necessary identification.
- F Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.
- G Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.
 - 1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
 - 2. Additional copies submitted for maintenance manuals will be marked with action taken and will be returned.
- H Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.
 - 1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
 - 2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
 - 3. Transmittal Form: Use AIA Document G810.
- I Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- J Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- K Use for Construction: Use only final submittals with mark indicating action taken by Architect in connection with construction.

PART 2 PRODUCTS

2.1 ACTION SUBMITTALS

- A General: Prepare and submit Action Submittals required by individual Specification Sections.
- B Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.

- j. Standard product operating and maintenance manuals.
 - k. Compliance with recognized trade association standards.
 - l. Compliance with recognized testing agency standards.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
- C Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
- 1. Preparation: Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shop work manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 - 2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
- D Coordination Drawings: Comply with requirements in Division 01 Section "Project Management and Coordination."
- E Samples: Prepare physical units of materials or products, including the following:
- 1. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - 2. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - 3. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:
 - a. Generic description of Sample.
 - b. Product name or name of manufacturer.
 - c. Sample source.
 - 4. Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, provide the following:
 - a. Size limitations.
 - b. Compliance with recognized standards.
 - c. Availability.
 - d. Delivery time.
 - 5. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
 - a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations.
 - b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

6. Number of Samples for Initial Selection: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 7. Number of Samples for Verification: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.
 - a. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 8. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- F Product Schedule or List: Prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product.
 2. Number and name of room or space.
 3. Location within room or space.
- G Submittals Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation."
- H Application for Payment: Comply with requirements in Division 01 Section "Payment Procedures."
- I Schedule of Values: Comply with requirements in Division 01 Section "Payment Procedures."
- J Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.

2.2 INFORMATIONAL SUBMITTALS

- A General: Prepare and submit Informational Submittals required by other Specification Sections.
1. Number of Copies: Submit three copies of each submittal, unless otherwise indicated. Architect will not return copies.
 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
- B Contractor's Construction Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation."
- C Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- D Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.
- E Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- F Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.
- G Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.
- H Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.

- I Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
- J Pre-construction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.
- K Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- L Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.
- M Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- N Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- O Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Closeout Procedures."
- P Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- Q Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
 - 1. Preparation of substrates.
 - 2. Required substrate tolerances.
 - 3. Sequence of installation or erection.
 - 4. Required installation tolerances.
 - 5. Required adjustments.
 - 6. Recommendations for cleaning and protection.
- R Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 - 1. Name, address, and telephone number of factory-authorized service representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 6. Statement whether conditions, products, and installation will affect warranty.

7. Other required items indicated in individual Specification Sections.
- S Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

PART 3 EXECUTION

3.1 CONTRACTOR'S REVIEW

- A Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
1. Reviewed.
 2. Furnish as Corrected.
 3. Rejected.
 4. Revise and Resubmit.
- C Informational Submittals: Architect will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION 01 33 00

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SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section includes administrative and procedural requirements for quality assurance and quality control.
- B Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

- A Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- D Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.
- G Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

- I Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.4 DELEGATED-DESIGN SERVICES

- A Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

1.5 CONFLICTING REQUIREMENTS

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

1.6 ACTION SUBMITTALS

- A Delegated-Design Services Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.7 INFORMATIONAL SUBMITTALS

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

- 9. Unique characteristics of each quality-control service.
- F Reports: Prepare and submit certified written reports and documents as specified.
- G Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.8 CONTRACTOR'S QUALITY-CONTROL PLAN

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

1.9 REPORTS AND DOCUMENTS

- A Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, telephone number, and email address of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.

12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.
- B Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 1. Name, address, telephone number, and email address of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
 1. Name, address, telephone number, and email address of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.

1.10 QUALITY ASSURANCE

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

- H Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.
 - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.11 QUALITY CONTROL

- A Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
 - 2. Payment for these services will be made from testing and inspection allowances, as authorized by Change Orders.
 - 3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
- B Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
 - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 2. Engage a qualified testing agency to perform quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
 - 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - 5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform duties of Contractor.
- E Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."
- F Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G Associated Contractor Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspection equipment at Project site.
- H Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses.
 1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.12 SPECIAL TESTS AND INSPECTIONS

- A Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 TEST AND INSPECTION LOG

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

3.2 REPAIR AND PROTECTION

- A General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 Execution.
- B Protect construction exposed by or for quality-control service activities.
- C Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

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SECTION 01 42 00 - REFERENCES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

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

1.3 INDUSTRY STANDARDS

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

1.4 ABBREVIATIONS AND ACRONYMS

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

- D Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations.
- E State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 42 00

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 USE CHARGES

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

1.4 INFORMATIONAL SUBMITTALS

- A Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- C Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.
- D Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
 - 1. Locations of dust-control partitions at each phase of work.
 - 2. HVAC system isolation schematic drawing.
 - 3. Location of proposed air-filtration system discharge.
 - 4. Waste-handling procedures.
 - 5. Other dust-control measures.
- E Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by the Owner. Include the following:
 - 1. Methods used to meet the goals and requirements of the Owner.
 - 2. Concrete cutting method(s) to be used.
 - 3. Location of construction devices on the site.
 - 4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.
 - 5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with the Owner.
 - 6. Indicate locations of sensitive equipment areas or other areas requiring special attention as identified by Owner. Indicate means for complying with Owner's requirements.

1.5 QUALITY ASSURANCE

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

1.6 PROJECT CONDITIONS

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

PART 2 PRODUCTS

2.1 MATERIALS

- A Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- B Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats minimum 36 by 60 inches.
- C Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
- C Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

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

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

3.3 TEMPORARY UTILITY INSTALLATION

- A General: Install temporary service or connect to existing service.
1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- C Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- D Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
- E Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- F Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- G Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 2. Install lighting for Project identification signs and any directional signage.
- H Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install WiFi cell phone access equipment and one land-based telephone line(s) for each field office.
1. Provide additional telephone lines for the following:
 - a. Provide one telephone line(s) for Owner's use.
 2. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Contractor's emergency after-hours telephone number.
 - e. Architect's office.
 - f. Engineers' offices.
 - g. Owner's office.
 - h. Principal subcontractors' field and home offices.

- I Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:
 - 1. Provide WiFi connectivity in primary field office.

3.4 SUPPORT FACILITIES INSTALLATION

- A General: Comply with the following:
 - 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E136. Comply with NFPA 241.
 - 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification signs as indicated on Drawings, or if not indicated, as directed by the Architect.
 - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - 3. Maintain and touch up signs so they are legible at all times.
- D Waste Disposal Facilities: Comply with requirements specified in Section 01 74 19 Construction Waste Management and Disposal.
- E Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 73 00 Execution.
- F Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered tools and equipment and not temporary facilities.
- G Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- H Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- B Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.
- C Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- D Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- E Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

- F Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
 - 2. Provide walk-off mats at each entrance through temporary partition.
- G Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 - 1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

- A Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
 - 1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
 - 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
 - 3. Indicate methods to be used to avoid trapping water in finished work.

3.7 OPERATION, TERMINATION, AND REMOVAL

- A Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 Closeout Procedures.

END OF SECTION 01 50 00

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

- A Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term product includes the terms material, equipment, system, and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved by Architect through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words basis-of-design product, including make or model number or other designation. In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.
- C Subject to Compliance with Requirements: Where the phrase Subject to compliance with requirements introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications. Submit a comparable product request, if applicable.

1.3 ACTION SUBMITTALS

- A Comparable Product Request Submittal: Submit request for consideration of each comparable product. Identify basis-of-design product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Include data to indicate compliance with the requirements specified in Comparable Products Article.
 - 2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Architect's Approval of Submittal: As specified in Section 01 33 00 Submittal Procedures.
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00 Submittal Procedures. Show compliance with requirements.

1.4 QUALITY ASSURANCE

- A Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

1.6 PRODUCT WARRANTIES

- A Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C Submittal Time: Comply with requirements in Section 01 77 00 Closeout Procedures.

PART 2 PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
 4. Where products are accompanied by the term as selected, Architect will make selection.
 5. Where products are accompanied by the term match sample, sample to be matched is Architect's.
 6. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B Product Selection Procedures:
1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Sole product may be indicated by the phrase: Subject to compliance with requirements, provide the following: ...
 2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Sole manufacturer/source may be indicated by the phrase: Subject to compliance with requirements, provide products by the following: ...
 3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Limited list of products may be indicated by the phrase: Subject to compliance with requirements, provide one of the following: ...
 4. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Limited list of manufacturers is indicated by the phrase: Subject to compliance with requirements, provide products by one of the following: ...
 5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in Comparable Products Article for consideration of an unnamed product by one of the other named manufacturers.
 - a. For approval of products by unnamed manufacturers, comply with requirements in Section 01 25 00 Substitution Procedures for substitutions for convenience.
- C Visual Matching Specification: Where Specifications require match Architect's sample, provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 25 00 Substitution Procedures for proposal of product.

- D Visual Selection Specification: Where Specifications include the phrase as selected by Architect from manufacturer's full range or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 60 00

SECTION 01 73 00 - EXECUTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

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

1.4 PREINSTALLATION MEETINGS

- A Cutting and Patching Conference: Conduct conference at Project site.
 1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:
 - a. Contractor's superintendent.
 - b. Trade supervisor responsible for cutting operations.
 - c. Trade supervisor(s) responsible for patching of each type of substrate.
 - d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affecting by cutting and patching operations.
 2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A Qualification Data: For professional engineer.
- B Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.
- C Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 4. Dates: Indicate when cutting and patching will be performed.
 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

- a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

1.6 QUALITY ASSURANCE

- A Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Plumbing piping systems.
 - f. Mechanical systems piping and ducts.
 - g. Control systems.
 - h. Communication systems.
 - i. Fire-detection and -alarm systems.
 - j. Conveying systems.
 - k. Electrical wiring systems.
 - l. Operating systems of special construction.
 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 PRODUCTS

2.1 MATERIALS

- A General: Comply with requirements specified in other Sections.
 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.
- B In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

PART 3 EXECUTION

3.1 EXAMINATION

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

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

3.2 PREPARATION

- A Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 31 00 Project Management and Coordination.

3.3 INSTALLATION

- A General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- B Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

- E Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.
- G Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J Repair or remove and replace damaged, defective, or nonconforming Work.
 - 1. Comply with Section 01 77 00 Closeout Procedures for repairing or removing and replacing defective Work.

3.4 CUTTING AND PATCHING

- A Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C Temporary Support: Provide temporary support of work to be cut.
- D Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00 Summary.
- F Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- G Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.

4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.
- H Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.5 OWNER-INSTALLED PRODUCTS

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

3.6 PROGRESS CLEANING

- A General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

- a. Use containers intended for holding waste materials of type to be stored.
- 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B Site: Maintain Project site free of waste materials and debris.
- C Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 74 19 Construction Waste Management and Disposal.
- H During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

- A Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 Quality Requirements.

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 73 00

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

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

1.4 PERFORMANCE GOALS

- A Construction Waste Reduction, Disposal and Recycling: Recycle and/or salvage for reuse a at least 65 percent of the nonhazardous construction and demolition waste; or meet a local construction and demolition waste management ordinance, whichever is more stringent. Demolition waste includes:
 - 1. Concrete.
 - 2. Concrete reinforcing steel.
 - 3. Wood studs.
 - 4. Plywood and oriented strand board.
 - 5. Wood trim.
 - 6. Structural and miscellaneous steel.
 - 7. Rough hardware.
 - 8. Insulation.
 - 9. Doors and frames.
 - 10. Door hardware.
 - 11. Windows.
 - 12. Glazing.
 - 13. Metal studs.
 - 14. Gypsum board.
 - 15. Acoustical tile and panels.
 - 16. Carpet.
 - 17. Equipment.
 - 18. Cabinets.
 - 19. Plumbing fixtures.
 - 20. Piping.
 - 21. Supports and hangers.
 - 22. Valves.
 - 23. Sprinklers.
 - 24. Mechanical equipment.
 - 25. Refrigerants.
 - 26. Electrical conduit.

27. Copper wiring.
28. Lighting fixtures.
29. Lamps.
30. Ballasts.
31. Electrical devices.
32. Switchgear and panelboards.
33. Transformers.
34. Construction Waste:
35. Lumber.
36. Wood sheet materials.
37. Wood trim.
38. Metals.
39. Roofing.
40. Insulation.
41. Carpet
42. Gypsum board.
43. Piping.
44. Electrical conduit.
45. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - a. Paper.
 - b. Cardboard.
 - c. Boxes.
 - d. Plastic sheet and film.
 - e. Polystyrene packaging.
 - f. Wood crates.
 - g. Plastic pails.

1.5 SUBMITTALS

- A Waste Management Plan and Progress Reports: Submit initial Waste Management Plan and monthly progress reports. Submit monthly progress reports concurrent with each Application of Payment.

1.6 QUALITY ASSURANCE

- A Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- B Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 01 Section Project Management and Coordination. Review methods and procedures related to waste management including, but not limited to, the following:
 1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 2. Review requirements for documenting quantities of each type of waste and its disposition.
 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 5. Review waste management requirements for each trade.

1.7 WASTE MANAGEMENT PLAN

- A General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B Waste Identification: Indicate anticipated types and quantities of demolition and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

- C Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 2. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 3. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 4. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 5. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PLAN IMPLEMENTATION

- A General: Implement waste management plan as approved by Architect. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
1. Comply with Division 01 Section Temporary Facilities and Controls for operation, termination, and removal requirements.
- B Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
- C Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
1. Distribute waste management plan to everyone concerned within three days of submittal return.
 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A General: Recycle paper and beverage containers used by on-site workers.
- B Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 2. Inspect containers and bins for contamination and remove contaminated materials if found.
 3. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 4. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 5. Store components off the ground and protect from the weather.
 6. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING DEMOLITION WASTE

- A Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
- B Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- C Metals: Separate metals by type.
 - 1. Structural Steel: Stack members according to size, type of member, and length.
 - 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- D Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
- E Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
 - 1. Separate suspension system, trim, and other metals from panels and tile and sort with other metals.
- F Carpet: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
 - 1. Store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.
- G Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- H Plumbing Fixtures: Separate by type and size.
- I Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- J Lighting Fixtures: Separate lamps by type and protect from breakage.
- K Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.
- L Conduit: Reduce conduit to straight lengths and store by type and size.

3.4 RECYCLING CONSTRUCTION WASTE

- A Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

3.5 DISPOSAL OF WASTE

- A General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B Burning: Do not burn waste materials.
- C Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 01 74 19

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

- A List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

1.4 ACTION SUBMITTALS

- A Product Data: For each type of cleaning agent.
- B Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C Certified List of Incomplete Items: Final submittal at Final Completion.

1.5 CLOSEOUT SUBMITTALS

- A Certificates of Release: From authorities having jurisdiction.
- B Certificate of Insurance: For continuing coverage.
- C Field Report: For pest-control inspection.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.7 SUBSTANTIAL COMPLETION PROCEDURES

- A Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.
- B Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.

- a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
5. Submit testing, adjusting, and balancing records.
6. Submit sustainable design submittals not previously submitted.
7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
 6. Advise Owner of changeover in utility services.
 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements.
 10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
 1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.8 FINAL COMPLETION PROCEDURES

- A Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
 1. Submit a final Application for Payment in accordance with Section 01 29 00 Payment Procedures.
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report.
 5. Submit Contractor's General Warranty form.
 6. Submit Asbestos-Free Warranty form.
 7. Submit Final Completion photographic documentation.

- B Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.9 LIST OF INCOMPLETE ITEMS

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

1.10 SUBMITTAL OF PROJECT WARRANTIES

- A Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- D Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
1. Submit on digital media acceptable to Architect.

PART 2 PRODUCTS

2.1 MATERIALS

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

PART 3 EXECUTION

3.1 FINAL CLEANING

- A General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site of rubbish, waste material, litter, and other foreign substances.

- b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
 - i. Vacuum and mop concrete.
 - j. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - l. Remove labels that are not permanent.
 - m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - p. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - q. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
 - r. Clean strainers.
 - s. Leave Project clean and ready for occupancy.
- C Pest Control: Comply with pest control requirements in Section 01 50 00 Temporary Facilities and Controls. Prepare written report.

END OF SECTION 01 77 00

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 SUMMARY

- A Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory manuals.
 - 2. Emergency manuals.
 - 3. Systems and equipment operation manuals.
 - 4. Systems and equipment maintenance manuals.
 - 5. Product maintenance manuals.

1.2 DEFINITIONS

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

1.3 CLOSEOUT SUBMITTALS

- A Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B Format: Submit operation and maintenance manuals in the following format:
 - 1. Submit on digital media acceptable to Architect by email to Architect. Enable reviewer comments on draft submittals.
- C Initial Manual Submittal: Submit draft copy of each manual at least 15 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
 - 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.
- E Comply with Section 01 77 00 Closeout Procedures for schedule for submitting operation and maintenance documentation.

1.4 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
 - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- B Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
 4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.
- 1.5 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS
- A Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 1. Title page.
 2. Table of contents.
 3. Manual contents.
 - B Title Page: Include the following information:
 1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for Construction Manager.
 7. Name and contact information for Architect.
 8. Name and contact information for Commissioning Authority.
 9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 10. Cross-reference to related systems in other operation and maintenance manuals.
 - C Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
 - D Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

- E Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.6 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

- A Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
 - 1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
 - 2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
 - 3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

1.7 EMERGENCY MANUALS

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

1.8 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

- B Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 - 2. Performance and design criteria if Contractor has delegated design responsibility.
 - 3. Operating standards.
 - 4. Operating procedures.
 - 5. Operating logs.
 - 6. Wiring diagrams.
 - 7. Control diagrams.
 - 8. Piped system diagrams.
 - 9. Precautions against improper use.
 - 10. License requirements including inspection and renewal dates.
- C Descriptions: Include the following:
 - 1. Product name and model number. Use designations for products indicated on Contract Documents.
 - 2. Manufacturer's name.
 - 3. Equipment identification with serial number of each component.
 - 4. Equipment function.
 - 5. Operating characteristics.
 - 6. Limiting conditions.
 - 7. Performance curves.
 - 8. Engineering data and tests.
 - 9. Complete nomenclature and number of replacement parts.
- D Operating Procedures: Include the following, as applicable:
 - 1. Startup procedures.
 - 2. Equipment or system break-in procedures.
 - 3. Routine and normal operating instructions.
 - 4. Regulation and control procedures.
 - 5. Instructions on stopping.
 - 6. Normal shutdown instructions.
 - 7. Seasonal and weekend operating instructions.
 - 8. Required sequences for electric or electronic systems.
 - 9. Special operating instructions and procedures.
- E Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- F Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.9 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.

- C Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.
- E Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training video recording, if available.
- F Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- G Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- H Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- I Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.
- J Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of maintenance manuals.

1.10 PRODUCT MAINTENANCE MANUALS

- A Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

- C Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
- E Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- F Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 78 23

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 CLOSEOUT SUBMITTALS

- A Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of record Drawings as follows:
 - a. Final Submittal:
 - 1) Submit record digital data files and three set(s) of record digital data file plots.
 - 2) Plot each drawing file, whether or not changes and additional information were recorded.
- B Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

1.4 RECORD DRAWINGS

- A Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
 - 1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
 - 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 - 3. Refer instances of uncertainty to Architect for resolution.

1.5 RECORD SPECIFICATIONS

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

1.6 RECORD PRODUCT DATA

- A Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- C Format: Submit record Product Data as annotated PDF electronic file.
 - 1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.7 MAINTENANCE OF RECORD DOCUMENTS

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

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION 01 78 39

SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.

1.3 INFORMATIONAL SUBMITTALS

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

1.4 COORDINATION

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

PART 2 PRODUCTS

2.1 INSTRUCTION PROGRAM

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

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

PART 3 EXECUTION

3.1 PREPARATION

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

3.2 INSTRUCTION

- A Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
 - 2. Owner will furnish an instructor to describe Owner's operational philosophy.
 - 3. Owner will furnish Contractor with names and positions of participants.
- C Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner, through Architect, with at least 7 days' advance notice.
- D Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- F Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 01 79 00

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SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. AHJ: Authority (Authorities) Having Jurisdiction.
 - 2. EPA: Environmental Protection Agency.
 - 3. RFCI: Resilient Floor Covering Institute.
- B Definitions:
 - 1. Remove: Means to detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
 - 2. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store.
 - 3. Remove and Reinstall: Means to detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
 - 4. Existing to Remain: Means to leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
 - 5. Dismantle: Means to remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

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

1.5 PREINSTALLATION MEETINGS

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

1.6 INFORMATIONAL SUBMITTALS

- A Qualification Data: For refrigerant recovery technician.
- B Engineering Survey: Submit engineering survey of condition of building.
- C Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- D Schedule of Selective Demolition Activities: Sequence of selective demolition and removal work, with starting and ending dates
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.

3. Coordination for shutoff, capping, and continuation of utility services.
 4. Use of elevator and stairs.
 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed work.
- E Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations. Comply with Section 01 32 33 Photographic Documentation. Submit before work begins.
- F Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 QUALITY ASSURANCE

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

1.8 FIELD CONDITIONS

- A Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D Hazardous Materials: Present in building to be selectively demolished.
1. Remediation is part of the Project scope and a plan for remediation is to be provided.
- E Storage or sale of removed items or materials on-site is not permitted.
- F Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 WARRANTY

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

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of the AHJ.
- B Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B Review Project Record Documents of existing construction or other existing conditions and information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C Engage a professional engineer licensed in the state of North Carolina to perform, or perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

1. Perform surveys as the work progresses to detect hazards resulting from selective demolition activities.
 - D Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
 - E Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs or video, or templates.
- 3.2 PREPARATION
- A Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of the AHJ.
- 3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS
- A Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.
- 3.4 PROTECTION
- A Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 50 00 Temporary Facilities and Controls.
- B Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.

- C Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

- A General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 5. Maintain fire watch during and for at least 8 hours after flame-cutting operations.
 6. Maintain adequate ventilation when using cutting torches.
 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 10. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 74 19 Construction Waste Management and Disposal.
- B Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner.
 5. Protect items from damage during transport and storage.
- D Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

1. Where necessary to demolish concrete in small sections: Use power-driven saw, cut concrete to a depth of at least 1 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- C Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to the AHJ unless indicated to be recycled.
 1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Comply with Section 01 74 19 Construction Waste Management and Disposal.
- B Burning: Do not burn demolished materials.

3.8 CLEANING

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

END OF SECTION 02 41 19

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SECTION 03 54 16 - HYDRAULIC CEMENT UNDERLAYMENT

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 Specification Section.

1.2 SUMMARY

- A Section Includes:
 - 1. Polymer-modified, self-leveling, hydraulic cement underlayment:
 - a. For application below interior floor coverings when necessary to smooth concrete slabs; or
 - b. To cap rough, pitted, cracked, or uneven concrete where and when necessary to conform to the substrate tolerance requirements of specified finish floorings.
 - 2. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation or application.

1.3 REFERENCES

- A Definitions:
 - 1. Manufacturer: Means the hydraulic cement underlayment manufacturer unless otherwise indicated.

1.4 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For each type of product; include Health Product Declaration and Environmental Product Declaration.
 - 2. Shop Drawings: Include plans indicating substrates, locations, and average depths of underlayment based on survey of substrate conditions.
- B Informational Submittals:
 - 1. Qualification Data: For installer.

1.5 QUALITY ASSURANCE

- A Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.

1.6 FIELD CONDITIONS

- A Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.
 - 1. Place hydraulic cement underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A Source Limitations: Obtain underlayment materials from single source from the same manufacturer.

2.2 HYDRAULIC CEMENT UNDERLAYMENTS

- A Hydraulic Cement Underlayment: Polymer-modified, self-leveling, hydraulic cement product that can be applied in a uniform thickness of at least 1/4 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Manufacturers:

- a. Basis of Design Product: Subject to compliance with the Contract Documents, design is based on the following.
 - 1) "ARDEX K 13" manufactured by ARDEX Engineered Cements.
- b. Acceptable Manufacturers: Subject to compliance with the Contract Documents, provide basis-of-design product or comparable product by one of the following.
 - 1) Custom Building Products.
 - 2) Mapei Corp.
 - 3) Maxxon Corp.
- 2. Cement Binder: ASTM C 150, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C 219.
- 3. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109.
- 4. Underlayment Additive: If recommended by manufacturer for Project conditions, resilient-emulsion product of manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.
- B Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch; or coarse sand as recommended by manufacturer.
 - 1. Provide aggregate when recommended in writing by manufacturer for underlayment thickness required.
- C Water: Potable and at a temperature of not more than 70 deg F.
- D Primer: Product of manufacturer recommended in writing for substrate, conditions, and application indicated.
- E Surface Sealer: Designed to reduce porosity as recommended by manufacturer for type of floor covering to be applied to underlayment.

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine substrates, with installer present, for conditions affecting performance of the work.
- B Do not proceed with application until unsatisfactory conditions have been corrected.
 - 1. Installation of hydraulic cement underlayment indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A General: Prepare and clean substrate according to manufacturer's written instructions.
 - 1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
 - 2. Fill substrate voids to prevent underlayment from leaking.
- B Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond. If underlayments are installed over adhesive residues, consult manufacturer for recommendations.
 - 1. Moisture Testing: Perform anhydrous calcium chloride test, ASTM F 1869. Do not proceed with installation until substrates do not exceed a moisture-vapor-emission rate of no more than 3 lb. of water/1000 sq. ft. in 24 hours.
- C Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

3.3 APPLICATION

- A General: Mix and apply underlayment components according to manufacturer's written instructions.
 - 1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
 - 2. Coordinate application of components to provide optimum adhesion to substrate and between coats.

3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
 - B Apply primer over prepared substrate at manufacturer's recommended spreading rate.
 - C Apply underlayment to produce uniform, level surface.
 1. If addition of aggregate is required for applied thickness, apply a final layer without aggregate to product surface.
 2. Feather edges to match adjacent floor elevations.
 - D Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
 - E Do not install floor coverings over underlayment until after time period recommended in writing by manufacturer.
 - F If sealer is recommended by the manufacturer, apply surface sealer at rate recommended by manufacturer.
 - G Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.
- 3.4 PROTECTION
- A Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION 03 54 16

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SECTION 04 26 13 - MASONRY VENEER

PART 1 GENERAL

1.1 SUMMARY

A Section Includes:

1. Brick.
2. Mortar materials.
3. Ties and anchors.
4. Embedded flashing.
5. Accessories.
6. Mortar mixes.
7. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.2 REFERENCES

A Acronyms and Abbreviations:

1. BIA: The Brick Industry.
2. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.
3. TMS: The Masonry Society.

1.3 SUBMITTALS

A Action Submittals:

1. Product Data: For each type of product indicated.
2. Samples for Verification: For type and color of brick and mortar.

B Informational Submittals:

1. Material Certificates: For each type and size of product indicated.

1.4 QUALITY ASSURANCE

- A Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

1.5 PROJECT CONDITIONS

- A Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

- B Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602.

PART 2 PRODUCTS

2.1 UNIT MASONRY, GENERAL

- A Masonry Standard: Comply with TMS 602, except as modified by requirements in the Contract Documents.

- B Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed work.

2.2 BRICK

- A General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units.

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- B Face Brick: Facing brick complying with ASTM C 216.
1. Product: Subject to compliance with the Contract Documents provide brick matching existing and Architect's approved sample.
 2. Grade: SW.
 3. Type: FBS.
 4. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
 5. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
 6. Size (Actual Dimensions): Match existing.
 7. Color: Match existing.

2.3 MORTAR MATERIALS

- A Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce existing mortar color if applicable.
1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.
- B Hydrated Lime: ASTM C 207, Type S.
- C Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D Mortar Cement: ASTM C 1329/C 1329M.
- E Aggregate for Mortar: ASTM C 144.
1. White-Mortar Aggregates: Natural white sand or crushed white stone.
 2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

2.4 REINFORCEMENT

- A Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

2.5 TIES AND ANCHORS

- A Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
- B Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.
- C Adjustable, Screw-Attached, Masonry-Veneer Anchors:
1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
 - a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.
 - b. Basis of Design Product: Subject to compliance with the Contract Documents, provide "Pos-I-Tie" as manufactured by Heckmann Building Products, or comparable by one of the following:
 - 1) Dayton Superior Corporation.
 - 2) Hohmann & Barnard, Inc.
 - 3) Wire-Bond.

- c. Anchor Section: Corrosion-resistant, self-drilling, eye-screw designed to receive wire tie. Eye-screw has spacer that seats directly against framing and is same thickness as sheathing and has gasketed, washer head that covers hole in sheathing.
- d. Wire Ties: Seismic triangular-shaped wire ties fabricated from 0.187-inch- diameter, hot-dip galvanized steel wire in length as indicated on Drawings.

2.6 EMBEDDED FLASHING MATERIALS

- A Metal Flashing: Provide metal flashing complying with the SMACNA publication *Architectural Sheet Metal Manual* and as follows:
 - 1. Stainless Steel: ASTM A 240 or ASTM A 666, Type 304, 0.016-inch thick.
 - 2. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
 - 3. Metal Sealant Stop: Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
- B Solder and Sealants for Sheet Metal Flashings: As specified in Section 07 62 00 Sheet Metal Flashing and Trim.
- C Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.
- D Metal Expansion-Joint Strips: Fabricate from stainless steel to shapes indicated.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

- A Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene.
- B Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- C Round Plastic Weep/Vent Tubing: Medium-density polyethylene, 3/8-inch OD by 4 inches long.
 - 1. Product: Hohmann & Barnard, Inc.; 341 Series Round Plastic Weep Holes.
- D Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
 - 1. Products: Subject to compliance with the Contract Documents, provide one of the following:
 - a. Advanced Building Products Inc.; Mortar Break.
 - b. Archovations, Inc.; CavClear Masonry Mat.
 - c. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
 - d. Mortar Net USA, Ltd.; Mortar Net.

2.8 MORTAR MIXES

- A General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar.
 - 2. Use mortar cement unless otherwise indicated.
- B Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide Type N unless another type is indicated.
- D Pigmented Mortar: Use colored cement product if required to match existing.
- E Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
 - 1. Mix to match Architect's sample.
 - 2. Application: Use colored aggregate mortar for exposed mortar joints if required to match existing.

PART 3 EXECUTION**3.1 INSTALLATION, GENERAL**

- A Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- B Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

3.2 TOLERANCES

- A Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
 - 2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
 - 3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.
- B Lines and Levels:
 - 1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
 - 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
 - 3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
 - 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
 - 5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
- C Joints:
 - 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch; do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
 - 2. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

3.3 LAYING MASONRY WALLS

- A Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B Bond Pattern for Exposed Masonry: As indicated on the Drawings.
- C Built-in Work: As construction progresses, build in items specified in this and other Specification Sections. Fill in solidly with masonry around built-in items.
- D Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

- A Lay hollow brick as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - 2. With entire units, including areas under cells, fully bedded in mortar at starting course on footings.
- B Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

- C Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.5 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:
 - 1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 24 inches on center vertically and 36 inches on center horizontally.

3.6 ANCHORING MASONRY VENEERS

- A Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:
 - 1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
 - 2. Embed tie sections in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and face of sheathing.
 - 3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 - 4. Space anchors as indicated, but not more than 16 inches on center vertically and 32 inches on center horizontally with not less than 1 anchor for each 3.5 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

3.7 EXPANSION JOINTS

- A General: Install expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.
- B Form expansion joints in brick as follows:
 - 1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
 - 2. Build flanges of factory-fabricated, expansion-joint units into masonry.
 - 3. Build in compressible joint fillers where indicated.
 - 4. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 07 92 00 Joint Sealants.
- C Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 07 92 00 Joint Sealants, but not less than 3/8 inch.
 - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.8 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
 - 1. Use specified weep/vent products to form weep holes.
 - 2. Space weep holes 24 inches on center unless otherwise indicated.
- C Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

3.9 FIELD QUALITY CONTROL

- A Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
- B Inspections: Level 1 special inspections according to the "International Building Code."
- C Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

3.10 CLEANING

- A In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Protect adjacent surfaces from contact with cleaner.
 - 2. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 3. Clean brick by bucket-and-brush hand-cleaning method described in the BIA publication BIA Technical Notes 20.

3.11 MASONRY WASTE DISPOSAL

- A Excess Masonry Waste: Remove excess clean masonry waste and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 26 13

SECTION 05 01 30 - STEEL ROOF DECK REPAIR AND SECUREMENT (ALTERNATE)

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Steel Deck Repair: Inspect, evaluate and remediate steel roof deck as follows:
 - a. Repair of surface rust in steel decking.
 - b. Repair of through holes in steel decking.
 - c. Replacement of damaged or deteriorated steel decking.
 - 2. Steel Deck Securement: Provide mechanical fasteners to secure steel deck to existing steel framing and to secure existing deck side and end laps.

1.2 SUBMITTALS

- A. Product Data: Manufacturer's Product Data Sheets for materials specified certifying material complies with specified requirements.
- B. Manufacturer's Instructions: Latest edition of the Manufacturer's current material specifications and installation instructions.

1.3 QUALITY ASSURANCE

- A. Provide meticulous attention to the detail of installation and workmanship to ensure the assemblage of products in the highest grade of excellence by skilled craftsmen of the trade.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Steel Deck Repair:
 - 1. Steel Deck: FM Approved or UL listed, 22 gauge minimum; galvanized steel meeting ASTM A653/A653M with profile to conform to existing deck profile at end and side laps.
 - 2. Deck Repair Plates: 16 gauge, galvanized steel plates meeting ASTM A653/A653M sized to extend a min. 8 inches beyond the through hole in existing decking with plate edges resting on a rib.
 - 3. Deck Repair Coating: High solids, low VOC, self-priming epoxy coating for use on steel structures.
 - a. PPG Amerlock 400
 - b. Devoe Bar-Rust 231
 - c. Kryon Industrial High Build Epoxy Mastic 100
 - d. Benjamin Moore & Co. Surface Tolerant Epoxy Mastic Coating V160
- B. Steel Deck Securement:
 - 1. Deck-to-structural steel fasteners: FM Approved, self-drilling deck fasteners of length and type as required by fastener manufacturer for thickness of structural steel.
 - a. ITW Buildex Corp. 12-24 Tek 5
 - b. SFS Intec Impax 12-24 SD5
 - c. Blazer 1/4-20 DP5
 - 2. Deck-to-deck side lap fasteners: FM Approved self-drilling deck side lap fasteners of length and type as required by fastener manufacturer for thickness of steel deck.
 - a. ITW Buildex Corp. 10-16 Tek 3
 - b. SFS Intec #10-16 SD3
 - c. Blazer #10-16 DP3
 - 3. Washers: 3/4 inch diameter of same material as fastener or integral 1/2 inch diameter washer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Inspect roof deck in work areas noted on roof plan. Notify engineer of additional damaged decking, or damaged structural elements.
- B. Before removing decking, cutting decking or fastening decking, inspect interior conditions under the deck to prevent cutting or damaging the joists, electrical conduit, sprinkler piping, fixtures and utilities. Ensure conditions are satisfactory before proceeding with the work, and continuously monitor interior and exterior work conditions during demolition and construction operations.
- C. Commencement of work signifies acceptance of conditions. Correct defects in work resulting from accepted substrates at no additional expense to the Owner.
- D. The following descriptions indicate roof deck corrosion levels by degree. Inspect roof deck areas and assess corrosion level of 1 through 5. Following the assessment, conduct the appropriate Remediation Method in accordance with the deck corrosion level descriptions.
 - 1. Corrosion Degree 1
 - a. Red rust or dark brown rust scaling on top flange only.
 - b. Dark brown rust scale removed by scraping/wire brushing to indicate minor pitting of the metal surface.
 - c. Deck flutes discolored.
 - 2. Corrosion Degree 2
 - a. Red rust or dark brown rust scale present on the deck surface.
 - b. Deck sections (flanges and flutes) have been or can be readily removed during examination or areas of decking are missing, up to 13" in any one direction.
 - 3. Corrosion Degree 3
 - a. Red rust or dark brown rust scale present on the deck surface.
 - b. Deck sections (flanges and/or flutes) have been or can be readily removed during examination or areas of decking are missing, from 13" to 24" in one dimension.
 - 4. Corrosion Degree 4
 - a. Red rust or dark brown rust scale present on the deck surface.
 - b. Deck sections (flanges and/or flutes) have been or can be readily removed during examination or areas of decking are missing, 24" or greater in one dimension.

3.2 PREPARATION

- A. Remove and vacuum debris from deck surface and ribs to allow for inspection of deck, and to fasten decking.
- B. Remove and properly dispose of damaged decking (Corrosion Degree Level 4) and remove deck fasteners in the repair area.
- C. Take necessary precautions to prevent debris from entering building space, and coordinate operations with Engineer and Owner.
- D. Provide temporary protection of building interior and contents to prevent damage.

3.3 STEEL DECK REMEDIATION

- A. General:
 - 1. Remove loose dirt, rust, moisture, grease or other contaminants from the surface with a power wire brush.
 - 2. Vacuum the roof deck surface clean.
- B. Corrosion Degree 1:
 - 1. Properly mix deck repair coating according to manufacturer's recommendations.
 - 2. Do not mix more material than can be used in the materials expected pot life.
 - 3. Apply material at temperatures from 50° F to 90° F for optimum application.
 - 4. Brush or roller apply deck repair coating as recommended by manufacturer.

5. Allow coating to dry a minimum of 30 minutes. Do not install roof insulation until coating is dry.
- C. Corrosion Degree 2:
 1. Properly mix deck repair coating according to manufacturer's recommendations.
 2. Do not mix more material than can be used in the materials expected pot life.
 3. Apply material at temperatures from 50° F to 90° F for optimum application.
 4. Brush or roller apply deck repair coating as recommended by manufacturer.
 5. Mechanically attach deck repair plate to deck ribs with deck to side lap fasteners 6 inches on center maximum or a minimum of 2 screws per side.
- D. Corrosion Degree 3:
 1. Properly mix deck repair coating according to manufacturer's recommendations.
 2. Do not mix more material than can be used in the materials expected pot life.
 3. Apply material at temperatures from 50° F to 90° F for optimum application.
 4. Brush or roller apply deck repair coating as recommended by manufacturer.
 5. Allow coating to dry a minimum of 30 minutes. Do not install roof insulation until coating is dry.
 6. Overlay steel deck to match existing profile extending a minimum of 6 inches beyond the deficient area.
 7. Mechanically attach perimeter of overlay deck to existing deck ribs with deck to side lap fasteners 6 inches on center.
 - a. Where structural support is present, secure overlay deck to structural framing in accordance with the steel deck securement pattern.
 - b. Apply weight over the area being fastened to prevent deck deflection and ensure contact between fasteners, deck and/or structural steel.
 - c. Follow deck Manufacturer's instructions and SDI QA/QC .
- E. Corrosion Degree 4:
 1. Examine underside of steel deck for conduit located directly below the deck surface, anything suspended or fastened to the deck surface, etc. If necessary, detach objects from the bottom side of the deck being removed.
 2. Remove deck meeting Corrosion Degree 4.
 3. Provide roof deck where existing is removed.
 4. Overlap deck end laps no less than 6 inches and as required to secure through both panels and into the structural steel. Lap ends only over structural framing. Deck fasteners to penetrate deck panels no less than 2 inches from the edge of the panel.
 5. Overlap deck side laps to nest flush into neighboring deck panel. Install a minimum of two deck side lap fasteners between framing members.
 6. Apply weight over the area being fastened to prevent deck deflection and ensure contact between fasteners, deck and/or structural steel.
 7. Follow deck Manufacturer's instructions and SDI QA/QC .

3.4 STEEL DECK SECUREMENT

- A. Fasten steel deck panels to steel framing and steel deck side laps as described below:
 1. Field of Roof: Fasten deck to joist 12" on center, one fastener in every other deck rib.
 2. Perimeter of Roof: Fasten deck to joists 6" on center, one fastener in every deck rib.
 3. Deck Side-Lap Fastening:
 - a. Install two (2) deck panel side-lap fasteners between joists. Equally space the fasteners no greater than 30" apart.
 4. Fastener position/location:
 - a. Drive deck fasteners in the center of the bottom of the deck rib. Drive the fasteners within +/-1/4 inch of the center of the structural steel bearing surface. Drive fasteners along the center of the structural steel member, not near the edge of the structural steel.

- b. Drive deck side lap fasteners into the deck rib such that both panels are penetrated. Locate the side lap fasteners along the center of the bottom of the rib.
- 5. Apply weight over the area being fastened to prevent deck deflection and ensure contact between fasteners, deck and/or structural steel.

3.5 FIELD QUALITY CONTROL

- A. Monitor the inside of the building during removal and replacement of damaged steel decking to prevent damage to building, equipment and occupancy.
- B. Monitor hot work operations in strict accordance with the Owners requirements and local Code. These operations include, but are not limited to, cutting, welding, soldering, brazing, grinding, etc. and other spark or flame producing operations.

END OF SECTION 05 01 30

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Exterior non-load-bearing wall framing.

1.3 ACTION SUBMITTALS

- A Product Data: For each type of cold-formed steel framing product and accessory.
- B Shop Drawings:
 - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
- C Delegated-Design Submittal: For cold-formed steel framing and connections.

1.4 QUALITY ASSURANCE

- A Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. ClarkDietrich Building Systems.
 - 2. Marino/WARE.
 - 3. The Steel Network, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A Delegated Design: Engage a qualified professional engineer, as defined in Section "Quality Requirements," to design cold-formed steel framing.
- B Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated and dictated by building code.
 - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height.
 - 1) Brick Veneer: Horizontal deflection of L/600 of the wall height.
 - 3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
 - 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

- a. Upward and downward movement of 1 inch.
- 5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- C Cold-Formed Steel Framing Design Standards:
 - 1. Wall Studs: AISI S211.
 - 2. Headers: AISI S212.
- D AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

2.3 COLD-FORMED STEEL FRAMING, GENERAL

- A Steel Sheet: ASTM A 1003, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
 - 1. Grade: As required by structural performance.
 - 2. Coating: G60.
- B Steel Sheet for Vertical Deflection Clips: ASTM A 653, structural steel, zinc coated, of grade and coating as follows:
 - 1. Grade: As required by structural performance.
 - 2. Coating: G60.

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch.
 - 2. Flange Width: 1-5/8 inches.
- B Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch.
 - 2. Flange Width: 1-1/4 inches.
- C Vertical Deflection Clips: Manufacturer's standard bypass or head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ClarkWestern Building Systems, Inc.
 - b. Marino/WARE.
 - c. The Steel Network, Inc.
- D Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0538 inch.
 - 2. Flange Width: 1 inch plus the design gap for one-story structures.

2.5 FRAMING ACCESSORIES

- A Fabricate steel-framing accessories from steel sheet, ASTM A 1003, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - 1. Supplementary framing.
 - 2. Bracing, bridging, and solid blocking.
 - 3. Web stiffeners.
 - 4. Anchor clips.
 - 5. End clips.
 - 6. Foundation clips.
 - 7. Gusset plates.

8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

2.6 ANCHORS, CLIPS, AND FASTENERS

- A Steel Shapes and Clips: ASTM A 36, zinc coated by hot-dip process according to ASTM A 123.
- B Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- C Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- D Welding Electrodes: Comply with AWS standards.

2.7 MISCELLANEOUS MATERIALS

- A Galvanizing Repair Paint: ASTM A 780.
- B Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, with fluid consistency and 30-minute working time.
- C Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- D Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.8 FABRICATION

- A Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 1. Fabricate framing assemblies using jigs or templates.
 2. Cut framing members by sawing or shearing; do not torch cut.
 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.
 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 EXECUTION**3.1 EXAMINATION**

- A Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
- C Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- E Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H Install insulation, specified in Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- J Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: 16 inches maximum.

- C Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.
 - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 - 3. Connect vertical deflection clips to bypassing or infill studs and anchor to building structure.
 - 4. Connect drift clips to cold-formed metal framing and anchor to building structure.
- E Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 - a. Install solid blocking at centers indicated on Shop Drawings.
 - 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - 4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 FIELD QUALITY CONTROL

- A Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B Field and shop welds will be subject to testing and inspecting.
- C Testing agency will report test results promptly and in writing to Contractor and Architect.
- D Remove and replace work where test results indicate that it does not comply with specified requirements.
- E Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 REPAIRS AND PROTECTION

- A Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 40 00

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SECTION 05 50 00 - METAL FABRICATIONS

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 Specification Section.

1.2 SUMMARY

- A Section Includes:
 - 1. Non-decorative, utilitarian metal items and assemblies custom fabricated or manufactured from standard metal shapes and plates, and that are not specified in other Specification Sections.
 - 2. Steel framing and supports for applications where framing and supports are not specified in other Specification Sections including countertop support.
 - 3. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.
- B Products furnished, but not installed under this Section, include the following.
 - 1. Steel lintels.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. AWS: American Welding Society.
 - 2. GPR: Ground Penetrating Radar.
 - 3. MFMA: Metal Framing Manufacturers Association.
 - 4. SSPC: The Society for Protective Coatings.

1.4 COORDINATION

- A Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.5 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For manufactured items.
 - 2. Shop Drawings: Show fabrication and installation details for metal fabrications.
 - a. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- B Informational Submittals:
 - 1. Welding Certificates: Certification that welders to be employed for the Project have satisfactorily passed AWS qualification tests. Certifications shall be current within last 12 months.
 - 2. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
 - 3. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

- A Welding Qualifications: Qualify procedures and personnel according to the following, as applicable:
 - 1. AWS D1.1/D1.1M publication, Structural Welding Code - Steel.
 - 2. AWS D1.2/D1.2M publication, Structural Welding Code - Aluminum.

1.7 PROJECT CONDITIONS

- A Field Measurements: Verify locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 PRODUCTS

2.1 METALS

- A Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B Steel:
 - 1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - 2. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- C Cast Iron: Either gray iron, ASTM A 48, or malleable iron, ASTM A 47, unless otherwise indicated.
- D Aluminum:
 - 1. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.
 - 2. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
 - 3. Aluminum Castings: ASTM B 26, Alloy 443.0-F.

2.2 FASTENERS

- A General: Unless otherwise indicated, provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Maximum penetration of fasteners in slab shall be limited to 3/4-inch to avoid damaging the post tensioning tendons in the upper (ceiling) slab and the floor slab.
- B Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- D Machine Screws: ASME B18.6.3.
- E Lag Screws: ASME B18.2.1.
- F Plain Washers: Round, ASME B18.22.1.
- G Lock Washers: Helical, spring type, ASME B18.21.1.
- H Anchors, General: Anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Use 0.145-inch diameter power-actuated fasteners.
- I Post-Installed Anchors: Torque-controlled expansion anchors, unless otherwise indicated. Installation of post-installed expansion anchors or torque-controlled anchors in the upper (ceiling) slab and the floor slab requires X-ray or GPR of area to avoid damaging post-tensioned tendons.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
- J Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches on center. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.3 MISCELLANEOUS MATERIALS

- A Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- C Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- D Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.4 FABRICATION, GENERAL

- A Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D Form exposed work with accurate angles and surfaces and straight edges.
- E Weld corners and seams continuously to comply with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

- A General: Provide steel framing and supports not specified in other Specification Sections as needed to complete the work.
- B Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
- C Fabricate supports for operable partitions from continuous steel beams of sizes recommended by partition manufacturer with attached bearing plates, anchors, and braces as recommended by partition manufacturer. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
- D Galvanize miscellaneous framing and supports where indicated.

2.6 FINISHES, GENERAL

- A Finish metal fabrications after assembly.
- B Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.7 STEEL AND IRON FINISHES

- A Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

- B Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean items of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C Shop prime iron and steel items not indicated to be galvanized unless otherwise indicated.
 - 1. Shop prime with universal shop primer indicated.
- D Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

- A Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Cast Aluminum: Heavy coat of bituminous paint.
 - 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B Anchor supports for overhead-hung assemblies securely to, and rigidly brace from, building structure.

3.3 ADJUSTING AND CLEANING

- A Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide at least a 2.0-mil dry film thickness.
- B Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 50 00

SECTION 06 10 00 - ROUGH CARPENTRY, ROOF (ALTERNATE)

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Rough Carpentry work required to facilitate installation of roof assembly including:
 - a. Provide pressure treated rough carpentry.
 - b. Resecure rough carpentry to remain in place.
 - c. Replace damaged, rotted or deteriorated rough carpentry with pressure treated rough carpentry.

1.2 DEFINITIONS

- A. Rough Carpentry includes carpentry work not specified as part of other Sections and generally not exposed.
- B. KDAT: Kiln Dried After Treatment.

1.3 SUBMITTALS

- A. Refer to Section 01 33 00 - Submittal Procedures.
- B. Product Data: Manufacturer's Product Data Sheets for materials specified certifying material complies with specified requirements.

1.4 QUALITY ASSURANCE

- A. Inspect wood for damage, warping, splits, and moisture content as defined by the applicable wood products industry standards. Reject materials that do not comply.
- B. Rough carpentry to present a smooth, consistent substrate for roof system and flashing installation.
- C. Qualifications of workers: Provide sufficient, competent and skilled carpenters in accordance with accepted practices and supervisors present during execution of the work. Be thoroughly familiar with type of construction involved and related work and techniques specified.
- D. Moisture Content:
 - 1. Kiln Dry After Treatment (KDAT).
 - 2. Do not store or install treated lumber used in the roofing assembly in a manner exposing it to rain.
 - 3. Lumber: 19% or less before being covered/enclosed into roofing assembly.
 - 4. Plywood: 18% or less before being covered/enclosed into roofing assembly.
- E. Label: Bear the stamp of the AWWPA Quality Mark, indicating compliance with the requirements of the AWWPA Quality Control Program.
- F. Lumber Standards: Comply with PS 20 and applicable rules of perspective grading and inspecting agencies for species and products indicated.
- G. Plywood Standards: Comply with PS 1 (ANSI A 199.1) or, for products not manufactured under PS 1 provisions, with applicable APA Performance Standard for type of panel indicated.
- H. Installation of rough carpentry for roofing and flashing terminations to ensure plumb, uniform and level metal flashings.
- I. Install rough carpentry to ensure roof membrane flashing transitions are smooth for positive roof drainage and appearance.
- J. Installation of fasteners and associated materials to secure rough carpentry as detailed and specified.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Store a minimum of four inches above ground on framework or blocking. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks. Cover with protective waterproof covering providing for adequate air circulation and ventilation
- B. Avoid exposure to precipitation during shipping, storage or installation. If material does become wet, replace or permit to dry prior to covering or enclosure by other roofing, sheet metal or other construction materials (except for protection during construction).
- C. Upon delivery to job site, place materials in area protected from weather.
- D. Do not store seasoned materials in wet or damp portions of building.
- E. Protect sheet materials from corners breaking and damaging surfaces, while unloading.

PART 2 PRODUCTS**2.1 MATERIALS**

- A. Wood Nailers/Blocking:
 - 1. No. 2 or better spruce or southern yellow pine lumber meeting PS 20 standards.
 - 2. Sound, thoroughly seasoned, dressed to nominal finish dimension, and free of warpage, cupping, and bowing.
 - 3. Dimensions determined by job conditions or as indicated in detail drawings.
- B. Plywood:
 - 1. APA PS 1 Rated Sheathing, 32/16, Exposure 1, Grade C, thickness to match existing or as indicated in Contract Drawings.
 - 2. Minimum thickness of 3/4" or as required to match existing.
- C. Preservative Treatment:
 - 1. ACQ as manufactured for Viance in accordance with AWP A U1 and P5, P26, P27, P28, P29 as appropriate. Use 0.15 lb/cu ft of ACQ in accordance with AWP A U1, Use Category UC3B.
 - 2. Ecolife or EL2 as manufactured by Viance. Use 0.019 lb/cu ft of Ecolife or EL2 (+ 0.2 lb/cu ft MCS) in accordance with AWP A U1, Use Category UC3B.
 - 3. Micro-Guard as manufactured by Hoover Treated Wood Products, Inc. in accordance with AWP A U1, Use Category UC3B.
 - 4. Engineers accepted equivalent.

2.2 FASTENERS

- A. General:
 - 1. Stainless steel or as accepted by Engineer.
 - 2. Fasteners securing pressure treated lumber manufactured for corrosion resistance and exposures associated with pressure treated wood applications.
 - 3. Do not use nails at roof edges to fasten rough carpentry, lumber, plywood, etc. Use screws, anchors, and/or machine bolts to secure rough carpentry at roof perimeter edges.
 - 4. Do not use masonry screws, spikes, and drive-pins to fasten edge/perimeter nailers to concrete. Utilize minimum 1/2-inch diameter anchors or bolts to secure roof edge nailers to concrete.
 - 5. Do not secure or fasten edge/perimeter wood nailers to hollow core concrete masonry; grout concrete masonry units and provide minimum embedment of fasteners to meet anchor manufacturer's installation instructions.
 - 6. Do not secure edge/perimeter wood nailers to brick masonry as the primary securement method.
- B. Nails: 8d (0.135 inch shank diameter), 10d (0.148 inch shank diameter) or 16d (0.162 inch shank diameter), type 316 stainless steel, ring shank nails. meeting ASTM F1667/F1667M. Length to embed into base substrate a minimum 1-1/2 inches.
 - 1. Maze Nails

2. Anchor Staple and Nail
 3. Simpson Strong Tie
 4. Manasquan Premium Fasteners
 5. Engineers accepted equivalent.
- C. Screws: No. 10 or greater, stainless steel wood screws with flat head, or insulation screws. Length to embed into base substrate a minimum of 1-1/2 inches.
- D. Self-Drilling Screws:
1. Zinc coated steel meeting ASTM A153/A153M with corrosion resistant coating, FM Approved, self-drilling, self-tapping, winged screw. Length to provide minimum 3 pitches of thread through metal thicknesses or 3/4" through top flange of steel deck. Diameter, threads and drill point determined based upon wood and substrate component meeting manufacturer's published data.
 - a. ITW Buildex Tek.
 - b. SFS Intec.
 - c. Engineers accepted equivalent.
 2. For structural steel (greater than 12-gauge): #12-24 DP5 (for steel thickness up to 1/2 inch) or DP4 (for steel thickness from 1/8 inch to 3/8 inch), flat or hex head, corrosion resistant, self-drilling/self-tapping fastener of length to provide minimum 3 pitches of thread through metal thicknesses.
 - a. ITW Buildex Tek.
 - b. SFS Intec.
 - c. Engineers accepted equivalent.
 3. Plywood Attachment:
 - a. ITW Building Tek's Wood-to-Metal Fastener
 - 1) #10-24 Drill Point #3 for 16 gauge to 0.175 inch thick steel
 - 2) #10-16 Drill Point #3 for 22 gauge to 0.175 inch thick steel
 - b. Blazer Self-Drilling Screw Wood to Metal Applications
 - 1) #10-24 Blazer-3 with Wings for 18 gauge to 3/16 inch thick steel
 - 2) #10-16 Blazer-3 Long Pilot for 26 gauge to 1/8 inch thick steel
 - 3) #12-24 Blazer-5 with Wings for 1/4 inch to 1/2 inch thick steel
 - c. Hilti
 - 1) S-WD 10-24 PWH #3 for 18 gauge to 0.175 inch thick steel
 4. Wood Blocking:
 - a. ITW Building Tek's Wood-to-Metal Fastener
 - 1) #12-24 Drill Point #4 for 1/8 inch thick to 1/4 inch thick steel
 - b. Blazer Self-Drilling Screw Wood to Metal Applications
 - 1) #12-24 Blazer-2 with Wings for 18 gauge to 0.210 inch thick steel
 - 2) 1/4-20 Blazer-5 with Wings for 0.210 inch to 1/2 inch thick steel
 - c. Hilti Wood Drill Screws
 - 1) S-WW 12-24 1/2 PFH #4 Wings for 18 gauge to 0.232 inch thick steel
 - 2) S-WW 14-20 #4 PFH Wings for 18 gauge to 0.25 inch thick steel
- E. Concrete/Masonry Anchors: Sleeve-Type, or Wedge-Type, Expansion Anchor: Minimum 1/2-inch diameter, Type 304 or 316 Stainless Steel, Expansion Anchor Bolt Assembly of length as required to provide minimum embedment as required by fastener manufacturer based upon substrate being secured but not less than minimum 5-inch embedment into concrete walls or reinforced, grouted CMU walls and provide 1 inch embedment into structural concrete roof deck.
1. Lok/Bolt, Power Bolt or Power-Stud by Powers Fasteners
 2. Redi-Bolt, Dynabolt or Trubolt by Red Head Anchoring Systems
 3. Kwik Bolt by Hilti
 4. Engineers accepted equivalent.
- F. Washers: Fasteners heads for screws, anchors and bolts terminating at the surface of nailers provided with a minimum 5/8-inch diameter, stainless steel or similar corrosion resistance flat washer provided by fastener manufacturer, unless washer is provided from factory as part of the fastener assembly.

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Inspect substrates to receive rough carpentry, and ensure substrates are in satisfactory condition prior to installation of rough carpentry.
- B. Inspect rough carpentry including fasteners for material condition before proceeding with installation. Replace deteriorated, rotted, damaged, split, warped, twisted or wet materials. Refer to Section 01 22 00 - Unit Prices.
- C. Remove cants, tapered edge strips, debris, fasteners, etc. that interfere with the installation of rough carpentry.
- D. Notify Engineer in writing of unsatisfactory conditions.
- E. Commencement of work signifies acceptance of substrates. Correct defects in work resulting from accepted substrates at no additional expense to the Owner.

3.2 PREPARATION

- A. Roof Deck and Structure:
 - 1. Adjust substrates to receive rough carpentry to ensure completed rough carpentry installation is acceptable for roofing and sheet metal flashings.
 - 2. Coat steel decking with a uniform, heavy application of asphalt primer, or separate by membrane or other acceptable means to prevent contact between steel and treated wood products.
 - a. Do not allow treated lumber to make direct contact with steel decking.

3.3 INSTALLATION

- A. Replace damaged or deteriorated wood blocking, nailers, and curbs.
- B. Re-secure wood nailers at roof edges that are to remain with fastener type and spacing to comply with this section.
- C. Install wood blocking, nailers, and curbs to achieve a minimum 8-inch flashing height above the roof membrane.
- D. Install wood nailers at perimeter roof edges and low-profile expansion joints to match insulation height while maintaining a constant nailer height along perimeter edges.
- E. Install wood blocking and nailers concurrently with roof system installation. Removal of insulation and/or folding back of roof membrane to install wood blocking and nailers at a later date is not acceptable.
- F. Set rough carpentry to required levels and lines, with members plumb, true to line, material cut to fit, and braced to hold work in proper position. Use a belt sander to remove obtrusive surface irregularities. Drive nails and spikes home; and pull bolt nuts tight with heads and washers in close contact with the wood.
- G. Fit rough carpentry to other construction, scribe and cope for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction. Install joints between wood for a smooth transition.
- H. Attachment:
 - 1. Consult the fastener manufacturer's published literature and follow the recommended requirements for pre-drilling, cleaning, placement and compatibility of substrates. Follow manufacturer's requirements for fasteners spacing, substrate preparation and substrate embedment where not specified.
 - 2. Securely attach rough carpentry work to substrate with fasteners anchored to resist the required upward and outward design wind loads.
 - 3. Meet the requirements herein and that of FM DS 1-49 for rough carpentry attachment.
 - 4. Install bolts flush with the top surface of nailers where possible to avoid countersinking. Bolt bottom nailers then fasten above nailers where possible. Countersink bolts, nuts and screws flush with wood surfaces only as detailed; countersink a maximum of one half the board thickness.

5. Install fasteners without splitting wood. Pre-drill where necessary. Replace split or damaged wood to provide acceptable conditions.
6. For anchors, pre-drill concrete and masonry units to prevent damage or cracking of the masonry. Consult fastener manufacturer's published guides. Repair or replace damaged masonry with fasteners re-installed in an acceptable location.
7. Fastener spacing: Staggered in two rows 1/3 the board width when board is wider than 6 inches and installed within 3 to 4 inches of each end.
 - a. Nails: Securing wood to wood spaced as indicated below with two nails installed within 3 to 4 inches of each end of nailer lengths to prevent wood from twisting at board joints. Do not utilize nails at roof edges, utilize screws.
 - 1) Perimeter (Zone 2) spacing of 12 inches maximum and Corner (Zone 3) spacing of 6 inches maximum.
 - b. Screws: Securing wood to wood spaced as indicated below with two screws installed within 3 to 4 inches of each end of nailer lengths to prevent wood from twisting at board joints.
 - 1) Perimeter (Zone 2) spacing of 12 inches maximum and Corner (Zone 3) spacing of 6 inches maximum.
 - c. Self-Drilling Screws: Securing wood to steel spaced as indicated below with one screw within 3 to 4 inches of each end of nailer lengths to prevent wood from twisting at board joints.
 - 1) Perimeter (Zone 2) spacing of 12 inches maximum and Corner (Zone 3) spacing of 6 inches maximum.
 - d. Concrete/Masonry Anchors: Spaced as indicated below and an additional fastener within 3 to 4 inches of each end of nailer to prevent boards from twisting at board joints.
 - 1) Perimeter (Zone 2) spacing 48 inches max. and Corner (Zone 3) spacing 24 inches max.
 - e. Masonry Screws: Securing wood to concrete or masonry units as indicated below with fasteners installed within 3 to 4 inches of each end of nailer lengths to prevent wood from twisting at board joints. Do not utilized at perimeter roof edges.
 - 1) Perimeter (Zone 2) spacing of 12 inches maximum and Corner (Zone 3) spacing of 6 inches maximum.
8. Plywood Sheathing Securement: Secure at 12 inches on center in Perimeter (Zone 2) and 6 inches on center in Corner (Zone 3) staggered each direction.
- I. Select fasteners of size and length that are not exposed from the building interior and/or from the ground, or remove protruding fasteners, paint or finish to eliminate exposure.
- J. Thickness of wood nailers flush with adjacent insulation and other materials. Install additional fasteners to ensure nailers are flush.
- K. Unless otherwise detailed, install plywood used as blocking or shim below dimensional lumber such that the fastener head terminates at the dimensional lumber surface.
- L. Do not utilize wood nailers at roof perimeters, expansion joints, roof area dividers, etc. less than 3 feet long.
- M. When multiple nailers are installed stacked two high or more, offset nailers no less than 12" such that joints at nailer end do not line-up vertically.
- N. Fasten each end of nailers with additional fasteners to ensure a smooth transition at butted joints, and to prevent warping and/or twisting.
- O. Shims:
 1. Provide plywood and lumber shims as required for the specified height and thickness.
 2. Shims to make full contact with stacked rough carpentry. Partial shim contact, and small shim pieces spaced apart are not acceptable.
- P. Curbs:
 1. Adjust wood curbs to support rooftop piping, ducts, equipment, etc.
 2. Raise equipment to provide required flashing height for roofing.

3.4 CLEANING

- A. Ensure the site and building are cleaned to meet pre-construction conditions, as accepted by the Owner.
- B. Clean the site and building of saw dust from lumber, fasteners and other debris.
- C. Repair or replace damages to the building, grounds, equipment and site to meet pre-construction conditions, as accepted by the Owner.

END OF SECTION 06 10 00

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Wood blocking, furring, and nailers.
 - 2. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. AHJ: Authority (Authorities) Having Jurisdiction.
 - 2. ALSC: American Lumber Standards Committee, Inc.
 - 3. DOC: Department of Commerce.
 - 4. FRT: Fire-Retardant Treated.
 - 5. GPR: Ground Penetrating Radar.
 - 6. NeLMA: Northeastern Lumber Manufacturers Association.
 - 7. NLGA: National Lumber Grades Authority.
 - 8. S4S: Surfaced Four Sides.
 - 9. SPIB: Southern Pine Inspection Bureau.
 - 10. WCLIB: West Coast Lumber Inspection Bureau.
 - 11. WWPA: Western Wood Products Association.
- B Definitions:
 - 1. Boards or Strips: Means lumber of less than 2 inches nominal size in least dimension.
 - 2. Dimension Lumber: Means lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.

1.4 SUBMITTALS

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

1.5 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
 - 3. Dress lumber, S4S, unless otherwise indicated.
- B Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

2.2 FRT LUMBER

- A General: Where FRT materials are indicated, materials are to comply with requirements in this article, that are acceptable to the AHJ, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B FRT Lumber by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Treatment shall not promote corrosion of metal fasteners.
 - 2. Provide one of the following:
 - a. Exterior Type: Treated materials are to comply with requirements specified above for FRT lumber by pressure process after being subjected to accelerated weathering in accordance with ASTM D 2898. Suitable for use in interior applications.
 - b. Interior Type A: Treated materials are to have a moisture content of 28 percent or less when tested in accordance with ASTM D 3201/D 3201M at 92 percent relative humidity.
- C Kiln-dry lumber after treatment to a moisture content of no more than 19 percent. Kiln-dry plywood after treatment to moisture content of no more than 15 percent.
- D Identify FRT wood with appropriate classification marking of qualified testing agency and other information required by the AHJ.
- E Application: Treat all interior miscellaneous rough carpentry.

2.3 MISCELLANEOUS LUMBER

- A General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Furring.
- B Concealed Boards: Moisture content of no more than 19 percent and any of the following species and grades:
 - 1. Mixed southern pine or southern pine, No. 2 grade; SPIB.
 - 2. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
 - 3. Eastern softwoods, No. 2 Common grade; NeLMA.
- C For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.4 FASTENERS

- A General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.
 - 1. Maximum penetration of fasteners in slab shall be limited to 3/4-inch to avoid damaging the post tensioning tendons in the upper (ceiling) slab and the floor slab.
- B Nails, Brads, and Staples: ASTM F 1667.
- C Screws for Fastening to Metal Framing: ASTM C 954, length as recommended by screw manufacturer for material being fastened.
- D Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to the AHJ, based on ICC-ES AC70.
 - 1. Use 0.145-inch diameter power-actuated fasteners.
- E Post-Installed Anchors: Fastener systems with an evaluation report acceptable to the AHJ, as appropriate for the substrate. Installation of post-installed expansion anchors or torque-controlled anchors in the upper (ceiling) slab and the floor slab requires X-ray or GPR of area to avoid damaging post-tensioned tendons.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

- A Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B Provide blocking as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- C Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- D Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.10.1, "Fastening Schedule," in the NCBC.
 - 2. ICC-ES evaluation report for fastener.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILERS

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

3.3 WOOD FURRING INSTALLATION

- A Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

END OF SECTION 06 10 53

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SECTION 06 16 00 - SHEATHING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Wall sheathing.
 - 2. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. AHJ: Authority (Authorities) Having Jurisdiction.
 - 2. GA: Gypsum Association.
- B Definitions:
 - 1. Manufacturer: Means the sheathing manufacturer, as applicable, unless otherwise indicated.

1.4 SUBMITTALS

- A Action Submittals:
 - 1. Product Data Submittals: For each product; include Health Product Declaration and Environmental Product Declaration. Indicate component materials and dimensions and include construction and application details.

1.5 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.1 GYPSUM WALL SHEATHING

- A Wall Sheathing: At the Contractor's option, provide one of the following wall sheathing types.
 - 1. Glass-Mat Gypsum Sheathing: ASTM C 1177/C 1177M.
 - a. Products: Subject to compliance with the Contract Documents, provide one of the following.
 - 1) "GlasRoc Sheathing Type X" manufactured by CertainTeed.
 - 2) "DensGlass Fireguard Sheathing" manufactured by Georgia-Pacific Gypsum.
 - 3) "Gold Bond eXP Fire-Shield Sheathing" manufactured by National Gypsum Company.
 - 4) "Securock Brand Ultralight Glass-Mat Sheathing Firecode X" manufactured by USG Corporation.
 - b. Type and Thickness: Type X, 5/8 inch thick.
 - c. Size: At least 48 by 96 inches.

2.2 FASTENERS

- A General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Provide fasteners with hot-dip zinc coating complying with ASTM A153/A 153M or of Type 304 stainless steel.
- B Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to the AHJ, based on ICC-ES AC70.

- C Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.
 - 1. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C 954.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

- A Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. Table 2304.10.1, "Fastening Schedule," in the NCBC.
 - 2. ICC-ES evaluation report for fastener.
- D Coordinate wall and parapet sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- F Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 INSTALLATION OF GYPSUM SHEATHING

- A Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 2. Install panels with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
 - 3. Install panels with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.
 - 1. Space fasteners approximately 8 inches on center and set back at least 3/8 inch from edges and ends of panels.
- D Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.
 - 1. Space fasteners approximately 8 inches on center and set back at least 3/8 inch from edges and ends of panels.

END OF SECTION 06 16 00 06 16 00

SECTION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Reception desk.
 - 2. Checkout tables.
 - 3. Book cubes.
 - 4. Vanity aprons.
 - 5. Counter/ work surface.
 - 6. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. AWI: Architectural Woodwork Institute.
 - 2. SCAQMD: South Coast Air Quality Management District.
 - 3. VOC: Volatile Organic Compound.

1.4 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For the following.
 - a. Anchors.
 - b. Adhesives Indicate VOC content.
 - c. Shop finishing materials.
 - 2. Shop Drawings: Include dimensioned plans, elevations, sections, and attachment details. Detail fabrication and installation.
- B Informational Submittals:
 - 1. Product Certificates: For adhesives.

1.5 QUALITY ASSURANCE

- A Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
 - 1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.
- B Installer Qualifications: Manufacturer of products.

1.6 DELIVERY, STORAGE, AND HANDLING

- A Do not deliver interior architectural woodwork until painting and similar finish operations that might damage woodwork have been completed in installation areas.
- B Store woodwork in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

- A Environmental Limitations: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of the construction period.

- B Field Measurements: Where interior architectural woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 ARCHITECTURAL WOODWORK, GENERAL

- A Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 - 1. The Contract Documents may contain requirements that are more stringent than the Architectural Woodwork Standards. Comply with the Contract Documents and Architectural Woodwork Standards.
 - 2. Architectural Woodwork Standards Grade: Custom.

2.2 ARCHITECTURAL WOODWORK FABRICATIONS

- A Architectural Woodwork Standards Grade: Custom.
- B Core: Exterior grade plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.
 - 1. Plastic Laminate Cladding:
 - 2. Basis-of-Design Products: Subject to compliance with the Contract Documents design is based on product indicated in in the Finish Material Legend on the Drawings.
 - 3. Acceptable Manufacturers: Subject to compliance with the Contract Documents provide the basis-of-design products or comparable approved products by one of the following.
 - a. Polilam.
 - b. Wilsonart, LLC.
- C Dimensions and Profiles: As indicated on the Drawings.

2.3 MISCELLANEOUS MATERIALS

- A Fasteners: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches into wood substrate.
- B Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.
- C Adhesives: Product recommended by fabricator for each material and substrate for secure anchorage.
 - 1. Allowable VOC Content: Adhesives, adhesive bonding primers, and adhesive primers must comply with SCAQMD Rule 1168 VOC limits.
 - a. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene).
- D Accessories: As supplied, recommended, or required by the manufacturers or fabricators and as necessary for a complete installation.

2.4 FABRICATION

- A Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.
- B Complete fabrication, including assembly and finishing, to maximum extent possible before shipment to Project site.
 - 1. Disassemble components only as necessary for shipment and installation.
 - 2. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.

PART 3 EXECUTION

3.1 PREPARATION

- A Before installation, condition interior architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.
- B Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION

- A Grade: Install interior architectural woodwork to comply with same grade as item to be installed.
- B Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed during shop fabrication.
- C Install interior architectural woodwork level, plumb, true in line, and without distortion.
 - 1. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates, unless otherwise indicated or required to be adhered.
 - 1. Secure with countersunk, concealed fasteners and blind nailing.
 - 2. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with interior architectural woodwork.

3.3 REPAIR

- A Repair damaged and defective interior architectural woodwork, where possible, to eliminate functional and visual defects.
- B Where not possible to repair, replace defective woodwork.

3.4 CLEANING

- A Clean interior architectural woodwork on exposed and semiexposed surfaces.

END OF SECTION 06 40 23

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SECTION 06 41 16 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Plastic-laminate-clad architectural cabinets.
 - 2. Plastic-laminate-clad architectural countertops.
 - 3. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. AWI: Architectural Woodwork Institute.
 - 2. BHMA: Builders Hardware Manufacturers Association.
- B Definitions:
 - 1. Manufacturer: Means the plastic-laminate material manufacturer unless otherwise indicated.

1.4 COORDINATION

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

1.5 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For each type of product. Include current Health Product Declaration and Environmental Product Declaration.
 - 2. Shop Drawings:
 - a. Include plans, elevations, sections, and attachment methods to floor and wall details; Detail fabrication and installation, including countertop field joints.
 - b. Show large-scale details.
 - c. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Specification Sections.
 - d. Show locations and sizes of cutouts and holes for items installed in plastic-laminate-clad architectural cabinets.
- B Informational Submittals:
 - 1. Qualification Data: For manufacturer and installer.
 - 2. Product Certificates: For each type of product.
- C Closeout Submittals:
 - 1. Keys: Provide Owner's representative with sets of 2 keys for each cabinet lock.

1.6 QUALITY ASSURANCE

- A Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B Installer Qualifications: Manufacturer of products.

1.7 DELIVERY, STORAGE, AND HANDLING

- A Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
- B Deliver countertops only after cabinets and supports on which they will be installed have been completed in installation areas.
- C Keep surfaces of countertops covered with protective covering during handling and installation.

1.8 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 between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- B Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.
 - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

PART 2 PRODUCTS**2.1 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS**

- A Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. The Contract Documents may contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.
- B Architectural Woodwork Standards Grade: Custom.
- C Type of Construction: As indicated on the Drawings.
- D Door and Drawer-Front Style: As indicated on the Drawings.
- E High-Pressure Decorative Laminate: ISO 4586-3.
 - 1. Basis-of-Design Products (PL): Subject to compliance with the Contract Documents, design is based on the products indicated in the Finish Material Schedule on the Drawings.
 - 2. Acceptable Manufacturers: Subject to compliance with the Contract Documents provide the basis-of-design products or comparable approved products by one of the following.
 - a. Polilam.
 - b. Wilsonart LLC.
 - 3. Pattern Direction: As indicated.
- F Materials for Semiexposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, ISO 4586-3.
 - a. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.
 - b. Edges of Plastic-Laminate Shelves; PVC tape, at least 0.018-inch thick, matching laminate in color, pattern, and finish.
 - 2. Drawer Sides and Backs: Solid-hardwood lumber.
 - 3. Drawer Bottoms: Hardwood plywood.
- G Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, ISO 4586-3.
- H Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 - 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

2.2 PLASTIC-LAMINATE-CLAD COUNTERTOPS

- A Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-clad countertops indicated for construction, finishes, installation, and other requirements.
 - 1. The Contract Documents may contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.
- B Grade: Custom.
- C High-Pressure Decorative Laminate: ISO 4586-3.
 - 1. Basis-of-Design Product (PL): Subject to compliance with the Contract Documents, provide product indicated in the Finish Material Schedule on the Drawings.
 - 2. Acceptable Manufacturers: Subject to compliance with the Contract Documents, provide the basis-of-design product or comparable approved product by one of the following.
 - a. Polilam.
 - b. Wilsonart LLC.
- D Core Material:
 - 1. Typical: MDF made with exterior glue or exterior-grade plywood.
 - 2. Core Material at Sinks: Exterior-grade plywood.
 - 3. Edges: PVC tape, at least 0.018-inch thick, matching laminate in color, pattern, and finish.
- E Core Thickness: 3/4 inch.

2.3 WOOD MATERIALS

- A Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
- B Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 - 1. Softwood Plywood: DOC PS 1.
 - 2. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.

2.4 CABINET HARDWARE AND ACCESSORIES

- A General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- B Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 135 degrees of opening, self-closing.
- C Back-Mounted Pulls: ANSI/BHMA A156.9, B0201, as selected by the Architect.
- D Shelf Rests: ANSI/BHMA A156.9, B04013; metal.
- E Drawer Slides: ANSI/BHMA A156.9.
 - 1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer.
 - a. Type: Full extension, easy close.
 - b. Material: Epoxy-coated steel with polymer rollers.
 - 2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-overtravel-extension type; zinc-plated-steel ball-bearing slides.
 - 3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 2.
 - 4. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide Grade 1.
 - 5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.
 - 6. For computer keyboard shelves, provide Grade 1.
 - 7. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-100.
- F Door Locks: ANSI/BHMA A156.11, E07121; verify locations with Architect.
- G Drawer Locks: ANSI/BHMA A156.11, E07041; verify locations with Architect.
- H Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.

- I Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated, and as indicated on the Drawings.
- J For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

- A Furring, Blocking, Shims, and Hanging Strips: As specified in Section 06 10 53 Miscellaneous Rough Carpentry.
- 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.

2.6 FABRICATION

- A Fabricate architectural cabinets to dimensions, profiles, and details indicated.
- B Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets.
- C 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.
- D Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION

- A Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.
- B Cabinet Installation:
 - 1. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
 - 2. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
 - 3. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
 - a. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 - b. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - c. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches on center with No. 10 wafer-head screws sized for not less than 1-1/2 inch penetration into wood framing, blocking, or hanging strips.
- C Countertop Installation:
 - 1. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.

2. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by countertop manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
 - a. Secure field joints in countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten in accordance with manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
3. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
4. Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
5. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inches variation from a straight, level plane.
6. Secure backsplashes to walls with adhesive.
7. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 ADJUSTING AND CLEANING

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

END OF SECTION 06 41 16

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SECTION 06 42 19 - PLASTIC-LAMINATE-FACED WOOD PANELING

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 Specification Section.

1.2 SUMMARY

- A Section Includes:
 - 1. Plastic-laminate-faced wood paneling.
 - 2. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation or application.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. AHJ: Authority (Authorities) Having Jurisdiction.
 - 2. FRT: Fire-Retardant-Treated.
 - 3. MDF: Medium Density Fiberboard.
- B Definitions:
 - 1. Manufacturer: Means the plastic-laminate cladding manufacturer unless otherwise indicated.

1.4 COORDINATION

- A Coordinate sizes and locations of blocking, furring, reinforcements, and other related units of work specified in other Specification Sections to ensure that paneling can be installed as indicated.

1.5 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For plastic-laminate-faced wood paneling.
 - a. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
 - 2. Shop Drawings: For plastic-laminate-faced wood paneling.
 - a. Include plans, elevations, sections, and attachment details.
 - b. Show locations and sizes of blocking, including concealed blocking specified in other Specification Sections.
- B Informational Submittals:
 - 1. Qualification Data: For fabricator.
 - 2. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.6 QUALITY ASSURANCE

- A Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1.7 DELIVERY, STORAGE, AND HANDLING

- A Do not deliver paneling until painting and similar operations that might damage paneling have been completed in installation areas. Store paneling in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.8 FIELD CONDITIONS

- A Environmental Limitations without Humidity Control: Do not deliver or install paneling until building is enclosed, wet-work is complete, and HVAC system is operating and will maintain temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

- B Field Measurements: Where paneling is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed blocking and reinforcements that support paneling by field measurements before being enclosed/concealed by construction and indicate measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 PANELING, GENERAL

- A Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-faced wood paneling (decorative laminate surfacing) indicated for construction, finishes, installation, and other requirements.
 - 1. The Contract Documents may contain requirements that are more stringent than the referenced woodwork quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.

2.2 PLASTIC-LAMINATE-FACED WOOD PANELING

- A Grade: Custom.
- B Plastic Laminate: High-pressure decorative laminate complying with ISO 4586-3.
 - 1. Basis-of-Design Products: Subject to compliance with the Contract Documents the design is based on products indicated in the Finish Material Schedule on the Drawings.
 - 2. Acceptable Manufacturers: Subject to compliance with the Contract Documents provide the basis-of-design products or comparable approved products by one of the following.
 - a. Wilsonart LLC.
 - b. PoliLam.
- C Panel Core: MDF.
 - 1. Thickness: 3/4 inch.
- D Exposed Panel Edges: Plastic-laminate matching faces.
- E Adhesives for Bonding Plastic Laminate: As selected by fabricator to comply with Project conditions.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive used for faces.
- F Assemble panels by gluing .

2.3 MATERIALS

- A Materials, General: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.
- B Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.
 - 1. MDF: ANSI 208.2, Grade 130.

2.4 INSTALLATION MATERIALS

- A Z-Clips: Concealed panel hanger clips. Subject to compliance with the Contract Documents provide products by one of the following.
 - 1. Eagle Aluminum
 - 2. Monarch Metal.
 - 3. Star Hanger Systems.

2.5 FABRICATION

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

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

PART 3 EXECUTION

3.1 PREPARATION

- A Before installation, condition paneling to humidity conditions in installation areas.
- B Before installing paneling, examine shop-fabricated work for completion.

3.2 INSTALLATION

- A Grade: Install paneling to comply with quality standard grade of paneling to be installed.
- B Install paneling level, plumb, true in line, and without distortion. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches. Install with no more than 1/16 inch in 96 inch vertical cup or bow and 1/8 inch in 96 inch horizontal variation from a true plane.
- C Anchor paneling to supporting substrate with concealed panel-hanger clips. Do not use face fastening unless.

3.3 ADJUSTING AND CLEANING

- A Repair damaged and defective paneling, where possible, to eliminate defects. Where not possible to repair, replace paneling. Adjust for uniform appearance.
- B Clean paneling on exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06 42 19

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SECTION 07 01 50 - PREPARATION FOR REROOFING (ALTERNATE)

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Complete preparatory work prior to roof installation including but not limited to:
 - a. Removal of roof assemblies down to the steel deck.
 - b. Raising of mechanical units and/or HVAC units to meet the required minimum flashing height.
 - c. Installation and/or modification of through wall overflow scuppers.
 - d. Under roof deck survey (for pre-existing damages).

1.2 DEFINITIONS

- A. Removal: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain property of the Owner.
- B. Existing to remain: Protect construction indicated to remain against damage and soiling during demolition. When accepted by Engineer, items may be removed to a suitable, protected storage location during demolition, cleaned and reinstalled in their original locations.
- C. Material ownership: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished items become the Contractor's property. Remove demolished items from the site.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's Product Data Sheets for materials specified certifying material complies with specified requirements.
- B. Manufacturer's Instructions: Latest edition of the Manufacturer's current material specifications and installation instructions.

1.4 EXISTING ROOF ASSEMBLIES

- A. Refer to Contract Drawings for existing roof system composition.

1.5 QUALITY ASSURANCE

- A. Qualifications: Previous experience removing roof systems.
- B. Requirements: Comply with governing EPA regulations and hauling/disposal regulations of authorities having jurisdiction.

1.6 SCHEDULING

- A. Do not disrupt Owner's operations during demolition. Provide 72 hours notification to Owner of activities that affect Owner's operations.

1.7 WARRANTIES

- A. Repair or replace damage to existing items under warranty with materials acceptable to the Warrantor.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Soil Pipe No-Hub Extensions:

1. Provide no-hub coupling with coupling conforming to CISPI 310 and ASTM C 1277. Gasket to be made from elastomeric compound meeting ASTM C 564. 5/16" hex-head screw band assembly. Inside diameter to match outside diameter of soil pipe being raised.
2. Cast iron pipe of diameter to match existing and length as necessary to provide minimum 8" and maximum 12" flashing height.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Survey conditions to determine extent of demolition.
- B. Record the conditions of items to be removed/reinstalled and items to be removed/salvaged.
- C. Do not remove elements that result in structural deficiency or collapse the structure or adjacent structures during demolition.
- D. Inspect substrate for soundness and notify Engineer in writing of deficiencies. Commencement of work signifies acceptance of site conditions.

3.2 PREPARATION

- A. Do not begin demolition until utilities have been disconnected/sealed and have been verified as such in writing.
- B. Do not close off or obstruct streets, walks or other adjacent occupied facilities without permission from Owner and authorities having jurisdiction.
- C. Provide safe conditions for pedestrians. Erect temporary protection, walkways, fences, railings and canopies as required by OSHA and other governing authorities.
- D. Provide protection for adjacent building, appurtenances and landscaping to remain. Erect temporary fencing around trees to remain.
- E. Provide temporary weather protection as required to prevent water leakage and damaged to exterior or interior of adjacent structures.

3.3 UTILITIES/SERVICES

- A. Maintain utilities that are to remain in service and protect them against damage during selective site demolition unless authorized in writing by the Owner and authorities having jurisdiction.
 1. Locate conduits and equipment attached to the underside of the decking prior to reroofing. Do not disturb conduits or interior components/equipment with insulation fasteners.
 2. If utilities serving occupied portions of the site are shut down, provide temporary services.
 3. Provide 72 hours' notice to Owner if shut down is required.
 4. Where services are removed, relocated or abandoned, provide necessary bypass connections to remaining occupied buildings and areas.

3.4 POLLUTION CONTROLS

- A. Use water, mist, temporary enclosures and other suitable methods to limit the spread of dust and dirt. Comply with local EPA regulations.
 1. Do not use water where there is potential for damage to occur or where hazardous conditions, ice or flooding are created.

3.5 UNDER ROOF DECK SURVEY

- A. Prior to work being performed, complete a survey of the under deck components.
- B. Locate and mark conduit, utilities, etc. that interfere with the replacement roof system.

- C. Determine the presence of spray applied fireproofing on the underside of the roof deck. If fireproofing is present, utilize caution when removing and replacing roof system to prevent fireproofing from dislodging. Survey interior of building during tear-off operations and at end of each day. Clean up debris daily. Report displaced fireproofing to the Owner/Engineer.
 - 1. Contractor is responsible to repair displaced fireproofing and repair any interior finishes damaged from the displaced fireproofing.
- D. Notify Owner and Engineer prior to survey being performed.

3.6 REMOVALS

- A. Coordinate and sequence roof removal such that tear-off debris and materials are not stored on or trafficked over the replacement roof system and such that varying heights between roof assemblies does not adversely affect roof drainage.
- B. Demolish and remove construction only to the extent required.
- C. Remove roof membrane, flashings, roof insulation, sheet metal, and cover board and discard.
- D. Remove or correct obstructions which interfere with the proper application of materials.
- E. Lift or remove equipment so that flashings can be replaced.
- F. Remove debris to provide clean, dry substrate.
- G. Remove and transport debris in a manner that prevents damage/spills to adjacent buildings and areas.
- H. Dispose of demolished items and materials on a daily basis. On-site storage of removed items is not permitted.
- I. Transport demolished materials off-site and dispose of materials in a legal manner.
- J. Perform progress inspections to detect hazards resulting from demolition activities.

3.7 FLASHING HEIGHTS

- A. Permanently raise roof top equipment as required to achieve 8" minimum flashing height.
- B. Extend sanitary vents to height required by the applicable Plumbing Code, but no less than 8 inches and no more than 12 inches above the finished roof system.
 - 1. For soil pipes that do not provide minimum 8" flashing height, cut existing pipe so that no-hub coupling can be located within roof insulation system.
 - 2. Provide no-hub coupling installed and torqued in accordance with manufacturer's installation instructions.
 - 3. Provide PVC pipe extension to provide a minimum 8" and maximum 12" flashing height.

3.8 SCUPPER INSTALLATION

- A. Locate bottom of overflow scupper 2 inches above surface of the roof system adjacent to the nearest roof drain (excluding sump).
- B. Extend opening through parapet wall. Take precautions to avoid damaging adjacent wall surfaces.
- C. Provide finished openings as indicated.
- D. Repair exterior wall surface, veneer or cladding to match adjacent surfaces.

3.9 CLEANING

- A. Inspect the site daily and clean up debris and hazards at the end of each day. Keep adjacent roads, drives and walkways in operation and free from construction materials debris.
- B. Clean adjacent structures of dust dirt and debris. Return adjacent areas to original conditions to the satisfaction of the Owner.

END OF SECTION 07 01 50

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SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Sheet waterproofing.
 - 2. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. AHJ: Authority (Authorities) Having Jurisdiction.
 - 2. VOC: Volatile Organic Compound.
- B Definitions:
 - 1. Manufacturer: Means the self-adhering sheet waterproofing manufacturer unless otherwise indicated.
 - 2. Waterproofing: Means the self-adhering sheet waterproofing.

1.4 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For each type of product.
 - a. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
 - b. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.
 - 2. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, expansion joints, sheet flashings, penetrations, inside and outside corners, ties-ins with adjoining waterproofing, and other termination conditions.
- B Informational Submittals:
 - 1. Qualification Data: For installer.
 - 2. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

- A Installer Qualifications: An entity that employs installers and supervisors who are acceptable to the manufacturer and who are experienced in installing work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

1.6 FIELD CONDITIONS

- A Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by the manufacturer. Do not apply waterproofing to a damp or wet substrate.
 - 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B Maintain adequate ventilation during preparation and application of waterproofing materials.

1.7 WARRANTY

- A Manufacturer's Warranty:
 - 1. Waterproofing Warranty: Manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

- a. Warranty Period: 5 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 SOURCE LIMITATIONS

- A Source Limitations for Waterproofing System: Obtain waterproofing materials from single source from the same manufacturer.

2.2 SHEET WATERPROOFING

- A Modified Bituminous Sheet Waterproofing: At least 60-mil nominal thickness, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated on one side to a 4-mil-thick, polyethylene-film reinforcement, and with release liner on adhesive side; formulated for application with primer or surface conditioner that complies with VOC limits of the AHJ.
 - 1. Products: Subject to compliance with the Contract Documents, provide one of the following.
 - a. "MiraDRI 860/861" manufactured by Carlisle Coatings & Waterproofing.
 - b. "BITUTHENE 3000" manufactured by GCP.
 - c. "Blueskin WP200" manufactured by Henry Company.
 - 2. Physical Properties:
 - a. Tensile Strength, Membrane: At least 250 psi; ASTM D 412, Die C, modified.
 - b. Ultimate Elongation: At least 300 percent; ASTM D 412, Die C, modified.
 - c. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D 1970/D 1970M.
 - d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement; ASTM C 836/C 836M.
 - e. Puncture Resistance: At least 40 lbf; ASTM E 154/E 154M.
 - f. Water Absorption: No more than 0.2 percent weight-gain after 48-hour immersion at 70 deg F; ASTM D 570.
 - g. Water Vapor Permeance: No more than 0.05 perm; ASTM E 96/E 96M, Water Method.
 - h. Hydrostatic-Head Resistance: At least 200 feet; ASTM D 5385.
 - 3. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.3 ACCESSORIES

- A Furnish accessory materials recommended by manufacturer for intended use and compatible with sheet waterproofing.
 - 1. Furnish liquid-type accessory materials that comply with VOC limits of the AHJ.
- B Primer: Liquid primer recommended for substrate by the manufacturer.
- C Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by the manufacturer.
- D Liquid Membrane: Elastomeric, 2-component liquid, cold fluid applied, of trowel grade or low viscosity.
- E Substrate Patching Membrane: Low-viscosity, 2-component, modified asphalt coating.
- F Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch, predrilled at 9-inch centers.
- G Other Accessories: As supplied, recommended, or required by the manufacturer and as necessary for a complete installation.

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine substrates, areas, and conditions, with installer present, for compliance with requirements and other conditions affecting performance of waterproofing.
 - 1. Verify that concrete has cured and aged for minimum time period recommended in writing by the manufacturer.
 - 2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by the manufacturer. Test for capillary moisture by plastic sheet method in accordance with ASTM D 4263.

- B Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 1. Installation of waterproofing indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D Remove fins, ridges, mortar, and other projections.
- E Fill form tie holes, honeycomb, aggregate pockets, holes, and other voids.
- F Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks in accordance with ASTM D 4258.
 - 1. If waterproofing covers nonmoving joints and cracks, install sheet strips of width according to manufacturer's written instructions and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch.
- G If applicable and recommended in writing by the manufacturer, bridge and cover isolation joints, expansion joints, and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips of widths according to manufacturer's written instructions.
 - 1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.
- H Corners: Prepare, prime, and treat inside and outside corners in accordance with manufacturer's instructions.
 - 1. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:
 - a. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.
- I Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions.

3.3 INSTALLATION OF SHEET WATERPROOFING

- A Install waterproofing according to manufacturer's written instructions.
- B Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch-minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.
 - 1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.
- D Horizontal Application: Apply sheets from low to high points of decks to ensure that laps shed water.
- E Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.
- F Seal edges of sheet waterproofing terminations with mastic or termination bar and sealant in accordance with manufacturer's written instructions.
- G Install sheet waterproofing and accessory materials to tie into adjacent waterproofing.
- H Roll waterproofing membrane to firmly adhere to substrate. Roll seams and terminations.
- I Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.
- J Immediately install protection course with butted joints over waterproofing membrane.
 - 1. Drainage panels may be used in place of a separate protection course to vertical applications when approved by the manufacturer and installed immediately.

3.4 PROTECTION, REPAIR, AND CLEANING

- A Do not permit foot or vehicular traffic on unprotected membrane.
- B Protect waterproofing from damage and wear during remainder of construction period.
- C Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- D Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 07 13 26

SECTION 07 21 00 - THERMAL INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Mineral-wool blanket insulation.
 - 2. Mineral-wool board insulation.
 - 3. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. AHJ: Authority (Authorities) Having Jurisdiction.
 - 2. SCAQMD: South Coast Air Quality Management District.
 - 3. VOC: Volatile Organic Compound.
- B Definitions:
 - 1. Manufacturer: Means the thermal insulation manufacturer unless otherwise indicated.

1.4 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For specified products; include Environmental Product Declaration and Health Product Declaration. Indicate VOC content for adhesive.
- B Informational Submittals:
 - 1. Installer's Certification: Listing type, manufacturer, and R-value of insulation installed in each element of the building thermal envelope unless insulation materials are labeled by the manufacturer to indicated R-value.
 - 2. Product Test Reports: For each product, for tests performed by a qualified testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Protect insulation materials from damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indexes less than 25 and 450 when tested in accordance with ASTM E 84.
- B Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.
- C Thermal-Resistance Value (R-Value): R-value as indicated on Drawings in accordance with ASTM C 518.

2.2 MINERAL-WOOL INSULATION

- A Manufacturers: Subject to compliance with the Contract Documents, provide basis-of-design product, or comparable products by one of the following:
 - 1. Johns Manville.
 - 2. Owens Corning.
 - 3. ROOKWOOL.

- B Mineral-Wool Blanket/Batt Insulation, Unfaced: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; passing ASTM E 136 for combustion characteristics.
- C Mineral-Wool Board Insulation: ASTM C 612, Type IVB; unfaced.
 - 1. Thickness: As indicated on the Drawings and as necessary to achieve required R-value.

2.3 ACCESSORIES

- A Adhesively Attached, Spindle-Type Insulation Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.
- B Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.
- C Other Accessories: As supplied, recommended, or required by the manufacturer and as necessary for a complete installation.

PART 3 EXECUTION

3.1 PREPARATION

- A Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A Comply with insulation manufacturer's written instructions applicable to products and applications.
- B Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C Install insulation with manufacturer's R-value label exposed after insulation is installed unless installer is providing certification specified in "Informational Submittals" Article in Part 1.
- D Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- E Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF CAVITY-WALL INSULATION

- A Mineral-Wool Board Insulation: Install insulation fasteners 4 inches from each corner of board insulation, at center of board, and as recommended by manufacturer.
 - 1. Fit courses of insulation between masonry wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
 - 2. Press units firmly against inside substrates.

3.4 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A Blanket/Batt Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. For wood-framed construction, install blankets in accordance with ASTM C 1320.
- B Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation.

3.5 PROTECTION

- A Protect installed insulation from damage.

- B Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 00 07 21 00

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SECTION 07 22 16 - ROOF INSULATION (ALTERNATE)

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Provide roof insulation system as specified in Contract Drawings.
 - 2. Provide 2" roof insulation mechanically fastened.
 - 3. Provide 1.5" roof insulation adhered in foam adhesive.
 - 4. Provide tapered insulation crickets and saddles adhered in foam adhesive (as shown in design drawings).
 - 5. Provide 0.5" cover board adhered in foam adhesive.

1.2 REFERENCE STANDARDS

- A. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2025.
- B. ASHRAE 90.1 – Energy Standard For Site And Building Except Low-Rise Residential Buildings.

1.3 PERFORMANCE REQUIREMENTS

- A. R Value
 - 1. In accordance with the referenced Energy Conservation Code and ASHRAE 90.1.
 - 2. Minimum continuous R-value: 20
 - 3. R value based on Long-Term Thermal Resistance (LTTR) for polyisocyanurate insulation and manufacturer's published data for other insulation components, as tested in accordance with specified the specified.
- B. Wind Design: Install insulation system to meet the required wind uplift pressures as specified in Contract Drawings.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's Product Data Sheets for materials specified certifying material complies with specified requirements.
- B. Manufacturer's Instructions: Latest edition of the Manufacturer's current material specifications and installation instructions.
- C. Shop Drawings: Tapered insulation plan from material supplier with minimum R-value for each roof area.

1.5 QUALITY ASSURANCE

- A. Install insulation in accordance with their respective manufacturer's requirements.
- B. Reject insulation not bearing UL label at point of delivery.
- C. Remove insulation damaged or wetted before, during, or after installation from the job site no later than the next working day from the day such damage or moisture contamination is noted.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials in the manufacturer's original sealed and labeled packaging.
- B. Storage: Store materials out of direct exposure to the elements on pallets or dunnage at least 4 inches above ground level at location acceptable to Owner.
 - 1. Utilize tarps that cover materials to prevent moisture contamination. Remove or slit factory shrouds and/or visqueen; do not use these materials as tarps.
 - 2. Install vapor retarders under material storage areas located on the ground.
 - 3. Remove damaged or deteriorated materials from the job site.
 - 4. Store adhesives in accordance with manufacturer's instructions.

- C. Handling: Handle material in such a manner to prevent damage and contamination with moisture or foreign matter.

1.7 PROJECT CONDITIONS

- A. Do not apply insulation during precipitation. Take responsibility for starting installation in the event there is a probability of precipitation occurring during application.
- B. Take necessary action to restrict dust, asphalt, and debris from entering the structure.
- C. Do not remove more roofing than can be replaced with insulation, membrane and flashings in the same day to create a watertight installation.

PART 2 PRODUCTS

2.1 MATERIALS

A. Insulation Boards:

1. Roof Insulation:

- a. Rigid polyisocyanurate roof insulation board complying with ASTM C1289 Type II, Class 2, Grade 2 and meeting the following requirements:
 - 1) Factory applied coated polymer bonded glass fiber mat facers on the top and bottom.
 - 2) 24 hours minimum curing time, plus an additional 24 hours minimum per inch thickness, at a minimum of 60 degrees F before shipment from the manufacturer.
 - 3) 2 percent maximum linear change dimensional stability when conditioned at 158 degrees F and 97 percent relative humidity for seven days.
 - 4) Maximum permissible insulation board size for mechanical attachment is 4 feet by 8 feet and for foam adhesive and hot asphalt attachment is 4 feet by 4 feet. Field cutting of larger boards is not acceptable.
 - 5) Thickness: as indicated in Contract Drawings

2. Tapered Insulation Crickets and Saddles:

- a. Rigid polyisocyanurate roof insulation board complying with ASTM C1289 Type II, Class 2, Grade 2 and meeting the following requirements:
 - 1) Factory applied coated polymer bonded glass fiber mat facers on the top and bottom.
 - 2) Curing time: 24 hours minimum, plus an additional 24 hours minimum per inch thickness, at a minimum of 60 degrees F before shipment from the manufacturer.
 - 3) Dimensional stability: 2 percent maximum linear change when conditioned at 158 degrees F and 97 percent relative humidity for seven days.
 - 4) Board size: 4 feet by 4 feet.
 - 5) Slope: 1/2 inch per foot
 - 6) Minimum thickness: 1/2 inch
 - 7) Fill Insulation: Rigid polyisocyanurate meeting the above requirements with board size of 4 feet by 4 feet and thickness of 2 inches.
 - 8) Crickets and Saddles: Rigid polyisocyanurate meeting the above requirements with a board size of 4 feet by 4 feet and 1/2 inch per foot slope.

3. Tapered Insulation System:

- a. Rigid polyisocyanurate roof insulation board complying with ASTM C1289 Type II, Class 2, Grade 2 and meeting the following requirements:
 - 1) Factory applied coated polymer bonded glass fiber mat facers on the top and bottom.

- 2) Curing time: 24 hours minimum, plus an additional 24 hours minimum per inch thickness, at a minimum of 60 degrees F before shipment from the manufacturer.
 - 3) Dimensional stability: 2 percent maximum linear change when conditioned at 158 degrees F and 97 percent relative humidity for seven days.
 - 4) Board size: 4 feet by 4 feet.
 - 5) Slope: 1/4 inch per foot
 - 6) Minimum thickness: 1/2 inch
 - 7) Fill Insulation: Rigid polyisocyanurate meeting the above requirements with board size of 4 feet by 4 feet and thickness of 2 inches.
 - 8) Tapered System: Rigid polyisocyanurate meeting the above requirements with a board size of 4 feet by 4 feet and 1/4 inch per foot slope.
4. Cover Board:
 - a. Cover board approved by roof system manufacturer. Board Size: 4 feet by 8 feet. Minimum thickness as listed below or as required by roof system manufacturer.
 - 1) Georgia Pacific 1/2 inch DensDeck Prime Roof Board
 - 2) DEXcell 1/2 inch FA Glass Mat Roof Board
 - B. Insulation Accessories:
 1. Tapered Edge Strip:
 - a. Polyisocyanurate: Closed-cell polyisocyanurate foam core integrally bonded to non-asphaltic, fiber-reinforced organic felt or inorganic coated-glass facers. Fabricated with 1 inch per foot slope and "zero edge" to provide transitions as required by field conditions.
 - 1) Install at edges to make transitions as detailed in Contract Drawings.
 - 2) Provide to form crickets in front of curbs wider than 12 inches.
 - 3) Provide slope transitions at the outside of drainage sumps.
 - 4) Use 1/2 inch by 6 inch tapered edge strips in front of tapered insulation crickets to provide smooth transition.
 - C. Insulation Mechanical Attachment Materials:
 1. Steel Deck Fasteners and Stress Plates: Corrosion resistant 3-inch galvalume stress plate and corrosion resistant screw type fasteners for use with steel decks; approved by the insulation manufacturer for the insulation type, thickness and board size specified; fastener length as required by the fastener manufacturer for the insulation thickness specified, and to penetrate the deck a minimum of 3/4 inch and a maximum of 1-1/4 inch.
 - D. Adhesives:
 1. Foam Adhesive: One or two part, VOC compliant, moisture-cured polyurethane foamable adhesive designed as roof insulation adhesive and approved by insulation manufacturer.
 - a. Primer: Provide as required by adhesive manufacturer and substrate conditions.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Inspect substrate for soundness and notify Engineer in writing of deficiencies.
- B. Commencement of work signifies acceptance of substrates. Correct defects in work resulting from accepted substrates at no additional expense to the Owner.

3.2 PREPARATION

- A. Dry and broom roof deck clean of debris and foreign matter prior to installation of insulation system.

3.3 APPLICATION

A. General

1. Apply in accordance with the insulation and roof system manufacturer's instructions and these specifications.
2. Install insulation in full boards, carefully fitted and pushed against adjoining sheets to form tight joints. Gaps exceeding 1/4 inch are not acceptable.
3. Saw cut or knife cut insulation and cover boards in a straight line, not broken. Utilize chalk lines to cut insulation. Uneven or broken edges are not acceptable.
4. Remove insulation dust and debris that develops during insulation cutting operations.
5. Offset joints between successive and adjacent layers of insulation a minimum of six inches.
6. Stagger joints of cover boards one foot (vertically and laterally) to ensure that joints do not coincide with joints from the previous or adjacent layer.
7. On steel decks, apply insulation boards with long dimension of units across deck ribs. Bear ends of insulation boards on top flange of steel deck.
8. Install crickets, saddles and tapered edge strips before the cover board.
9. Adhere cant strips and tapered edge strips at transitions, terminations and/or penetrations as detailed or required ribbons of foam adhesive to ensure smooth transitions are provided for the roof membrane and flashings.
10. Provide necessary modifications to insulation system or nailers at roof edges as required to ensure a flush and smooth transition is provided for the roof membrane and flashing.
11. Make field modifications of insulation, tapered insulation, tapered edge strips and cants where required to accommodate roof and flashing conditions and to prevent water dams and ponding water. Ponding water at scuppers and cricket valleys is not acceptable.
12. Ponding Water:
 - a. The ponding of water on the roof surface after installation of the roofing system is not acceptable and is grounds for rejection of the roof.
 - b. Ponding is herein defined as precipitation remaining in a four-square foot area or larger, 1/4 inch or deeper for a period of 24 hours from the termination of precipitation.
 - c. Provide modifications to insulation system to ensure proper drainage and prevent standing water including but not limited to reinstallation of roof system or installation of additional tapered insulation.

B. Tapered Insulation System:

1. Install tapered insulation system to provide positive slope for roof drainage without ponding water.
2. Size crickets as shown in the Contract Drawings. Provide modifications to ensure positive slope and prevent standing water along the cricket valley.
 - a. Minimum length to width ratio of 3:1. Fabricate partial crickets with dimensions which result in a minimum length to width ratio of 3:1 if they were extended to full size.
 - b. Unless otherwise noted, fabricate crickets from tapered stock as required to provide the specified minimum slope. For example, when roof slope is indicated as 1/4 inch per foot minimum, fabricate crickets with slope of 1/2 inch per foot minimum.
 - c. Construct crickets on up slope side of curbs to ensure positive drainage.
 - d. Install tapered edge strips at cricket edges to provide a smooth transition between the cricket and insulation system below.

3. Insulation boards may require mechanical fasteners and stress plates at slope transition of crickets to minimize bridging.
- C. Roof Drainage:
1. Install drainage sumps as detailed.
 2. Carefully lay out the tapered insulation, sumps, drain bowls and scuppers to ensure the finished roof provides drainage with no ponding water.
 3. Fabricate miter-cut sumps at drains/scuppers to provide smooth transitions between the insulation system and the drains/scuppers.
 4. Ensure sumps provide roof drainage and prevent water dams.
 5. Adjust insulation, drains and scuppers to ensure roof drainage and satisfactory substrates for membrane and flashings.
 6. Secure drain sump components using specified insulation fasteners or adhesives.
 7. Circular sumps and sumps that do not provide smooth transition or that create standing water at the drains are not allowed.
- D. Tapered Edge Strips:
1. Install at edges to make transitions as detailed in Contract Drawings.
 2. Provide to form crickets in front of curbs wider than 12 inches.
 3. Provide slope transition at the outside of drainage sumps.
 4. Provide slope at top of parapet walls below coping.
 5. Use 1/2 inch by 6 inch tapered edge strips in front of tapered insulation crickets to provide smooth transition.
- E. Insulation Mechanical Attachment:
1. Fastener quantity and spacing as required to comply with the requirements of roof system manufacturer's approved, tested assembly.
 2. Install fasteners using manufacturer's recommended equipment and in accordance with the manufacturer's requirements.
 3. Set fasteners and stress plates secure and tight against the insulation surface and do not over drive.
 4. Fasteners to engage the top flange of steel decks only.
- F. Foam Adhesive:
1. Position and space adhesive beads as required to comply with the requirements of the roof system manufacturer's approved, tested assembly.
 2. Size adhesive beads in accordance with the adhesive manufacturer's guidelines.
 3. Place insulation boards onto the beads and "walk" and/or "weight" into place. Place insulation boards into the adhesive in accordance with the adhesive manufacturer's guidelines.
 4. Ensure adhesion of insulation and take whatever steps necessary to achieve adhesion, including but not limited to temporary ballasting of insulation until adhesive sets.

END OF SECTION 07 22 16

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SECTION 07 54 00 - THERMOPLASTIC SINGLE PLY ROOFING (ALTERNATE)

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Provide adhered, fleeceback, thermoplastic membrane and flashings to provide a permanently watertight system.

1.2 PERFORMANCE REQUIREMENTS

- A. Install roofing system to meet UL 790 Class A Fire Rating.
- B. Wind Uplift Strength: Provide an approved roof assembly tested in accordance with FM 4470, UL 580 or UL 1897 to resist the minimum required wind uplift strength specified in the Contract Drawings.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's Product Data Sheets for materials specified certifying material complies with specified requirements.
- B. Manufacturer's Instructions: Latest edition of the Manufacturer's current material specifications and installation instructions.
- C. Roof System Assembly Letter: Letter from roof system manufacturer listing roof assembly components along with their method of attachment and acceptance of the specified roof system warranty terms. Assembly letter should match the submitted test report documentation and specified assembly.
- D. Test Reports: Submit documentation of approved, tested roof system to meet the specified requirements for the following:
 1. Wind uplift pressures
 2. UL Fire Resistance Rating
- E. Shop Drawings:
 1. Submit manufacturer approved drawings and details for conditions not depicted in Contract Drawings including but not limited to inside corners, outside corners, lap seams, etc.

1.4 QUALITY ASSURANCE

- A. Manufacturer Requirements:
 1. Written contractor/installer approval program.
 2. Primary membrane products (including roof membrane and flashing membrane) manufactured by other manufacturers and private labeled are not acceptable.
- B. Contractor Requirements:
 1. Install roof system by a Contractor authorized by the membrane manufacturer for a minimum of two years with manufacturer's highest certification level.
 2. Application of the roofing system accomplished by primary roofing contractor, his roofing foreman, and sufficient applicator technicians who have been trained and approved by the manufacturer of the single ply roofing system. Submit evidence of qualification from the manufacturer.
- C. No deviations made from the Contract Documents or the accepted shop drawings without prior written acceptance by the Engineer.
- D. Complete work by personnel trained and authorized by the membrane manufacturer.
- E. Upon completion of the installation, provide inspection by a representative of the membrane manufacturer to review the installed roof system and document deficiencies.
- F. Provide manufacturer written verification indicating seams have been probed and are watertight.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials in the manufacturer's original sealed and labeled packaging and in quantities required to allow continuity of application.
- B. Storage: Store materials out of direct exposure to the elements on pallets or dunnage at least 4 inches above ground level at location acceptable to Owner.
 - 1. Utilize tarps that cover materials to prevent moisture contamination. Remove or slit factory shrouds and/or visqueen; do not use these materials as tarps.
 - 2. Install vapor retarders under material storage areas located on the ground.
 - 3. Remove damaged or deteriorated materials from the job site.
 - 4. Store membrane rolls lying down on pallets and protected from the weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions affecting the ease of membrane weldability.
 - 5. Store adhesives at temperatures approved for the product.
 - 6. Store flammable materials in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/ supplier.
 - 7. Remove damaged materials and replace at no cost to the Owner.
- C. Handling: Handle materials in such a manner as to prevent damage and contamination with moisture or foreign matter.

1.6 PROJECT CONDITIONS

- A. Do not apply roofing during precipitation. Contractor assumes responsibility for starting installation in the event there is a probability of precipitation occurring during application.
- B. Only install as much of the roofing as can be made weathertight each day, including flashing and detail work. Clean and hot air weld seams before leaving the job site that day.
- C. Schedule and execute work without exposing the interior building areas to the effects of inclement weather. Protect the building and its contents against risks.
- D. Ensure surfaces to receive insulation, membrane or flashings are dry. Provide the necessary equipment to dry the surface prior to application.
- E. Secure construction, including equipment and accessories, in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.
- F. Install uninterrupted water stops at the end of each day's work and remove before proceeding with the next day's work. Do not allow water stops to emit dangerous or unsafe fumes and remain in contact with the finished roof as the installation progresses. Replace contaminated membrane at no cost to the Owner.
- G. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, provide necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. Provide a protection layer of plywood over insulation board for roof areas that receive rooftop traffic during construction.
- H. Prior to and during application, remove dirt, debris and dust from surfaces, either by vacuuming, sweeping, blowing with compressed air and/or similar methods.
- I. Do not allow contaminants, grease, fats, oils, and solvents to come into contact with the roofing membrane. Report rooftop contamination that is anticipated or that is occurring to the Engineer and membrane manufacturer to determine the corrective steps necessary.
- J. If unusual or concealed condition is discovered; stop work and notify Engineer of such condition in writing within 24 hours.
- K. Do not install the roofing membrane under the following conditions without consulting the membrane manufacturer's technical department for precautionary steps:
 - 1. The roof assembly permits interior air to pressurize the membrane underside.
 - 2. The wall/deck intersection permits air entry into the wall flashing area.
- L. Refer to Section 01 14 00 - Work Restrictions for precautions when using membrane adhesives at or near rooftop vents or air intakes. Keep lids on unused cans.

1.7 WARRANTIES

- A. Manufacturer's Guarantee: Manufacturer's standard form, non-pro-rated, without monetary limitation or deductibles, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks or breaches in the primary roof membrane causing moisture to enter the substrate below (even if visible leaks are not observed inside the facility).
1. Warranty Period: 30 years from date of Substantial Completion
 2. Warranty to remain in effect for wind speeds up to 72 mph.
 3. Warranties requiring the Owner's signature are not acceptable.
 4. Warranty to include membrane materials, adhesives, related materials and fasteners specified in this section and the following materials specified in other sections as follows:
 - a. 07 22 16 - Roof Insulation
 - b. Polymer Clad Metal as specified in Section 07 62 00 - Sheet Metal Flashing and Trim
 - c. Retrofit Roof Drains as specified in Section 22 14 26 - Roof Drains
- B. Contractor's Warranty: Two Year Warranty: Manufacturer's Representative and Contractor's Representative will attend post construction field inspection no earlier than one month prior to the expiration date of the Contractor's Warranty. Submit a written report within seven (7) days of the site visit to the Engineer listing observations, conditions and recommended repairs or remedial action.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Subject to compliance with requirements herein, provide roof system from a single source. Manufacturers:
1. Sika Sarnafil
 2. Fibertite
 3. IB Roof Systems
 4. Siplast
 5. Soprema

2.2 MEMBRANE MATERIALS

- A. Membrane: Thermoplastic membrane with fiberglass and/or polyester reinforcement meeting ASTM D4434/D4434M or ASTM D6754/D6754M and factory applied fleece backing. Acceptable products:
1. Sika Sarnafil 80-mil S327 Feltback
 2. Fibertite 60-mil SM-FB
 3. IB PVC FB 80-mil Single-Ply Membrane
 4. Siplast Parasolo PVC Fleeceback 80-mil
 5. Soprema Sentinel P200 HFB
- B. Flashing/Stripping Membrane: Non fleeceback, thermoplastic membrane reinforced with fiberglass.
1. Sika Sarnafil 60-mil G410
 2. Fibertite 45-mil SM
 3. IB PVC 60-mil Single-Ply Membrane
 4. Siplast Parasolo PVC Smooth 60-mil
 5. Soprema Sentinel P150 Membrane
- C. Asphalt Resistant Flashing/Stripping Membrane: Thickness to match Flashing/Stripping Membrane, non fleeceback, asphalt resistant, thermoplastic membrane reinforced with fiberglass or polyester. Utilize where flashing membrane is in contact with residual asphaltic materials or as required by the manufacturer.
- D. Membrane and Flashing Membrane Color: White

2.3 ADHESIVES

- A. Membrane Adhesive: Membrane manufacturer's foam based adhesive. Utilize foam based adhesive with fleeceback membrane's and application in splatter pattern; ribbons will not be accepted unless provided at spacing sufficient to provide fully adhered membrane.
 - 1. Sika Sarnafil Sarnacol AD
 - 2. Fibertite Polyset CR-20 Polyurthane Foam Adhesive
 - 3. IB PG-1 EF-ECO
 - 4. Siplast Parafast Adhesive T
 - 5. Soprema Duotack SPF
- B. Flashing Adhesive: Membrane manufacturer's solvent-based adhesive.
 - 1. Sika Sarnafil Sarnacol 2170
 - 2. Fibertite FTR 190e
 - 3. IB Vertibond Adhesive 432
 - 4. Siplast Parasolo PVC Bonding Adhesive
 - 5. Soprema Sentinel S Bonding Adhesive

2.4 RELATED MATERIALS

- A. T-joint Patch: Membrane manufacturer's circular patch welded over T-joints formed by overlapping thick membranes.
- B. Corner Flashing: Membrane manufacturer's pre-formed inside and outside flashing corners that are hot-air welded to membrane or polymer clad metal base flashings.
- C. Cover strip: 8 inch wide pre-cut polyester reinforced flashing strip.
- D. Pipe Flashing: Membrane manufacturer's pre-formed pipe boot flashing that is hot-air welded to membrane and secured with a stainless-steel draw band and sealant.
- E. Termination Bar: Manufacturer's 1/8 inch by 1 inch mill finish extruded aluminum bar with pre-punched slotted holes.
- F. Lipped Termination Bar: 3/4 inch wide, extruded mill finished aluminum (6063 T6 Alloy) with 3/16 inch lip and pre-punched oval holes at 6 inches on center.
- G. Pre-Fabricated Expansion Joint: Manufacturer's approved pre-fabricated expansion joint made with polyester reinforced membrane, neoprene foam and galvanized metal.
- H. Polymer Clad Metal: Refer to Section 07 62 00 - Sheet Metal Flashing and Trim.

2.5 SEALANTS AND CLEANERS

- A. Sealant: Manufacturer's multi-purpose sealant.
- B. Sealant Tape: Minimum 1/2 inch wide, non-skinning, butyl sealant tape.
- C. Primary Membrane Cleaner: High-quality solvent cleaner provided by membrane manufacturer for use as a general membrane cleaner.
- D. Pre-weld Cleaner: High-quality solvent based seam cleaner with moderate evaporation rate as recommended and provided by membrane manufacturer.

2.6 FASTENERS

- A. Flashing Membrane Termination Screws: #12 corrosion resistant hex or pan head screws with length to penetrate substrate a minimum of 1-1/2 inch.
- B. Concrete and Masonry Flashing Membrane Termination Anchors:
 - 1. 1/4-inch diameter metal-based expansion anchor with stainless steel pin of length to penetrate substrate a minimum of 1-1/2 inch.
 - 2. Masonry screws approved by membrane manufacturer, 1/4-inch minimum diameter, corrosion resistant, with Phillips flat head. Length to provide minimum 1-1/2 inch embedment into substrate.
- C. Steel Deck Fasteners and Plates: #12 corrosion resistant approved by membrane manufacturer of length to penetrate top flange of steel deck a minimum of 1 inch with galvalume plates approved for membrane attachment.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Inspect the surface of the insulation or substrate prior to installation of the roof membrane.
- B. Verify that the substrate is dry, clean, smooth, and free of debris, loose material, oil, grease, or other foreign matter. Remove sharp ridges and other projections and accumulations of bitumen to ensure a smooth surface before roofing.
- C. Replace broken, delaminated, wet or damaged insulation boards.
- D. Repair deteriorated substrates.
- E. Beginning installation means acceptance of prepared substrate.

3.2 PREPARATION

- A. Remove, cover or flash using compatible, approved materials substrates containing asphalt. Do not allow PVC to contact substrates containing asphalt materials.
- B. Provide necessary protection from adhesive vapors to prevent interaction with foamed plastic insulation.

3.3 ADHERED MEMBRANE INSTALLATION

- A. Over the properly installed and prepared substrate, apply membrane adhesive in accordance with the manufacturer's instructions and application rates utilizing equipment as required by the manufacturer.
 - 1. Do not allow adhesive to skin-over or surface-dry prior to installation of roof membrane.
 - 2. Comply with the manufacturer's published requirements for adhesive application rates.
 - 3. Count the amount of pails of adhesive used per area per day to verify conformance to the specified adhesive rate.
 - 4. Do not apply adhesive in seam areas.
 - 5. Replace notched squeegees daily or as notches are reduced below 1/4 inch.
- B. Place roof membrane into the adhesive in accordance with manufacturer's instructions.
- C. Shingle seams with flow of water. Overlap upslope, adjacent rolls 3 inches over previous roll. This process is repeated throughout the roof area.
- D. After placement of membrane, press roll into place with the manufacturer's recommended roller by frequent rolling in two directions.
- E. Weld membrane coverstrips at fleeceback membrane seams without a factory selvage edge.

3.4 MEMBRANE TERMINATION

- A. Terminate membrane at walls and curbs as shown in the contract drawings.
 - 1. Roof Deck: Mechanically terminated using specified fasteners and plates 6 inches on center.
 - 2. Wood Wall Substrate: Turn membrane up wall 1 inch and mechanically terminate using specified screws 8 inches on center with a termination bar.
 - 3. Concrete/Masonry Wall Substrate: Turn membrane up wall 1 inch and mechanically terminated using specified anchors 8 inches on center with a termination bar.
- B. Terminate membrane at penetrations as shown in the contract drawings.
 - 1. Fasten membrane 6 inches on center or a minimum of 4 fasteners per penetration into the structural deck using fasteners and plates as approved by the membrane manufacturer for the deck substrate.
- C. Extend membrane over roof edge a minimum of 2 inches below the perimeter wood blocking. If fleeceback membrane is utilized, trim membrane flush with outside edge of roof and hot-air weld a non fleeceback flashing membrane to extend over the roof edge.
- D. Provide sealant tape at base of flashing membrane on outside of wall to prevent moisture infiltration.

3.5 FLASHING INSTALLATION

A. General

1. Install flashings concurrently with the roof membrane as the job progresses.
2. Temporary flashings are not allowed.
3. Do not tape seams as temporary measure; hot-air weld seams before the end of each day.
4. Adhere flashings to compatible, dry, smooth, and solvent-resistant surfaces.
5. Where substrates are incompatible with adhesives and PVC materials, remove the incompatible materials and replace with a compatible substrate or install compatible PVC flashing materials.
6. Use caution to ensure adhesive fumes are not drawn into the building.

B. Adhesive for Flashing Membrane

1. Over the properly installed and prepared flashing substrate, apply flashing adhesive according to manufacturer's installation instructions. Apply adhesive in smooth, even coats with no gaps, globs or similar inconsistencies.
2. Press the sheet firmly in place with a hand roller to ensure bond and adhesion.
3. Do not apply adhesive in seam areas that are to be welded.

C. Mechanically terminate flashings a minimum of 8 inches above the finished roofing surface using specified method indicated in the Contract Drawings.

D. Cut and provide hot-air welded corner flashing at interior and exterior corners.

E. Hot-air weld flashings at their joints and at their connections with the roof membrane.

F. Provide additional securement for flashings that exceed 30 inches in height. Consult Manufacturer's Technical Department for securement methods.

G. Seal off Polymer Clad sheet metal incorporated into the roofing system with a hot-air welded stripping ply. Extend stripping ply four inches beyond sheet metal onto roof membrane and fit closely to edge of sheet metal.

H. At expansion joints, extend flashing membrane over joint and dip into cavity to allow for expansion.

I. Roof Drain:

1. Mechanically attach membrane 6 inches on center into structural deck around drain sump. Adhere flashing membrane and hot-air weld to membrane a minimum of 4 inches.
2. Set flashing membrane in bed of sealant under the clamping ring.
3. Refer to Section 22 14 26 - Roof Drains.

J. Soil Pipe/Pipe Penetration:

1. Provide field wrapped pipe penetration flashing or manufacturer's prefabricated pipe boot as shown in detail drawing.
2. Apply aluminum tape to penetration if asphalt contamination is present.
3. Hot-air weld horizontal flashing membrane a minimum of four inches onto the membrane.
4. Adhere vertical flashing membrane adhered to pipe penetration and extend a minimum of 1.5 inches horizontal at the base of penetration. Hot-air weld vertical flashing membrane to horizontal flashing membrane.
5. Install stainless steel draw band and sealant or hot-air weld flashing cap to terminate top edge of pipe flashing.

3.6 HOT-AIR WELDING OF SEAM OVERLAPS

A. General

1. Hot-air weld seams.
 - a. Minimum 3-inch-wide membrane overlap when automatic machine-welding.
 - b. Minimum 4-inch-wide membrane overlap when hand-welding, except for certain details.
 - c. Minimum width of hot-air weld is 1-1/2 inches.
 - d. Provide wider membrane overlaps or width of welds as required by the roof membrane manufacturer.

2. Provide welding equipment by or approved by the membrane manufacturer. Mechanics intending to use the equipment to have successfully completed a training course provided by a membrane manufacturer's technical representative prior to welding.
 3. Clean and dry membrane to be hot-air welded.
- B. Hand-Welding
1. Complete hand-welded seams in two stages. Allow hot-air welding equipment to warm up prior to welding.
 2. Weld the back edge of the seam with a narrow but continuous weld to prevent loss of hot air during the final welding.
 3. Insert nozzle into the seam at a 45-degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow," the hand roller is positioned perpendicular to the nozzle and pressed lightly. For straight seams, the 1-1/2 inch wide nozzle is recommended for use. For corners and compound connections, the 3/4 inch wide nozzle is recommended for use.
- C. Machine Welding
1. Machine welded seams are achieved by the use of automatic welding equipment. When using this equipment, follow instructions from the manufacturer and local codes for electric supply, grounding and over current protection. Dedicated circuit house power or a dedicated portable generator is recommended. Do not operate other equipment off the generator.
 2. Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.
- D. Quality Control of Hot-Air Welded Seams
1. Check hot-air welded seams for continuity using a rounded screwdriver. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark grey material from the underside of the top membrane. Provide on-site evaluation of welded seams daily and to locations as directed by the Engineer or membrane manufacturer's representative.
 2. Take 1-inch-wide cross-section samples of hot-air welded at least three times a day. Correct welds display failure from shearing of the membrane prior to separation of the weld. Patch test cut areas.
- 3.7 TEMPORARY CUT-OFF
- A. Install flashings concurrently with the membrane in order to maintain a watertight condition as the work progresses.
 - B. When a break in the day's work occurs in the central area of the project, install a temporary watertight seal. Provide an 8-inch strip of flashing membrane welded 4 inches to the field membrane. Seal the remaining 4 inches of flashing membrane to the deck or the substrate so that water can not travel under the membrane. Seal the edge of the membrane with a continuous, heavy, 6 inch width application of pourable sealer. When work resumes, remove the contaminated membrane. Do not reuse these materials.
 - C. If inclement weather occurs while a temporary water stop is in place, monitor the situation to maintain a watertight condition.
 - D. If water is allowed to enter under the completed system, replace the affected area.
- 3.8 CLEANING
- A. Ensure trash and debris is removed from the roof daily.
 - B. Keep metal scraps, nails, screws and other sharp damaging debris off of the roof membrane surface during construction.
 - C. Clean off/remove excess adhesive, sealant, stains and residue on the membrane and flashing surfaces.
 - D. Remove temporary coverings and masking protection from adjacent work areas upon completion.

3.9 PROTECTION

- A. Protect the roof from construction related damages during the Work.
- B. Replace damaged membrane, flashings and other membrane components. Repair in accordance with the membrane manufacturers repair instructions to comply with the specified warranty.

END OF SECTION 07 54 00

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section includes the following sheet metal flashing and trim:
 - 1. Formed wall flashing and trim.
 - 2. Miscellaneous sheet metal fabrications.
 - 3. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. AAMA: American Architectural Manufacturers Association (now FGIA).
 - 2. NAAMM: National Association of Architectural Metal Manufacturers.
 - 3. NRCA: National Roofing Contractors Association.
 - 4. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.
 - 5. SPRI: Single Ply Roofing Industry.

1.4 COORDINATION

- A Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.5 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Shop Drawings: Show layouts of sheet metal flashing and trim.
 - a. Include plans, elevations, sections, and attachment details.
 - b. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
 - c. Include identification of material, thickness, weight, and finish for each item and location in Project.
 - d. Include details for forming, including profiles, shapes, seams, and dimensions.
 - e. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 - f. Include details of termination points and assemblies.
 - g. Include details of roof-penetration flashing.
 - h. Include details of edge conditions, including counterflashings as applicable.
 - i. Include details of special conditions.
 - j. Include details of connections to adjoining work.
 - k. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.

1.6 DELIVERY, STORAGE, AND HANDLING

- A Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
 - 1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
 - 2. Protect stored sheet metal flashing and trim from contact with water.

- B Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A General: Sheet metal flashing and trim assemblies including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B Sheet Metal Standard for Flashing and Trim: Comply with the NRCA publication *The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing* and the SMACNA publication *Architectural Sheet Metal Manual* requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- D Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

2.2 SHEET METALS

- A Stainless-Steel Sheet: ASTM A240 or ASTM A666, Type 304, 0.016 inch thick dead soft, fully annealed.
- B Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
 - 1. As-Milled Finish: For concealed flashing.

2.3 UNDERLAYMENT MATERIALS

- A Self-Adhering, High-Temperature Sheet Underlayment: At least 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.
 - 1. Products: Subject to compliance with the Contract Documents, provide one of the following.
 - a. "Grace Ultra" manufactured by Grace Construction Products, a unit of W.R. Grace & Co.
 - b. "MetShield" manufactured by Metal-Fab Manufacturing, LLC.
 - c. "WeatherLock Metal High Temperature Underlayment" manufactured by Owens Corning.

2.4 MISCELLANEOUS MATERIALS

- A General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

- a. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
- 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- C Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- D Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E Epoxy Seam Sealer: 2-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- F Bituminous Coating: ASTM D 1187/D 1187M cold-applied asphalt emulsion.

2.5 FABRICATION, GENERAL

- A General: Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
 - 1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - 2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
 - 4. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.
- D Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 - 1. Where lapped or bayonet-type expansion provisions in the work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.
- E Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- F Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- G Do not use graphite pencils to mark metal surfaces.

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 1. Installation of sheet metal flashing and trim indicates acceptance of surfaces and conditions.

3.2 INSTALLATION OF UNDERLAYMENT

A Self-Adhering, High-Temperature Sheet Underlayment:

1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
2. Prime substrate if recommended by underlayment manufacturer.
3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
6. Roll laps and edges with roller.
7. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

A Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
8. Do not field cut sheet metal flashing and trim by torch.
9. Do not use graphite pencils to mark metal surfaces.

B Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

1. Coat side of uncoated aluminum sheet and stainless steel metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install underlayment and cover with a slip sheet.
3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.

C Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

D Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.

E Fasteners: Use fasteners of sizes that will penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

1. Aluminum: Use aluminum or stainless-steel fasteners.

F Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

- G Seal joints with elastomeric sealant as required for watertight construction.
 - 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 - 2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 Joint Sealants.
- H Uncoated Aluminum Flashing: Rivet joints in uncoated aluminum where necessary for strength.

3.4 INSTALLATION OF WALL FLASHINGS

- A Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.5 ERECTION TOLERANCES

- A Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING

- A Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B Clean off excess sealants.

3.7 PROTECTION

- A On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.
- B Maintain sheet metal flashing and trim in clean condition during construction.
- C Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 07 62 00

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SECTION 07 62 10 - SHEET METAL FLASHING AND TRIM, ROOF (ALTERNATE)

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Sheet metal flashings and trim to provide a permanently watertight condition.

1.2 SUBMITTALS

- A. Product Data: Manufacturer's Product Data Sheets for materials specified certifying material complies with specified requirements.
- B. Manufacturer's Instructions: Latest edition of the Manufacturer's current material specifications and installation instructions.
- C. Shop Drawings: For any transitions and/or terminations not depicted in Contract Drawings.
- D. Test Reports: Submit test reports for edge metal indicating resistance of specified wind uplift pressures.
- E. Color Charts:
 - 1. Pre-finished Sheet Metal
 - 2. Polymer Clad Sheet Metal
 - 3. Sealants

1.3 MOCK-UPS

- A. Provide mock-ups of the following sheet metal components prior to fabrication of the components:
 - 1. Coping:
 - a. Provide minimum 10-foot length of coping mock-up including applicable fascia covers. Include at least one seam of the configuration specified.
 - b. Provide one 24-inch by 24-inch corner section.
 - 2. Expansion Joint: Provide minimum 10-foot length of expansion joint cover and cleat mock-up. Include at least one seam of the configuration specified.

1.4 QUALITY ASSURANCE

- A. Install in accordance with the Contract Drawings.
- B. Ensure work is free of leaks.
- C. Provide metal coping fabricated and tested in accordance with ANSI/SPRI/FM 4435/ES-1 to resist the specified wind uplift pressures.
 - 1. Fabricate metal coping as shown in Contract Drawings and following NRCA (RM) tested details.
- D. Provide first-class workmanship. Assemble and secure sheet metal work in accordance with these specifications, roof system manufacturer's requirements and referenced standards.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials in the manufacturer's original sealed and labeled containers and in quantities required to allow continuity of application.
- B. Storage: Store materials within areas designated by the Owner. Ensure materials remain dry, covered and not in contact with the ground.
- C. Handling: Handle material in such manner as to preclude damage and contamination with moisture or foreign matter.

1.6 PROJECT CONDITIONS

- A. Environmental: Protect building and its components from the elements.

- B. Coordination and Scheduling: Coordinate phases of work to allow continuity of work without delays.

1.7 WARRANTY

- A. Provide pre-finished sheet metal manufacturer's thirty (30) year finish warranty from the date of substantial completion.

PART 2 PRODUCTS

2.1 PRIMARY SHEET METAL

- A. Material: Pre-finished Galvalume
 - 1. 24-gauge, galvalume coated steel meeting or exceeding AZ50 per ASTM A792. Manufacturer's smooth finish, pre-finished color coatings consisting of 70% Kynar 500 fluorocarbon (Polyvinylidene Fluoride PVF2) coating over a urethane primer on the finish side, with primer and a wash coat on the reverse. Measurements per NCCA Technical Bulletin II-4 or ASTM D1005. Protect the finish during fabrication and installation with a strippable plastic film. Manufacturer's standard color selected by Owner.
- B. Components:
 - 1. Receiver Flashing
 - 2. Counterflashing
 - 3. Expansion Joint Cover
 - 4. Expansion Joint Cleat
 - 5. Coving
 - 6. Scupper Face Plate
 - 7. Continuous Cleat (use one gauge thicker than primary sheet metal): 22-gauge, galvalume coated steel

2.2 STAINLESS STEEL FLASHINGS

- A. 26-gauge, Type 304, 2B as tested in accordance with ASTM A240/A240M.
 - 1. Splash Pan

2.3 POLYMER CLAD METAL

- A. Heat-weldable, 24 gauge, AISI G90 galvanized steel sheet with an unsupported 20-mil thermoplastic membrane coating to match the flashing membrane composition laminated on one side, manufactured by, and included in the roof membrane manufacturer's warranty. Color selected by Owner.
 - 1. Scupper Liner

2.4 FASTENERS

- A. Roofing Nails: Minimum 12-gauge stainless steel ring shank roofing nails with diamond point, minimum 3/8 inch diameter head and length as required to penetrate substrate a minimum of 1-1/4 inches.
- B. Screws:
 - 1. Sheet metal to wood attachment (exposed): #12 stainless steel, 5/16 HWH with length to penetrate substrate a minimum of 1-1/2 inches. Provide with bonded EPDM washer or washer specified below. Factory painted heads to match the sheet metal color.
 - 2. Sheet metal to wood attachment (concealed): #10 stainless steel, low profile pancake head with length to penetrate substrate a minimum of 1-1/2 inches.
 - 3. Sheet metal to sheet metal attachment (exposed): 1/4 inch x 7/8 inch carbon steel, self-drilling point, self-tapping, zinc alloy hex head screws with bonded EPDM tubular washer under head of fastener; screw heads to match color of wall panel by means of factory applied coating. Factory painted heads to match the sheet metal color.

4. Sheet metal to light gauge steel attachment (concealed): #14-13 DP1 stainless-steel low-profile pancake head of length as required for three threads to penetrate metal substrate or min. 1 inch penetration through wood substrates.
- C. Concrete and Masonry Anchors (Drive-pin: 1/4 inch diameter metal-based expansion anchor with stainless steel pin of length to penetrate substrate a minimum of 1-1/2 inches. Factory painted heads to match the sheet metal color.
- D. Washers: Stainless steel with neoprene gasket backing.
 1. 9/16 inch diameter for use with #12 screws
 2. 5/8 inch diameter for use with 1/4 inch diameter concrete and masonry anchors.
- E. Rivets: #44 stainless steel rivets with stainless steel mandrel and factory painted head to match adjacent sheet metal. Length to properly fasten particular sheet metal components.

2.5 RELATED MATERIALS

- A. Expansion Joint Cavities:
 1. PVC Flashing: 20 mil corrosion resistant, waterproof PVC flashing.
 2. Compressible Insulation: Un-faced friction-fit fiberglass building insulation, cut to fit from 3-1/2 inch x 15 inch x 48 inch batts.
- B. Sealants:
 1. Silicone Sealant: One-component, non-sag, neutral cure, low-modulus, UV resistant, high performance silicone sealant meeting ASTM C920, Type S, Grade NS, Class 100/50, Use NT, M, G, A or O. Color to match sheet metal color selected by Owner. Acceptable Manufacturers include:
 - a. Dow 790 Building Sealant
 - b. Pecora 890 NST Silicone
 - c. Sikasil-WS 290
 - d. Triangle Fastener Corporation Ultra 1000
 2. Sealant Tape: Minimum 1/2 inch wide, non-skinning, butyl sealant tape.
 3. Butyl Sealant: Gun grade, non-skinning, non-hardening, flexible blend of butyl rubber and polyisobutylene sealant.
 4. Backer Rod: Closed-cell polyethylene or polyurethane rods sized approximately 25% larger than joint opening.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Coordinate with other work for correct sequencing of items.
- B. Ensure substrates are installed, secured and modified to accommodate sheet metal flashings.
- C. Report deficiencies associated with the sheet metal substrates to Engineer before beginning sheet metal work. Correct deficiencies before installing sheet metal flashings.

3.2 INSTALLATION

- A. General:
 1. Lock and seal joints of pre-finished sheet metal.
 2. Provide for thermal movement (expansion and contraction) of sheet metal.
 3. Where dissimilar metals contact, prevent galvanic action by means of heavy coat of asphalt primer or separate with sheet metal underlayment.
 4. Prime sheet metal surfaces (top and bottom) to receive bituminous materials. Allow primer to dry before application of bituminous materials.
 5. Install metal flanges on top of membrane, adhere and fasten as indicated in detail drawings, specified herein, and in accordance with membrane manufacturer's requirements.
 6. Provide uniform sheet metal sections with corners, joints and angles mitered, sealed and secured.
 7. Hem (return) exposed edges for strength and appearance.

8. Fit sheet metal close and neat.
 9. Provide cleats or stiffeners and other reinforcements to make sections rigid and substantial.
 10. Fabricate, support, cleat, fasten and join sheet metal to prevent warping, "oil canning", and buckling.
 11. Provide redundancy with sheet metal including but not limited to sheet metal underlayment and sealants. Install, seal and lap underlayment to ensure a redundant layer of protection to shed moisture infiltration behind sheet metal.
- B. Sheet Metal Laps (unless otherwise indicated):
1. Notch and lap ends of adjoining sheet metal sections not less than 4 inches; apply sealant tape or two bead of butyl sealant between sections.
 2. Lap miters at corners a minimum of 1 inch and apply sealant between laps. Rivet at 2 inches on center.
- C. Polymer Clad Sheet Metal:
1. Secure flanges of polymer clad sheet metal into roof deck at 12 inches on center.
 2. Sheet Metal Laps:
 - a. Leave a 1/4 inch opening between sheet metal sections.
 - b. Center aluminum tape over joint opening.
 - c. Hot-air weld 4-inch wide strip of stripping membrane over joint.
 - d. At inside and outside corners, lap miters a minimum of 1 inch and rivet at 2 inches on center; strip in with 4-inch wide strip of stripping membrane over joint.
- D. Fasteners:
1. Size and type required.
 2. Fasteners compatible with materials being joined.
 3. Exposed Fasteners:
 - a. Install screws with 5/16-inch predrilled, oversized holes.
 - b. Install Concrete and Masonry Anchors with 11/32-inch predrilled, oversized holes.
 - c. Exposed horizontal surface fasteners are not acceptable.
- E. Receiver Flashing:
1. Fabricate receiver flashing as shown in detail drawings in 10 foot lengths.
 2. Attachment:
 - a. Install receiver flashing surface mounted at 12 inches on center. If receiver flashing is located within Corner (Zone 3) secure at 6 inches on center maximum.
 3. Install sealant properly tooled to ensure adhesion and slope to shed water.
- F. Counterflashing:
1. Fabricate counterflashing as shown in detail drawings in 10 foot lengths.
 2. Install counterflashing as indicated in detail drawings and secure to receiver flashing 12 inches on center. If counter flashing is located within Corner (Zone 3) secure at 6 inches on center maximum.
 3. Stagger receiver anchors with counter flashing fasteners.
 4. Extend counter flashing a minimum of 1.5 inches below base flashing termination.
- G. Coping:
1. Fabricate coping in 10 foot lengths. Fabricate coping a maximum of 1/2 inch wider than the width of the wall; field verify parapet wall width prior to sheet metal fabrication. Refer to SMACNA (ASMM) Figure 3-4A.
 2. Install continuous cleat fastened to substrate 6 inches on center in vertical leg. Locate fasteners no greater than 2 inches from the bottom hem.
 3. Lock outside face of coping onto continuous cleat and secure inside face as follows:
 - a. For coping widths greater than 12 inches, secure inside face with continuous cleats. Secure cleat through vertical face of cleat to blocking with fasteners at 6 inches on center. Locate fasteners no greater than 2 inches from the bottom hem.

4. Coping Seams: Provide drive seam at adjoining coping sections. Turn cover ends back a minimum of 1 inch onto itself. Allow 1/4 inch space between coping sections for expansion and contraction and install sealant. Refer to SMACNA (ASMM) Figure 3-2, Type 4
 5. Provide one-piece coping section at corners, four-way intersections and tee intersections. Locate joints within 24 inches from inside corner.
 6. Terminate coping ends as shown in detail drawings.
- H. Through Wall Scupper:
1. Fabricate scupper flange, liner, and faceplate as shown in detail drawings. Scuppers dimensions as indicated in the Contract Drawings with flange extending a minimum of 4 inches on top and sides of scupper and extends a minimum of 4 inches onto the horizontal membrane.
 2. Strip in scupper liner as shown in detail drawings.
 3. Provide faceplate which extends 1.5 inches around the scupper and secure to wall substrate 12 inches on center with minimum of four fasteners/drive pins (one in each corner). Set faceplate in a bead of sealant.
 4. Extend scupper liner 1 inch beyond the exterior wall face and lock onto faceplate.

3.3 CLEANING AND PROTECTION

- A. Clean sheet metal work of asphalt, flux, scrapes and dust.
- B. Replace sheet metal components with scratches through the metal finish.

END OF SECTION 07 62 00

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SECTION 07 92 00 - JOINT SEALANTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Silicone joint sealants.
 - 2. Mildew-resistant joint sealants.
 - 3. Latex joint sealants.
 - 4. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. SCAQMD: South Coast Air Quality Management District.
 - 2. VOC: Volatile Organic Compounds.
- B Definitions:
 - 1. Manufacturer: Means the joint sealant manufacturer unless otherwise indicated.

1.4 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For specified products; include Health Product Declaration and Environmental Product Declaration.
 - a. Indicate VOC content for sealants and sealant primers.
 - 2. Samples: For each kind and color of joint sealant required.
 - 3. Joint-Sealant Schedule: Include the following information:
 - a. Joint-sealant application, joint location, and designation.
 - b. Joint-sealant manufacturer and product name.
 - c. Joint-sealant formulation.
 - d. Joint-sealant color.
- B Informational Submittals:
 - 1. Qualification Data: For qualified testing agency.
 - 2. Product Test Reports: For each kind of joint sealant, for tests performed by a qualified testing agency.
 - 3. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

1.5 QUALITY ASSURANCE

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

1.6 PRECONSTRUCTION TESTING

- A Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
 - 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each kind of sealant and joint substrate.
 - 3. Notify Architect 7 days in advance of dates and times when test joints will be erected.

4. Arrange for tests to take place with the manufacturer's technical representative present.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.7 FIELD CONDITIONS

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

1.8 WARRANTY

- A Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Specification Section within specified warranty period.
 1. Warranty Period: 2 years from date of Substantial Completion.
- B Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Specification Section within specified warranty period.
 1. Warranty Period: 5 years from date of Substantial Completion.
- C Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Specification Section within specified warranty period.
 1. Warranty Period: 20 years from date of Substantial Completion.
- D Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A Source Limitations: Obtain joint sealants from a single manufacturer for each sealant type.
- B Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by the manufacturer, based on testing and field experience.

- C Allowable VOC Content: Sealants, sealant primers, and caulks must comply with SCAQMD Rule 1168 VOC limits.
 - 1. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene).
- D Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- E Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- F Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A Neutral-Curing Silicone Joint Sealant, Nonstaining: ASTM C 920.
 - 1. Products: Subject to compliance with the Contract Documents, provide one of the following:
 - a. Dow Chemical Company; DOWSIL 756 SMS.
 - b. Sika Corporation; Sikasil WS-295 or WS-290.
 - c. Pecora Corporation; 864 NST.
 - 2. Type: Single component (S).
 - 3. Grade Nonsag (NS).
 - 4. Class: 50.
 - 5. Exposure: Nontraffic (NT)
- B Mildew-Resistant, Neutral-Curing Silicone Sealant:
 - 1. Products: Subject to compliance with the Contract Documents, provide one of the following:
 - a. Pecora Corporation; 898
 - b. Tremco, Tremsil 600.
 - c. Dow Chemical Company; DOWSIL 786.
 - 2. Type: Single-component (S)
 - 3. Grade: Nonsag (NS)
 - 4. Class: 25.
 - 5. Exposure: Nontraffic (NT)

2.3 LATEX JOINT SEALANTS

- A Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 - 1. Product: Subject to compliance with the Contract Documents, provide one of the following:
 - a. Pecora Corporation; AC-20+.
 - b. Tremco Incorporated; Tremflex 834.
 - c. BASF Corporation; Sonolac.

2.4 JOINT SEALANT BACKING

- A Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.5 MISCELLANEOUS MATERIALS

- A Primer: Material recommended by the manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction field tests.

- B Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.
- D Accessories: As supplied, recommended, or required by the manufacturer and as necessary for a complete installation.

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine joints indicated to receive joint sealants, with installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the work.
- B Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 1. Installation of joint sealants indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - a. Remove laitance and form-release agents from concrete.
 - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
 - 3. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
- B Joint Priming: Prime joint substrates where recommended by the manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with the manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION

- A Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- C Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

- D Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

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

3.5 FIELD QUALITY CONTROL

- A Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed elastomeric sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet of joint length for each type of elastomeric sealant and joint substrate.
 - b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.
 - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab in Appendix X1 in ASTM C 1193, as appropriate for type of joint-sealant application indicated.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; do this by extending cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field-adhesion-test log.
 - 4. Inspect tested joints and report on the following:
 - a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 - b. Whether sealants filled joint cavities and are free of voids.
 - c. Whether sealant dimensions and configurations comply with specified requirements.
 - 5. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
 - 6. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.6 PROTECTION

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

END OF SECTION 07 92 00

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Interior standard steel frames.
 - 2. Exterior standard steel doors and frames.
 - 3. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. AHJ: Authority (Authorities) Having Jurisdiction.
 - 2. BHMA: Builders Hardware Manufacturers Association.
 - 3. DHI: Door and Hardware Institute.
 - 4. SDI: Steel Door Institute.
- B Definitions:
 - 1. Manufacturer: Means the hollow metal door and frame manufacturer unless otherwise indicated.
 - 2. Minimum Thickness: Minimum thickness of base metal without coatings in accordance with ANSI/SDI A250.8.

1.4 COORDINATION

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

1.5 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For each type of product; include Environmental Product Declaration.
 - a. Include construction details, material descriptions, core descriptions, and finishes.
 - 2. Shop Drawings: Include the following:
 - a. Elevations of each door type.
 - b. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 - c. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - d. Locations of reinforcement and preparations for hardware.
 - e. Details of each different wall opening condition.
 - f. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
 - g. Details of anchorages, joints, field splices, and connections.
 - h. Details of accessories.
 - 3. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.6 DELIVERY, STORAGE, AND HANDLING

- A Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
- B Deliver welded frames with 2 removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on at least 4-inch- high blocking. Provide at least 1/4-inch space between each stacked door to permit air circulation.

PART 2 PRODUCTS**2.1 MANUFACTURERS**

- A Hollow Metal Doors and Frames:
 - 1. Manufacturers: Subject to compliance with the Contract Documents, provide products by one of the following.
 - a. CECO Door; an ASSA ABLOY Group company.
 - b. CURRIES; an ASSA ABLOY Group company.
 - c. Republic Doors and Frames; an Allegion company.
 - d. Steelcraft; an Allegion company.

2.2 INTERIOR STANDARD STEEL FRAMES

- A General: Construct hollow-metal frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B Heavy-Duty Frames: ANSI/SDI A250.8, Level 2.
 - 1. Frames:
 - a. Materials: Uncoated steel sheet, at least 0.053 inch.
 - b. Sidelite Frames: Fabricated from same thickness material as adjacent door frame.
 - c. Construction: Full profile welded.
 - 2. Exposed Finish: Factory prime.

2.3 EXTERIOR STANDARD HOLLOW METAL DOORS AND FRAMES

- A Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A.
 - 1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Metallic-coated steel sheet, at least 0.053 inch thick, with at least A60 coating.
 - d. Edge Construction: Model 1, Full Flush.
 - e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
 - f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
 - g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
 - h. Core: Manufacturer's standard.
 - 2. Frames:
 - a. Materials: Metallic-coated steel sheet, at least 0.053 inch, with at least A60 coating.
 - b. Construction: Full profile welded.
 - 3. Exposed Finish: Factory prime.

2.4 FRAME ANCHORS

- A Jamb Anchors:
 - 1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.

2. Quantity: At least 3 anchors per jamb, with 1 additional anchor for frames with no floor anchor. Provide 1 additional anchor for each 24 inches of frame height above 7 feet.
3. Postinstalled Expansion Anchor: At least 3/8-inch- diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- B Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.
- D Material: ASTM A 879/A 879M, Commercial Steel (CS), 04Z designation; mill phosphatized.
 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M; hot-dip galvanized in accordance with ASTM A 153/A 153M, Class B.

2.5 FLASHING

- A Metal Flashing: Provide metal flashing complying with the SMACNA publication *Architectural Sheet Metal Manual* and as follows:
 1. Stainless Steel: ASTM A 240 or ASTM A 666, Type 304, 0.016 inch thick.

2.6 ACCESSORIES

- A Accessories: As supplied, recommended, or required by the manufacturer for the Project installation conditions and as necessary for a complete installation.

2.7 MATERIALS

- A Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- D Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A 153/A 153M.
- E Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- F Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with flame-spread and smoke-developed indexes of no more than 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

2.8 FABRICATION

- A Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
 1. Sidelite Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive 3 door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive 2 door silencers.
- B Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule, and templates.
 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

2.9 STEEL FINISHES

A Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

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

PART 3 EXECUTION

3.1 PREPARATION

A Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

B Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

A Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B Hollow-Metal Frames: Comply with ANSI/SDI A250.11.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed work.
2. Floor Anchors: Secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. Solidly pack mineral-fiber insulation inside frames.
4. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.

1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.

3.3 REPAIR

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

END OF SECTION 08 11 13

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. 5-ply flush wood veneer-faced doors for transparent finish.
 - 2. Factory finishing flush wood doors.
 - 3. Factory fitting flush wood doors to frames and factory machining for hardware.
 - 4. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. AHJ: Authority (Authorities) Having Jurisdiction.
 - 2. BHMA: Builders Hardware Manufacturers Association.
 - 3. DHI: Door and Hardware Institute.
 - 4. WDMA: Window & Door Manufacturers Association.
- B Definitions:
 - 1. Door(s): Means veneer-faced flush wood door(s).
 - 2. Manufacturer: Means the flush wood door manufacturer unless otherwise indicated.

1.4 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For each type of product, including the following. Include current Health Product Declaration and Environmental Product Declaration.
 - a. Door core materials and construction.
 - b. Door edge construction
 - c. Door face type and characteristics.
 - d. Factory-machining criteria.
 - e. Factory-finishing specifications.
 - 2. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:
 - a. Door schedule indicating door location, type, size, and swing.
 - b. Door elevations, dimension and locations of hardware, lite cutouts, and glazing thicknesses.
 - c. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
 - d. Dimensions and locations of blocking for hardware attachment.
 - e. Dimensions and locations of mortises and holes for hardware.
 - f. Clearances and undercuts.
 - g. Requirements for veneer matching.
 - h. Doors to be factory finished and application requirements.
 - 3. Samples:
 - a. Factory Finishes: Applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.
 - 1) For each wood species and transparent finish, provide set of 3 Samples showing typical range of color and grain to be expected in the finished work.
- B Informational Submittals:
 - 1. Sample Warranty: For special warranty.
- C Closeout Submittals:

1. Maintenance Data: For doors to include in maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Comply with requirements of referenced standard and manufacturer's written instructions.
- B Package doors as standard with the manufacturer: (1) individually in plastic bags or cardboard cartons; or (2) individually in cardboard cartons, and wrap bundles of doors in plastic sheeting.
- C Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

- A Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

- A Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 1. Failures include:
 - a. Delamination of veneer.
 - b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 2. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A Manufacturers:
 1. Basis-of-Design Manufacturer: Subject to compliance with the Contract Documents the design is based on products by the following.
 - a. VT Industries.
 2. Acceptable Manufacturers: Subject to compliance with the Contract Documents, provide products by the basis-of-design manufacturer, or comparable products by one of the following.
 - a. Oshkosh Door Company.
 - b. Forte Opening Solutions (formerly Masonite Architectural Doors).

2.2 FLUSH WOOD DOORS, GENERAL

- A Quality Standard: In addition to requirements specified, comply with ANSI/WDMA I.S. 1A.

2.3 SOLID-CORE 5-PLY FLUSH WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A Interior Doors:
 1. Performance Grade: ANSI/WDMA I.S. 1A: Heavy Duty.
 2. ANSI/WDMA I.S. 1A Grade: Custom.
 3. Faces: Single-ply wood veneer not less than 1/50 inch thick. Provide the following.
 - a. Species and Cut: As selected by the Architect.
 - b. Match between Veneer Leaves: As selected by the Architect.
 - c. Assembly of Veneer Leaves on Door Faces: Balance match.
 4. Exposed Vertical Edges: Same species as faces or a compatible species.
 5. Core for Non-Fire-Rated Doors:
 - a. ANSI A208.1, Grade LD-2 particleboard.
 - 1) Blocking: Provide wood blocking in particleboard-core doors as follows:
 - (a) 5-inch top-rail blocking, in doors indicated to have closers.
 - (b) 5-inch bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.

- 2) Provide doors with WDMA I.S. 10 structural-composite-lumber cores instead of particleboard cores for doors scheduled to receive exit devices.
6. Construction: 5 plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

2.4 FABRICATION

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

2.5 FACTORY FINISHING

- A Comply with referenced quality standard for factory finishing.
 1. Factory finish doors.
 2. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 3. Finish faces, all 4 edges, edges of cutouts, and mortises.
 4. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.
- B Transparent Finish:
 1. ANSI/WDMA I.S. 1A Grade: Custom.
 2. Finish: ANSI/WDMA I.S. 1A TR-8 UV Cured Acrylated Polyester/Urethane.
 3. Stain: As selected by the Architect.
 4. Sheen: As selected by the Architect.

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine doors and installed door frames, with installer present, before hanging doors.
 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 2. Reject doors with defects.
- B Do not proceed with installation until unsatisfactory conditions have been corrected.
 1. Installation of doors indicates acceptance of surfaces and conditions.

3.2 INSTALLATION

- A Hardware: As indicated on the Drawings.
- B Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

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

END OF SECTION 08 14 16

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SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Non-load-bearing steel framing systems for interior partitions.
 - 2. Suspension systems for interior ceilings and soffits.
 - 3. Grid suspension systems for gypsum board ceilings.
 - 4. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. AHJ: Authority (Authorities) Having Jurisdiction.
 - 2. AISI: American Iron and Steel Institute.
 - 3. STC: Sound Transmission Class.
- B Definitions:
 - 1. Manufacturer: Means the non-structural metal framing manufacturer unless otherwise indicated.

1.4 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For each type of product indicated. Include Environmental Product Declaration.
- B Informational Submittals:
 - 1. Evaluation Reports: For power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to the AHJ.

1.5 QUALITY ASSURANCE

- A Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of one of the following:
 - 1. The Certified Steel Stud Association.
 - 2. The Steel Framing Industry Association.
 - 3. The Steel Stud Manufacturers Association.
 - 4. The Supreme Steel Framing System Association.

1.6 DELIVERY, STORAGE, AND HANDLING

- A Notify manufacturer of damaged materials received prior to installation.
- B Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by the AISI publication AISI S202, Code of Standard Practice for Cold-Formed Steel Structural Framing.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

- B Design framing systems in accordance with the AISI publication *AISI S220, North American Standard for Cold-Formed Steel Framing - Nonstructural Members*, unless otherwise indicated.
- C Design Loads: As indicated on the Drawings, or at least 5 lbf/sq. ft. as required by the IBC.
- D Design framing systems to accommodate deflection of primary building structure and construction tolerances and to withstand design loads.

2.2 MANUFACTURERS

- A Manufacturers: Subject to compliance with the Contract Documents, provide products by one of the following.
 - 1. ClarkDietrich Building Systems.
 - 2. Marino\WARE.
 - 3. The Steel Network, Inc.

2.3 NON-LOAD-BEARING STEEL FRAMING, GENERAL

- A Framing Members, General: Comply with AISI S220 for conditions indicated.
 - 1. Steel Sheet Components: Comply with AISI S220 requirements for metal unless otherwise indicated.
 - 2. Protective Coating: Comply with AISI S220; ASTM A 653, G40 unless otherwise indicated. Galvannealed products are unacceptable.

2.4 STEEL FRAMING FOR FRAMED ASSEMBLIES

- A Steel Studs and Runners: AISI S220.
 - 1. Minimum Base-Metal Thickness: At least 0.0312 inch.
 - 2. Depth: As indicated on Drawings.
- B Slip-Type Head Joints: Where indicated, provide one of the following:
 - 1. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
 - 2. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. Manufacturers: Subject to compliance with the Contract Documents, provide products by one of the following:
 - 1) ClarkDietrich Building Systems.
 - 2) Marino\WARE.
 - 3) The Steel Network, Inc.
- C Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 - 1. Base-Metal Thickness: As indicated on the Drawings.
- D Cold-Rolled Channel Bridging: 0.0538-inch bare-steel thickness, with at least 1/2-inch-wide flanges.
 - 1. Depth: As indicated on the Drawings.
 - 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.
- E Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 - 1. Minimum Base Metal Thickness: As indicated on the Drawings.
 - 2. Depth: As indicated on Drawings.
- F Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.
 - 1. Configuration: Asymmetrical or hat shaped.
- G Cold-Rolled Furring Channels: 0.0538-inch bare-steel thickness, with at least 1/2-inch-wide flanges.
 - 1. Depth: As indicated on the Drawings.
 - 2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of 0.0312 inch.
 - 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch-diameter wire.

- H Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, bare-metal thickness of at least 0.0179 inch, and depth required to fit insulation thickness indicated.

2.5 SUSPENSION SYSTEM COMPONENTS

- A Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch-diameter wire.
- B Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.
- C Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.
- D Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of at least 0.0538 inch and at least 1/2-inch-wide flanges.
1. Depth: 2-1/2 inches.
- E Furring Channels (Furring Members):
1. Cold-Rolled Channels: 0.0538-inch bare-steel thickness, with at least 1/2-inch-wide flanges, 3/4 inch deep.
 2. Steel Studs: ASTM C 645.
 - a. Minimum Base-Metal Thickness: At least 0.0312 inch.
 - b. Depth: As indicated on Drawings.
 3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
 - a. Minimum Base Metal Thickness: At least 0.0312 inch.
 4. Resilient Furring Channels: 1/2-inch-deep members designed to reduce sound transmission.
 - a. Configuration: Asymmetrical or hat shaped.
- F Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
1. Products: Subject to compliance with the Contract Documents provide one of the following:
 - a. "Drywall Grid Systems" manufactured by Armstrong World Industries, Inc.
 - b. "Chicago Metallic Drywall Grid" manufactured by Rockfon.
 - c. "Drywall Suspension System" manufactured by USG Corporation.

2.6 AUXILIARY MATERIALS

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

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.
1. Do not proceed with installation until unsatisfactory conditions have been corrected.
 - a. Installation of non-structural metal framing indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION, GENERAL

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

3.4 INSTALLING FRAMED ASSEMBLIES

- A Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Space studs as follows:
 - a. Single-Layer Application: 16 inches on center unless otherwise indicated.
 - b. Multilayer Application: 16 inches on center unless otherwise indicated.
 - c. Tile Backing Panels: 16 inches on center unless otherwise indicated.
- B Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C Install studs so flanges within framing system point in same direction.
- D Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install 2 studs at each jamb, unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 - 4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- E Direct Furring: Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches on center.
- F Z-Furring Members:
 - 1. Erect insulation vertically and hold in place with Z-furring members spaced 24 inches on center.
 - 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches on center.
 - 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- G Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

- A Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.
- B Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C Suspend hangers from building structure as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 5. Do not attach hangers to steel roof deck.
 - 6. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 - 7. Do not connect or suspend steel framing from ducts, pipes, or conduit.

3.6 INSTALLATION OF GRID SUSPENSION SYSTEMS

- A Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.7 FIELD QUALITY CONTROL

- A Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09 22 16

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SECTION 09 28 00 - TILE BACKING BOARD

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Tile backing panels.
 - 2. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Abbreviations and Acronyms:
 - 1. GA: Gypsum Association.
- B Definitions:
 - 1. Manufacturer: Means the tile backing panel manufacturer unless otherwise indicated.

1.4 ACTION SUBMITTALS

- A Product Data: For each type of product. Include Health Product Declaration and Environmental Product Declaration.

1.5 DELIVERY, STORAGE AND HANDLING

- A Comply with the applicable requirements of GA Publication *GA-801, Handling and Storage of Gypsum Panel Products*.
- B Store materials inside under cover, dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

- A Environmental Limitations: Comply with applicable ASTM C 840 requirements or manufacturer's written instructions, whichever are more stringent.

PART 2 PRODUCTS

2.1 TILE BACKING PANELS

- A Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178, with manufacturer's standard edges.
 - 1. Products: Subject to compliance with the Contract Documents, provide one of the following.
 - a. "GlasRoc Tile Backer" manufactured by CertainTeed.
 - b. "Gold Bond Brand eXP Tile Backer" manufactured by National Gypsum Company.
 - c. "USG Durock Brand Glass-Mat Tile Backerboard" manufactured by USG Corporation.
 - 2. Core: 5/8 inch, Type X, unless otherwise indicated.
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.2 JOINT TREATMENT MATERIALS

- A General: Comply with ASTM C 475.
- B Glass-Fiber Mesh Joint Tape: Alkali-resistant self-adhering glass-fiber tape, at least 2 inches wide, 10 by 10, or 10 by 20 threads/inch, or as otherwise recommended by the manufacturer.
- C Joint Compound for Tile Backing Panels:
 - 1. Glass-Mat, Water-Resistant Backing Panel: As recommended by the manufacturer.

2.3 AUXILIARY MATERIALS

- A General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
 - 1. Use at least 1-1/4-inch-long screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
- C Accessories: Provide other accessories supplied, recommended, or required by the manufacturer as necessary for a complete installation.

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine areas and substrates with installer present, for compliance with requirements and other conditions affecting performance of the work.
- B Examine panels before installation. Reject wet, moisture-, or mold-damaged panels.
- C Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 1. Installation of tile backing panels indicates acceptance of surfaces and conditions.

3.2 INSTALLING TILE BACKING PANELS

- A General: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile.
 - 1. Glass-Mat, Water-Resistant Backing Panels: Install with 1/4-inch gap where panels abut other construction or penetrations.
- B Prefill joints and then immediately embed joint tape and level joints.
- C Where tile backing panels abut other types of panels in same plane that are thinner, shim surfaces to produce a uniform plane across panel surfaces.

3.3 FINISHING TILE BACKING PANELS

- A General: Treat tile backing panels as required to prepare tile backing panel surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

3.4 PROTECTION

- A Protect installed products from damage until finished with concealing finishes.

END OF SECTION 09 28 00

SECTION 09 29 00 - GYPSUM BOARD

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Interior gypsum board.
 - 2. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Definitions:
 - 1. Manufacturer: Means the gypsum board manufacturer unless otherwise indicated.

1.4 ACTION SUBMITTALS

- A Product Data: For each type of product. Include current Health Product Declaration and Environmental Product Declaration.

1.5 DELIVERY, STORAGE AND HANDLING

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

1.6 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated in accordance with ASTM E 119 by an independent testing agency.
- B STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

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

2.3 INTERIOR GYPSUM BOARD

- A Manufacturers: Subject to compliance with the Contract Documents, provide products by one of the following:
 - 1. CertainTeed.

2. Georgia-Pacific.
3. National Gypsum Company.
4. USG Corporation.
- B Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
 1. Core: 5/8 inch, Type X.
 2. Long Edges: Tapered.
 3. Mold Resistance: ASTM D 3273, score of 10 as rated in accordance with ASTM D 3274.

2.4 TRIM ACCESSORIES

- A Interior Trim: ASTM C 1047.
 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. L-Bead: L-shaped; exposed long flange receives joint compound.
 - d. Expansion (control) joint.
 - e. Curved-Edge Cornerbead: With notched or flexible flanges.

2.5 JOINT TREATMENT MATERIALS

- A General: Comply with ASTM C 475/C 475M.
- B Joint Tape: Paper.
- C Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 1. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 2. Fill Coat: For second coat, use drying-type, all-purpose compound.
 3. Finish Coat: For third coat, use drying-type, all-purpose compound.
 4. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound or high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

2.6 AUXILIARY MATERIALS

- A General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
- C Foam Gasket: Adhesive-backed, closed-cell vinyl or neoprene foam strips at least 1/8 inch thick, in width to suit mullion size.
- D Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool as specified in Section 09 81 00 Acoustical Insulation, Sealants, and Accessories.
 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- E Acoustical Sealant: As specified in Section 09 81 00 Acoustical Insulation, Sealants, and Accessories.
- F Accessories: As supplied, recommended, or required by the manufacturer as necessary for a complete installation.

PART 3 EXECUTION**3.1 EXAMINATION**

- A Examine areas and substrates including welded hollow-metal frames and framing, with installer present, for compliance with requirements and other conditions affecting performance.
- B Examine panels before installation. Reject wet, moisture-, or mold-damaged panels.
- C Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 1. Installation of gypsum board indicates acceptance of surfaces and conditions.

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

- A Comply with ASTM C 840.
- B Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E Form control and expansion joints with space between edges of adjoining gypsum panels.
- F Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
- G Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

- A Install interior gypsum board in the following locations:
 - 1. Mold-Resistant Type: At vertical surfaces and horizontal surfaces.
- B Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 - 3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C Multilayer Application:
 - 1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.

2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.4 INSTALLING TRIM ACCESSORIES

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

3.5 FINISHING GYPSUM BOARD

- A General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- C Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 2. Level 2: Panels that are substrate for tile.
 3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in Section 09 91 23 Interior Painting.
 4. Level 5: Where indicated on the Drawings.
 - a. Primer and its applicabtion to surfaces are specified in Section 09 91 23 Interior Painting.

3.6 PROTECTION

- A Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B Protect installed products from damage during remainder of the construction period.
- C Remove and replace wet, moisture-, or mold-damaged panels.
 1. Indications that panels are wet or moisture damaged include discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 30 00 - TILING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Wall tile.
 - 2. Floor tile.
 - 3. Waterproofing / crack isolation membranes.
 - 4. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. TCNA: The Tile Council of North America.
- B Definitions:
 - 1. Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to the work of this Specification Section unless otherwise specified.
 - 2. Manufacturer: Means the tile manufacturer, as applicable, unless otherwise indicated.

1.4 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For each type of product indicated; include current Health Product Declaration and Environmental Product Declaration.
 - 2. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- B Informational Submittals:
 - 1. Qualification Data: For installer.
 - 2. Product Certificates: For each type of product.
 - 3. Product Test Reports: For tile-setting and -grouting products.
- C Closeout Submittals:
 - 1. Maintenance Data: For tiling to include in maintenance manuals

1.5 QUALITY ASSURANCE

- A Installer Qualifications:
 - 1. Installer is a Five-Star member of the National Tile Contractors Association, or a Trowel of Excellence member of the Tile Contractors' Association of America, or who can demonstrate compliance with its certification program requirements.
 - 2. Installer employs at least one installer for Project who has completed the Advanced Certification for Tile Installers (ACT) certification for installation of large format tile, or who can demonstrate compliance with its certification program requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling tile packages.
- B Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D Store liquid materials in unopened containers and protected from freezing.

1.7 FIELD CONDITIONS

- A Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 - 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
 - 2. Obtain waterproof/crack isolation membrane from manufacturer of setting and grouting materials.

2.2 PRODUCTS, GENERAL

- A ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements.
- B ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.3 TILE PRODUCTS

- A Floor Tile:
 - 1. Basis of Design Product (PTF): Subject to compliance with the Contract Documents design is based on the products indicated in the Finish Material Legend on the Drawings as manufactured or distributed by the following.
 - a. TileBar.
 - 2. Acceptable Sources Subject to compliance with the Contract Documents provide the basis of design products or comparable acceptable products by one of the following.
 - a. BestTile.
 - b. Stone Source LLC.
- B Wall Tile:
 - 1. Basis-of-Design Product (T-1): Subject to compliance with the Contract Documents design is based on the product indicated in the Finish Material Legend on the Drawings as manufactured or distributed by the following.
 - a. Trinity Surfaces.
 - 2. Acceptable Sources Subject to compliance with the Contract Documents provide the basis of design products or comparable acceptable products by one of the following.
 - a. BestTile.
 - b. Stone Source LLC.
- C Tile Base:
 - 1. Basis-of-Design Product (PTB): Subject to compliance with the Contract Documents design is based on the product indicated in the Finish Material Legend on the Drawings as manufactured or distributed by the following.
 - a. TileBar.

2. Acceptable Sources Subject to compliance with the Contract Documents provide the basis of design product or comparable acceptable product by one of the following.
 - a. BestTile.
 - b. Stone Source LLC.

2.4 WATERPROOFING / CRACK ISOLATION MEMBRANES

- A General: Manufacturer's standard product that exceeds ANSI A118.10 and ANSI A118.12 and is recommended by the membrane manufacturer for the application indicated. Include reinforcement and accessories recommended by membrane manufacturer.
- B Product: Subject to compliance with the Contract Documents, provide the following.
 1. "Mapelastic AquaDefense" as manufactured by Mapei Corporation.

2.5 SETTING MATERIALS

- A Improved Modified Dry-Set Mortar (Thinset): ANSI A118.15.
 1. Product: Subject to compliance with the Contract Documents, provide the following:
 - a. "Ultraflex 3" as manufactured by MAPEI Corporation or comparable approved product..
 2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
 3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.15.

2.6 GROUT MATERIALS

- A Water-Cleanable Epoxy Grout: ANSI A118.3.
 1. Product: Subject to compliance with the Contract Documents, provide one of the following and as acceptable to the Architect.
 - a. "Kerapoxy CQ" as manufactured by MAPEI., or comparable approved product.
- B Grout Colors: As indicated in the Interior Finish Schedule on the Drawings.

2.7 MISCELLANEOUS MATERIALS

- A Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation supplied, recommended, or required by manufacturer of tile-setting materials for installations indicated.
- B Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- C Accessories: As supplied, recommended, or required by the manufacturer and as necessary for a complete installation.

2.8 MIXING MORTARS AND GROUT

- A Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B Add materials, water, and additives in accurate proportions.
- C Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine substrates, areas, and conditions where tile is indicated to be installed, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the work.
 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone.

2. Verify substrates comply with the flatness tolerances required by ANSI A108.01 and the following:
 - a. Tile with no edge larger than 15 inches: 1/4-inch in 10 feet.
 - b. Large Format Tile (15 inches or more on a side): 1/8 inch in 10 feet.
 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B Do not proceed with installation until unsatisfactory conditions have been corrected.
1. Installation of tile indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION OF WATERPROOFING / CRACK ISOLATION MEMBRANES

- A Install waterproof membrane to comply with manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.
- B Allow membrane to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.4 TILE INSTALLATION

- A Comply with the TCNA publication *Handbook for Ceramic, Glass, and Stone Tile Installation* for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage.
 - a. Tile floors consisting of tiles 8 by 8 inches or larger.
- B Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- E Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
1. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 2. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- F Joint Widths: Install tile with the joint widths as indicated in the Material Finish Legend on the Drawings, or if not indicated, as selected by the Architect.
- G Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

H Movement Joints: Provide movement joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated on Drawings. Form joints during installation of setting materials, mortar beds, and tile. Keep joints free of dirt, debris, and setting materials prior to filling with sealants. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them and of equal or greater widths.
2. Where tilework abuts restraining surfaces such as perimeter walls, curbs, columns, and ceilings.
3. Where there is a change in substrate material.
4. Interior Tilework: 20 to 25 feet in each direction.
5. Above-Ground Concrete Substrates: 8 to 12 feet in each direction.
6. Interior Tilework Exposed to Direct Sunlight: 8 to 12 feet in each direction.
7. Interior Tilework Exposed to Moisture: 8 to 12 feet in each direction.

3.5 ADJUSTING AND CLEANING

A Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.6 PROTECTION

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

B Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.

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

3.7 FLOOR TILE INSTALLATION SCHEDULE

A Interior Floor Installations, Concrete Subfloor:

1. Tile Installation: TCNA F122; thinset mortar on waterproof/crack isolation membrane; medium bed for large format tiles.
 - a. Thinset Mortar: Improved modified dry-set mortar.
 - b. Grout: Water-cleanable epoxy grout.

3.8 WALL TILE INSTALLATION SCHEDULE

A Interior Wall Installations, Metal Studs:

1. Ceramic Tile Installation: TCNA W245; thinset mortar on glass-mat, water-resistant gypsum backer board.
 - a. Thinset Mortar: Improved modified dry-set mortar.
 - b. Grout: Water-cleanable epoxy grout.

END OF SECTION 09 30 00

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SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Acoustical panels.
 - 2. Metal suspension systems.
 - 3. Metal edge moldings and trim.
 - 4. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation or application.
- B Products furnished, but not installed under this Specification Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 REFERENCES

- A Definitions:
 - 1. Manufacturer: Means the acoustical panel, sound diffuser, and suspension system manufacturer unless otherwise indicated.

1.4 SUBMITTALS

- A Action Submittals:
 - 1. Product Data:
 - a. Acoustical panels.
 - b. Sound diffusers.
 - c. Metal suspension systems.
 - d. Edge moldings and trim.
 - e. Current Health Product Declaration.
 - f. Current Environmental Product Declaration.
 - 2. Samples for Verification: For acoustical panels and suspension system, in manufacturer' standard sizes.
- B Informational Submittals:
 - 1. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - a. Ceiling suspension-system members.
 - b. Structural members to which suspension systems will be attached.
 - c. Method of attaching hangers to building structure.
 - 1) Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
 - d. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
 - e. Size and location of initial access modules for acoustical panels.
 - f. Items penetrating finished ceiling and ceiling-mounted items.
 - g. Minimum Drawing Scale: 1/4 inch = 1 foot.
 - 2. Product Test Reports: For each acoustical panel ceiling and sound diffuser, for tests performed by a qualified testing agency or by the manufacturer and witnessed by a qualified testing agency.
 - 3. Evaluation Reports: For anchor and fastener type, from ICC-ES.
- C Closeout Submittals:
 - 1. Maintenance Data: For finishes to include in maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 FIELD CONDITIONS

- A Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 PRODUCTS**2.1 SOURCE LIMITATIONS**

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

2.2 PERFORMANCE REQUIREMENTS

- A Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Class A in accordance with ASTM E 1264.
 - 2. Smoke-Developed Index: 50 or less.

2.3 ACOUSTICAL PANELS

- A Acoustical Panels (APC-1): Subject to compliance with the Contract Documents provide product to match existing and Architect's approved sample.

2.4 METAL SUSPENSION SYSTEMS

- A Metal Suspension System (APC-1): Subject to compliance with the Contract Documents provide product to match existing and Architect's approved sample.
- B Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories in accordance with ASTM C 635/C 635M and designated by type, structural classification, and finish indicated.
 - 1. Structural Classification: Heavy duty.

2.5 ACCESSORIES

- A Attachment Devices: Size for 5 times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated.
 - 1. Anchors in Concrete: Anchors with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 5 times that imposed by ceiling construction, as determined by testing in accordance with ASTM E 488/E 488M or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
- B Wire Hangers, Braces, and Ties: Provide wires as follows:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Size: Wire diameter sufficient for its stress at 3 times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch-diameter wire.
- C Other Accessories: As supplied, recommended, or required by the manufacturer and as necessary for a complete installation.

2.6 METAL EDGE MOLDINGS AND TRIM

- A Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
 - 1. Edge moldings to fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
 - 2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.7 ACOUSTICAL SEALANT

- A Acoustical Sealant: As specified in Section 09 81 00 Acoustical Insulation, Sealants, and Accessories.

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with installer present, for compliance with requirements specified in this and other Specification Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B Examine acoustical panels before installation. Reject wet, moisture-, or mold-damaged acoustical panels.
- C Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 1. Installation of acoustical panel ceilings indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- B Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION OF ACOUSTICAL PANEL CEILINGS

- A Install acoustical panel ceilings in accordance with ASTM C 636/C 636M and manufacturer's written instructions.
- B Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - 4. Secure wire hangers to ceiling-suspension members and to supports above with at least 3 tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - 5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 - 6. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 - 7. Do not attach hangers to steel deck tabs.
 - 8. Do not attach hangers to steel roof deck. Attach hangers to structural members.

9. Space hangers not more than 48 inches on center along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches on center and not more than 3 inches from ends. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.
 1. Arrange directionally patterned acoustical panels as indicated on reflected ceiling plans, or if not indicated, as directed by the Architect.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
 3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
 4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by the manufacturer.
- F Install diffusers in accordance with manufacturer's written instructions.

3.4 ERECTION TOLERANCES

- A Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-cumulative.
- B Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet, non-cumulative.

3.5 CLEANING

- A Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

SECTION 09 54 26 - SUSPENDED WOOD CEILINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Suspended wood ceiling system.
 - 2. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. CISCA: The Ceilings and Interior Systems Construction Association.
- B Definitions:
 - 1. Manufacturer: Means the wood ceiling manufacturer unless otherwise indicated.

1.4 COORDINATION

- A Coordinate layout and installation of wood ceilings and suspension systems with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.5 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For each type of product. Include the following.
 - a. Current Health Product Declaration.
 - b. Current Environmental Product Declaration.
 - 2. Shop Drawings: For wood ceilings.
 - a. Include reflected ceiling plans, sections, and details, drawn to scale, showing the following:
 - 1) Wood ceiling patterns and joints.
 - 2) Ceiling suspension members.
 - 3) Method of attaching hangers to building structure and locations of cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Specification Sections.
 - 4) Ceiling-mounted items.
 - 5) Ceiling perimeter and penetrations through ceiling; trim and moldings.
- B Informational Submittals:
 - 1. Qualification Data: For installer.
 - 2. Product Test Reports: For each wood ceiling, for tests performed by a qualified testing agency.
 - 3. Evaluation Reports: For wood-ceiling framing systems.
- C Maintenance Data: For finishes to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A Installer Qualifications: Experienced installer, approved by the manufacturer, who has completed ceilings similar in species, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.7 DELIVERY, STORAGE, AND HANDLING

- A Deliver ceiling components and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they are protected against damage.

- B Handle ceiling components and accessories in a manner that prevents damage.

1.8 PROJECT CONDITIONS

- A Environmental Limitations: Do not install wood ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
 - 1. Store and acclimatize wood products in the spaces where they will be installed for a at least 72 hours immediately before ceiling installation.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A Structural Performance: Suspended wood ceilings shall withstand the effects of gravity loads, and stresses without showing permanent deformation of ceiling system components or permanent damage to fasteners and anchors.
- B Surface-Burning Characteristics: Provide products with the following characteristics when tested in accordance with ASTM E 84.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.

2.2 WOOD CEILINGS

- A Wood Ceilings:
 - 1. Product (WDC-1): Subject to compliance with the Contract Documents design is based on the products indicated in the Finish Material Legend on the Drawings as manufactured by the following.
 - a. Armstrong World Industries, Inc.
 - 2. Acceptable Manufacturers: Subject to compliance with the Contract Documents, provide the basis-of-design product, or comparable approved product by one of the following.
 - a. Hunter Douglas.
 - b. USG Corporation.

2.3 ACCESSORIES

- A Accessories: As supplied, recommended, or required by the manufacturer as necessary for a complete installation.

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine substrates, areas, and conditions, including structural framing and substrates to which suspended wood ceilings attach or abut, with installer present, for compliance with requirements specified in this and other Specification Sections that affect ceiling installation and anchorage, and with requirements for installation tolerances and other conditions affecting performance of suspended wood ceilings.
- B Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 1. Installation of wood ceilings indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A Measure each ceiling area and establish layout of suspended wood ceilings.

3.3 INSTALLATION

- A Comply with manufacturer's written instructions, and the Cisca publication *Ceiling Systems Handbook*.

- B Install wood components and accessories in accordance with manufacturer's written instructions and to accommodate natural expansion and contraction of wood products resulting from fluctuations in humidity.

3.4 CLEANING

- A Clean exposed surfaces of ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 54 26

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SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Resilient base.
 - 2. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. SCAQMD: South Coast Air Quality Management District.
 - 2. VOC: Volatile Organic Compounds.
- B Definitions:
 - 1. Manufacturer: Means the resilient base or resilient stair accessories manufacturer as applicable unless otherwise indicated.

1.4 ACTION SUBMITTALS

- A Product Data: For each type of product. Include the following.
 - 1. Current Health Product Declaration.
 - 2. Current Environmental Product Declaration.
 - 3. Indicate VOC content for adhesive.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 FIELD CONDITIONS

- A Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
 - 1. For 48 hours before and after installation.
 - 2. During installation.
- B After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C Install resilient products after other finishing operations, including painting, have been completed.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A Fire-Test-Response Characteristics, Rubber Stair Accessories: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 RESILIENT BASE

- A Resilient Base Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic), Group 1.
 - 1. Basis-of-Design Products (RB): Subject to compliance with the Contract Documents, design is based on products indicated in the Finish Material Legend on the Drawings as manufactured by the following.

- a. Tarkett USA. (Johnsonite)
- 2. Acceptable Manufacturers: Subject to compliance with the Contract Documents provide the basis of design products or comparable approved product by one of the following.
 - a.
 - b. Roppe.
- B Lengths: Coils in manufacturer's standard length.
- C Outside and Inside Corners: Job formed.

2.3 INSTALLATION MATERIALS

- A Adhesives: Water-resistant type supplied, recommended, or required by the resilient product and adhesive manufacturers to suit products and substrate conditions indicated.
 - 1. Allowable VOC Content: Adhesives, adhesive bonding primers, and adhesive primers must comply with SCAQMD Rule 1168 VOC limits.
 - a. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene).
- B Accessories: As supplied, recommended, or required by the manufacturer and as necessary for a complete installation.

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine substrates, with installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Specification Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 RESILIENT BASE INSTALLATION

- A Comply with manufacturer's written instructions for installing resilient base.
- B Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas indicated to receive resilient base.
- C Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E Do not stretch resilient base during installation.
- F Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Form without producing discoloration (whitening) at bends.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Miter corners to minimize open joints.

3.3 CLEANING AND PROTECTION

- A Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B Perform the following operations immediately after completing resilient product installation:
 - 1. Remove adhesive and other blemishes from surfaces.
- C Protect resilient products from damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION 09 65 13

SECTION 09 65 19 - RESILIENT TILE FLOORING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Solid (luxury) vinyl floor tile.
 - 2. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. INSTALL: International Standards & Training Alliance.
 - 2. LVT: Luxury Vinyl Tile.
 - 3. SCAQMD: South Coast Air Quality Management District.
 - 4. VOC: Volatile Organic Compounds.
- B Definitions:
 - 1. Floor Tile: Means the LVT.
 - 2. Manufacturer: Means the LVT manufacturer unless otherwise indicated.

1.4 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For each type of product; include current Environmental Product Declaration and Health Product Declaration. Indicate VOC content for adhesive.
 - 2. Shop Drawings: For resilient floor tile.
 - a. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - b. Show details of special patterns, if applicable.
 - 3. Samples: Full-size units of each color and pattern of floor tile required.
- B Informational Submittals:
 - 1. Qualification Data: For installer.
- C Closeout Submittals:
 - 1. Maintenance Data: For floor tile to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation, or a certified INSTALL resilient floor covering installer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 55 deg F or more than 85 deg F. Store floor tiles on flat surfaces.

1.7 FIELD CONDITIONS

- A Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.

- B After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C Close spaces to traffic during, and for 48 hours after, floor tile installation.
- D Install floor tile after other finishing operations, including painting, have been completed.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 SOLID LUXURY VINYL TILE

- A LVT:
 - 1. Basis-of-Design Product (LVT-1): Subject to compliance with the Contract Documents design is based on the product indicated in the Finish Material Legend on the Drawings.
 - a. Shaw Industries Group, Inc; a Berkshire Hathaway Company.
 - 2. Acceptable Manufacturers: Subject to compliance with the Contract Documents, provide the basis-of-design product, or comparable approved product by one of the following.
 - a. Mohawk Industries.
 - b. Patcraft.

2.3 INSTALLATION MATERIALS

- A Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B Adhesives: Water-resistant type supplied, recommended, or required by the flooring and adhesive manufacturers to suit products and substrate conditions indicated.
 - 1. Allowable VOC Content: Adhesives, adhesive bonding primers, and adhesive primers must comply with SCAQMD Rule 1168 VOC limits.
 - a. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene).
- C Other Accessories: As supplied, recommended, or required by the manufacturer as necessary for a complete installation.

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine substrates, with installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Specification Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 1. Installation of floor tile indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B 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 the manufacturer. Do not proceed with installation until substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 10 pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than 3 tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Do not proceed with installation until substrates have a relative humidity level measurement of not more than 85 percent unless otherwise recommended or required in writing by the manufacturer.
- C 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.
- D Do not install floor tiles until they are same temperature as space where they are to be installed.
 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E Immediately before installation, sweep and vacuum clean substrates indicated to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A Comply with manufacturer's written instructions for installing floor tile.
- B Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 1. Lay tiles in pattern indicated.
- C Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 1. Lay tiles in pattern of colors and sizes indicated.
- D Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- G Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A Comply with manufacturer's written instructions for cleaning and protection of floor tile.
- B Perform the following operations immediately after completing floor tile installation:
 1. Remove adhesive and other blemishes from surface.
 2. Sweep and vacuum surface thoroughly.
 3. Damp-mop surface to remove marks and soil.
- C Protect floor tile products from damage from construction operations and placement of equipment and fixtures during remainder of construction period using methods recommended in writing by the manufacturer.

END OF SECTION 09 65 19

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SECTION 09 68 13 - TILE CARPETING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Modular carpet tile.
 - 2. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Abbreviations and Acronyms:
 - 1. AATCC: American Association of Textile Chemists and Colorists.
 - 2. AFU: AATCC Fading Units.
 - 3. CRI: The Carpet and Rug Institute, Inc.
 - 4. SCAQMD: South Coast Air Quality Management District.
 - 5. VOC: Volatile Organic Compounds.
- B Definitions:
 - 1. Manufacturer: Means the carpet tile manufacturer unless otherwise indicated.

1.4 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For each type of product, include the following:
 - a. Manufacturer's written data on physical characteristics, durability, and fade resistance.
 - b. Manufacturer's installation recommendations for each type of substrate.
 - c. Current Health Product Declaration.
 - d. Current Environmental Product Declaration.
 - 2. Shop Drawings: For carpet tile installation, plans showing the following:
 - a. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - b. Carpet tile type, color, and dye lot.
 - c. Type of subfloor.
 - d. Type of installation.
 - e. Pattern of installation.
 - f. Pattern type, location, and direction.
 - g. Pile direction.
 - h. Type, color, and location of edge, transition, and other accessory strips.
 - i. Transition details to other flooring materials.
- B Informational Submittals:
 - 1. Qualification Data: For installer.
 - 2. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
 - 3. Sample Warranty: For special warranty.
- C Closeout Submittals:
 - 1. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
 - a. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - b. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A Maintenance Materials: Furnish extra materials, from the same production run, to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but no fewer than 10 full-size units.

1.6 QUALITY ASSURANCE

- A Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association or who can demonstrate compliance with its certification program requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

- A Comply with the CRI publication CRI 104 Carpet Installation Standard for Commercial Carpet.

1.8 FIELD CONDITIONS

- A Comply with the CRI publication CRI 104 Carpet Installation Standard for Commercial Carpet for temperature, humidity, and ventilation limitations.
- B Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended in writing by the manufacturer.
- D Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.9 WARRANTY

- A Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - a. Failures include more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, excess static discharge, and delamination.
 2. Warranty Periods: Manufacturer's standard commercial warranties from date of Substantial Completion.

PART 2 PRODUCTS

2.1 CARPET TILE

- A Carpet Tile (CPT)
1. Basis-of-Design Products (CPT): Subject to compliance with the Contract Documents design is based on the product indicated in the Finish Material Legend on the Drawings as manufactured by the following.
 - a. Shaw Industries Group; a Berkshire Hathaway Company.
 2. Acceptable Manufacturers: Subject to compliance with the Contract Documents, provide the basis-of-design products, or comparable approved products by one of the following.
 - a. Mohawk Industries.
 - b. Patcraft.

2.2 INSTALLATION ACCESSORIES

- A Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by the manufacturer.
- B Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is supplied, recommended, or required by the manufacturer for releasable installation.
 - 1. Allowable VOC Content: Adhesives, adhesive bonding primers, and adhesive primers must comply with SCAQMD Rule 1168 VOC limits.
 - a. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene).

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine substrates, areas, and conditions, with installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B Examine carpet tile for type, color, pattern, and potential defects.
- C Concrete Slabs: Verify that finishes comply with requirements specified in Section 03 30 00 Cast-in-Place Concrete and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
 - 1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. and perform no fewer than 3 tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Do not proceed with installation until substrates have a moisture-vapor-emission rate of no more than 3 lb of water/1000 sq. ft. in 24 hours unless otherwise required or recommended in writing by the carpet tile and adhesive manufacturers.
 - b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Do not proceed with installation until substrates have a relative humidity level measurement of no more than 75 percent, unless otherwise required or recommended in writing by the carpet tile manufacturer and adhesive manufacturer.
 - 2. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Do not proceed with installation only after substrates pass testing.
- D Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 1. Installation of carpet tile indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A General: Comply with the CRI publication CRI 104 Standard for Installation of Commercial Carpet and with the manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes, and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's written instructions.
- C Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D Broom and vacuum clean substrates indicated to receive carpet tile immediately before installing carpet tile.

3.3 INSTALLATION

- A General: Comply with the CRI publication CRI 104 Standard for Installation of Commercial Carpet, Section 10, "Carpet Tile," and with the manufacturer's written installation instructions.
- B Installation Method: As recommended in writing by the manufacturer.
- C Maintain dye lot integrity. Do not mix dye lots in same area.
- D Maintain pile-direction patterns indicated on Drawings.
- E Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended in writing by the manufacturer.
- F Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H Install pattern parallel to walls and borders unless otherwise indicated.

3.4 CLEANING AND PROTECTION

- A Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended in writing by the manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B Protect installed carpet tile to comply with the CRI publication CRI 104 Standard for Installation of Commercial Carpet, Section 13.7.
- C Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by the manufacturer.

END OF SECTION 09 68 13

SECTION 09 81 00 - ACOUSTICAL INSULATION, SEALANTS, AND ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Concealed blanket/batt insulation.
 - 2. Acoustical joint sealants.
 - 3. Acoustical putty pads.
 - 4. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation or application.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. SCAQMD: South Coast Air Quality Management District.
 - 2. STC: Sound Transmission Class.
 - 3. VOC: Volatile Organic Compounds.
- B Definitions:
 - 1. Manufacturer: Means the applicable acoustical product manufacturer unless otherwise indicated.

1.4 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For each type of product; include Health Product Declaration and Environmental Product Declaration.
 - a. Indicate VOC content for sealants, sealant primers, and caulks.
 - 2. Samples:
 - a. Joint Sealants: Manufacturer's color charts consisting of strips of cured sealants for each kind and color of exposed-to-view acoustical joint sealant required.
- B Informational Submittals:
 - 1. Qualification Data: For acoustical joint sealant and spray-applied exposed insulation installers.
 - 2. Product Test Reports: For each kind of acoustical joint sealant and acoustical insulation, for tests performed by a qualified testing agency.
 - 3. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

- A Acoustical Joint Sealant Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A Protect materials from damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

1.7 WARRANTY

- A Special Installer's Warranty, Acoustical Joint Sealants: Installer agrees to repair or replace acoustical joint sealants that do not comply with performance and other requirements specified in this specification Section within specified warranty period.

1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 CONCEALED SOUND ATTENUATION BLANKET/BATT INSULATION

- A Sound Attenuation Blanket/Batt Insulation: ASTM C 665, Type I (blankets without membrane facing). Comply with mineral-fiber requirements of assembly.
 1. Products: Subject to compliance with the Contract Documents provide one of the following.
 - a. "MinWool SAFB (Sound Attenuation Fire Batts)" manufactured by Johns Manville.
 - b. "ROCKWOOL AFB (Acoustical Fire Batt)" manufactured by ROCKWOOL.
 - c. "Thermafiber SAFB (Sound Attenuation Fire Blankets)" manufactured by Owens Corning Insulating Systems, LLC.
 2. Thickness: As indicated on the Drawings.
 3. Performance Requirements:
 - a. Surface-Burning Characteristics: Complying with ASTM E 84; tested by a qualified testing agency.
 - 1) Flame-Spread Index: 0.
 - 2) Smoke-Developed Index: 0.

2.2 ACOUSTICAL JOINT SEALANTS

- A Acoustical Joint Sealants, General:
 1. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies in accordance with ASTM E 90.
 2. Allowable VOC Content: Sealants, sealant primers, and caulks must comply with SCAQMD Rule 1168 VOC limits.
 - a. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene).
- B Acoustical Sealant for Exposed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C 834.
 1. Products: Subject to compliance with the Contract Documents provide one of the following, or comparable product.
 - a. "RCS20" manufactured by Momentive Performance Materials; GE Silicone.
 - b. "Pecora AIS-919" manufactured by Pecora Corporation.
 2. Colors of Exposed Acoustical Joint Sealants: As selected by the Architect from manufacturer's full range of colors.
- C Acoustical Sealant for Concealed Joints: Manufacturer's standard nonsag, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber acoustical sealant.
 1. Products: Subject to compliance with the Contract Documents provide one of the following, or comparable product.
 - a. "Pecora BA-98" manufactured by Pecora Corporation.
 - b. "QuietSeal Pro" manufactured by PABCO Gypsum.
- D Fire-Rated Acoustical Sealant: Manufacturer's acrylic latex sealant.
 1. Products: Subject to compliance with the Contract Documents provide one of the following, or comparable product.
 - a. "AC-20 FTR" manufactured by Pecora Corporation.
 - b. "Sheetrock Brand Acoustical Sealant" manufactured by USG.
 2. Locations: At head and floor joints at acoustical- and fire-rated assemblies; not for use for penetration firestopping.

2.3 AUXILIARY MATERIALS

- A Insulation Fasteners: Mechanical fasteners, prong anchors, pins, or pointed rods. Subject to compliance with the Contract Documents, acceptable sources of comparable products include the following.

1. AGM Industries, Inc.
 2. Duro Dyne Corporation.
 3. Midwest Fasteners, Inc.
- B Putty Pads: Designed to maintain the performance of acoustically-rated walls at electrical outlet penetrations. Subject to compliance with the Contract Documents, acceptable sources of comparable products include the following.
1. ATS Acoustics.
 2. PABCO Gypsum.
 3. Soundproofing Company, Inc.
- C Primers: Material recommended by the manufacturer where required for adhesion of acoustical materials to substrates.
- D Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- E Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.
- F Other Accessories: Provide other accessories as supplied, recommended, or required by the acoustical material manufacturers and as necessary for a complete installation or application.

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine joints indicated as receiving acoustical joint sealants, with installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the work.
- B Examine surfaces indicated to receive exposed acoustical insulation and verify if priming or sealing is required to ensure bonding or to prevent discoloration caused by migratory stains.
- C Examine outlet boxes to ensure they are properly installed and free of dirt, dust, and oil.
- D Do not proceed with installation or application until unsatisfactory conditions have been corrected.
1. Installation of acoustical insulation, sealants, and accessories indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A Acoustical Joint Sealants:
1. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with the manufacturer's written instructions.
 2. Joint Priming: Prime joint substrates where recommended by the manufacturer. Apply primer to comply with the manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
 3. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF CONCEALED ACOUSTICAL BLANKET/BATT INSULATION

- A Blanket/Batt Insulation: Install in cavities formed by framing members according to the following requirements:
1. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.
 2. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 3. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

4. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically.
6. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation.

3.4 INSTALLATION OF ACOUSTICAL JOINT SEALANTS

- A General: Comply with the manufacturer's written installation instructions unless more stringent requirements apply.
- B STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations, and as otherwise indicated on the Drawings.
 1. Comply with ASTM C 919, ASTM C 1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.
- C Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

3.5 INSTALLATION OF ACOUSTICAL PUTTY PADS

- A Remove release paper. Starting at the side of the outlet box, align the putty pad to front edge of box and overlap onto the stud.
- B Cut putty pad to fit around conduits or cables and pleat extra material at the corners.
- C Fold pleated corners into place and firmly press putty pad into place so the entire surface of the back of the outlet box is covered.

3.6 CLEANING

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

3.7 PROTECTION

- A Acoustical Insulation: Protect installed insulation from damage. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- B Acoustical Sealants: Protect acoustical joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion.
 1. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated acoustical joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 09 81 00

SECTION 09 84 36 - SOUND-ABSORBING WALL UNITS

PART 1 GENERAL

1.1 REFERENCE STANDARDS

- A ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B NFPA 265 - Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile or Expanded Vinyl Wall Coverings on Full Height Panels and Walls.
- C NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.
- D UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

1.2 RELATED DOCUMENTS

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

1.3 SUMMARY

- A Section Includes:
 - 1. Wall panels tested for acoustical performance.
 - 2. Rewrapping existing sound-absorbing wall units.
 - 3. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.4 REFERENCES

- A Acronyms and Abbreviations:
 - 1. SCAQMD: South Coast Air Quality Management District.
 - 2. NRC: Noise Reduction Coefficient.
 - 3. PET: Polyethylene Terephthalate.
- B Definitions:
 - 1. Manufacturer: Means the sound-absorbing wall unit manufacturer unless otherwise indicated.

1.5 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For each type of product; include Health Product Declaration and Environmental Product Declaration.
 - 2. Shop Drawings: For unit assembly and installation.
 - a. Include plans, elevations, sections, and mounting devices and details.
 - b. Include details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge profile and core materials.
 - c. Include details at cutouts and penetrations for other work.
- B Informational Submittals:
 - 1. Coordination Drawings: Elevations and other details, drawn to scale, on which items penetrating or covered by units are shown and coordinated with each other, using input from installers of the items involved.
 - a. Show operation of hinged and sliding components covered by or adjacent to units.
 - 2. Product Certificates: For each type of unit.
- C Closeout Submittals:
 - 1. Maintenance Data: For each type of unit to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A Mockup, Fabric Wrapped Panels: Build mockups to demonstrate aesthetic effects, and to set quality standards for materials, fabrication, and installation.
 - 1. Rewrap one existing panel as selected by the Architect.

2. Approval of mockup does not constitute approval of deviations from the Contract Documents contained in mockup unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockup may become part of the completed work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A Comply with unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.
- C Protect panel edges from crushing and impact.

1.8 FIELD CONDITIONS

- A Environmental Limitations: Do not install units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B Lighting: Do not install units until a lighting level of not less than 50 fc is provided on surfaces to receive the units.
- C Air-Quality Limitations: Protect units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.
- D Field Measurements: Verify unit locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A Fire-Test-Response Characteristics: Units shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to the AHJ.
 1. Surface-Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.

2.2 SOUND ABSORBING UNITS

- A Sound Absorbing Wall Units: Panels fabricated from at least 75 percent recycled 100 percent PET; NRC of at least 0.85.
 1. Basis-of-Design Product (SAP): Subject to compliance with the Contract Documents the design is based on the product indicated in the Finish Material Legend on the Drawings as manufactured by the following. Provide specified product or product by comparable, approved manufacturer.
 - a. Autex Acoustics.
- B Fabric Facing Material for Existing Fabric-Wrapped Panels:
 1. Basis-of-Design Product (FWP): Subject to compliance with the Contract Documents design is based on fabric indicated in the Finish Material Legend on the Drawings as manufactured by the following.
 - a. Carnegie Fabrics, LLC.
 2. Acceptable Manufacturers: Subject to compliance with the Contract Documents provide basis-of-design product or comparable approved product by one of the following.
 - a. Knoll.
 - b. Maharam.

2.3 ACCESSORIES

- A Adhesive: Mildew-resistant, nonstaining, adhesive, for use with substrate application indicated and as recommended in writing by the manufacturer.
 - 1. Allowable VOC Content: Adhesives, adhesive bonding primers, and adhesive primers must comply with SCAQMD Rule 1168 VOC limits.
 - a. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene).
- B Concealed Mounting Hardware: As supplied by the manufacturer and capable of supporting weight of the unit.
- C Fasteners: As recommended or required by the manufacturer.
- D Accessories: As supplied, recommended, or required by the manufacturer and as necessary for a complete installation.

2.4 FABRICATION

- A Rewrapped Panels:
 - 1. Align fabric pattern and grain as indicated on the Drawings. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
 - 2. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent units.

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine fabricated units, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting unit performance.
- B Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 1. Installation of wall units indicates acceptance of surfaces and conditions.

3.2 INSTALLATION

- A Install units in locations indicated. Unless otherwise indicated, install units with vertical surfaces and edges plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B Comply with manufacturer's written instructions for installation of units using type of mounting method indicated on the Drawings or as selected by the Architect if not indicated. Mount units securely to supporting substrate.

3.3 INSTALLATION TOLERANCES

- A Variation from Plumb and Level: Plus or minus 1/16 inch in 48 inches, noncumulative.
- B Variation of Joint Width: Not more than 1/16-inch variation from hairline in 48 inches, noncumulative.

3.4 CLEANING

- A Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 09 84 36

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SECTION 09 91 23 - INTERIOR PAINTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Surface preparation and the application of paint systems on interior substrates.
 - 2. Supplementary components and accessories normally furnished or otherwise necessary for a complete application.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. MPI: Master Painters Institute.
 - 2. SCAQMD: South Coast Air Quality Management District.
 - 3. SSPC: The Society for Protective Coatings.
 - 4. VOC: Volatile Organic Compound.
- B Definitions:
 - 1. Gloss Level 1: Traditional matte finish of not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
 - 2. Gloss Level 3: Traditional eggshell-like finish. 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 3. Gloss Level 5: Traditional semigloss finish. 35 to 70 units at 60 degrees, according to ASTM D 523.
 - 4. Manufacturer: Means the paint manufacturer unless otherwise indicated.

1.4 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For each type of product. Include the following.
 - a. Current Health Product Declaration.
 - b. Current Environmental Product Declaration.
 - c. VOC content.
 - d. Preparation requirements.
 - e. Application instructions.
 - 2. Product List: Use same designations indicated on the Drawings and in the Finish Material Schedule to cross-reference paint systems specified in this Specification Section. Include color designations.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

- A Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 PRODUCTS

2.1 INTERIOR PAINT

A Manufacturers:

1. Basis-of-Design Manufacturer: Subject to compliance with the Contract Documents, design is based on products manufactured by the following.
 - a. The Sherwin-Williams Company.
2. Acceptable Manufacturers: Subject to compliance with the Contract Documents, provide products by the basis-of-design manufacturer or comparable products by one of the following manufacturers.
 - a. Benjamin Moore & Co.
 - b. PPG.

B Products: Refer to Part 3 of this Specification Section for products.

2.2 PAINT, GENERAL

A Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. Products shall be of same manufacturer for each coat in a coating system.

B Allowable VOC Content: Architectural coatings intended to be field applied must comply with SCAQMD Rule 1113 VOC limits.

1. Flat Paint and Coatings: 50 g/L.
2. Dry-Fog Coatings: 150 g/L.
3. Nonflat Paints and Coatings: 50 g/L.
4. Primers, Sealers, and Undercoaters: 100 g/L.
5. Rust-Preventive Coatings: 100 g/L.

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine substrates and conditions, with applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work.
- B Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Gypsum Board: 12 percent.
- C Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- E Do not proceed with coating application until unsatisfactory conditions have been corrected.
 1. Application of coatings indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A Comply with manufacturer's written instructions and recommendations in the MPI publication MPI Architectural Painting Specification Manual applicable to substrates and paint systems indicated.
- B Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

- D Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

3.3 APPLICATION

- A Apply paints according to the manufacturer's written instructions and to recommendations in the MPI publication MPI Architectural Painting Specification Manual.
1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E Apply primers and finish coats in accordance with manufacturer's recommended wet-film thickness, square foot per gallon, and mil thickness per coat. Do not add solvent or thinner to paint and coating products.
- F Allow adequate drying time before handling and before applying subsequent coats. Low VOC and water-based paint systems require longer drying times. Comply with manufacturer's written instructions. Protect in accordance with "Cleaning and Protection" Article below.
- G Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.
 - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.
 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

- A Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

- A General: Verify locations, colors, and sheens with Architect.
- B Gypsum Board Substrates:
 - 1. Institutional Low-Odor/VOC Latex System.
 - a. Prime Coat: Primer sealer, interior, institutional low odor/VOC.
 - 1) "ProMar 200 Zero VOC Latex Primer" B28W12600. Applied at a wet film thickness of 4 mils or 1.0 mils dry.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoats:
 - 1) Latex, interior, institutional low odor/VOC, eggshell (Gloss Level 3).
 - (a) "ProMar 200 HP Zero VOC Interior Acrylic Low Gloss Eg-Shel" B41-1900 Series. Applied at a wet film thickness of 4 mils or 1.7 mils dry.
 - 2. Epoxy-Modified Latex System.
 - a. Prime Coat: Primer sealer, interior.
 - 1) "ProMar 200 Zero VOC Latex Primer" B28W02600. Applied at a wet film thickness of 4 mils or 1.0 mils dry.
 - b. Intermediate Coat: Epoxy-modified latex, matching topcoat..
 - c. Topcoat: Latex, interior, institutional low odor/VOC, eggshell (Gloss Level 3).
 - 1) "Pro Industrial Pre-Catalyzed Water Based Epoxy" K46-150 Series. Applied at a wet film thickness of minimum 4.0 mils or 1.5 mils dry.
- C Metal Substrates:
 - 1. Institutional Low-Odor/VOC System.
 - a. Prime Coat: Primer, rust inhibitive, water based. Apply if metal substrate has not been shop primed.
 - 1) "Pro Industrial Pro-Cryl Universal Primer", B66-310 Series. Applied at a wet film thickness of 5.0 mils or 1.8 dry.
 - b. Intermediate Coat: Matching topcoat; verify compatibility with shop-applied primer if any.
 - c. Topcoat: Interior, institutional low odor/VOC, semi-gloss (Gloss Level 5).
 - 1) "Pro Industrial WB Alkyd Urethane", B53-1150 Series. Applied at a wet film thickness of 5.0 mils or 1.7dry.

END OF SECTION 09 91 23

SECTION 10 28 00 - TOILET AND BATH ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Public-use washroom accessories.
 - 2. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Definitions:
 - 1. Manufacturer: Means the toilet and bath accessories manufacturer unless otherwise indicated.

1.4 COORDINATION

- A Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B Deliver inserts and anchoring devices set into masonry as required to prevent delaying the work.

1.5 SUBMITTALS

- A Action Submittals
 - 1. Product Data: For each type of product.
 - a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - b. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 2. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - a. Identify locations using room designations indicated.
- B Informational Submittals:
 - 1. Sample Warranty: For manufacturer's special warranties.
- C Closeout Submittals:
 - 1. Maintenance Data: For accessories to include in maintenance manuals.
 - 2. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide at least 6 keys to Owner's representative.

1.6 WARRANTY

- A Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include visible silver spoilage defects.
 - 2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A Structural Performance: Design accessories and fasteners to comply with the following requirements:
 - 1. Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.

2.2 TOILET AND BATH ACCESSORIES

- A Source Limitations: Obtain each type of toilet and bath accessory from single source from the same manufacturer.
- B Toilet and Bath Accessories: Subject to compliance with the Contract Documents provide the products as indicated in the Toilet Accessories Schedule on the Drawings, or comparable approved products.

2.3 FABRICATION

- A General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

PART 3 EXECUTION

3.1 INSTALLATION

- A Install accessories in accordance with manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
 - 1. Remove temporary labels and protective coatings.
- B Grab Bars: Install to comply with specified structural-performance requirements.

3.2 ADJUSTING AND CLEANING

- A Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B Clean and polish exposed surfaces in accordance with manufacturer's written instructions.

END OF SECTION 10 28 00

SECTION 10 73 16 - METAL CANOPIES (ALTERNATE)

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 Specification Section.

1.2 SUMMARY

- A Section Includes:
 - 1. Metal building entrance canopies.
 - 2. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.
- B Related Requirements:
 - 1. Section 01 23 00 Alternates.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. AAMA: Architectural Aluminum Manufacturers Association.
 - 2. NAAMM: National Association of Architectural Metal Manufacturers.
- B Definitions:
 - 1. Manufacturer: Means the metal canopy manufacturer unless otherwise indicated.

1.4 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For aluminum canopies and components; include Health Product Declaration and Environmental Product Declaration. Include instructions for walkway cover components and accessories.
 - 2. Shop Drawings: Show layouts of metal canopies, including plans, elevations, sections, details, and attachment to other work. Include details of accessories.
 - 3. Samples: For each type of exposed finish required, prepared on samples of size indicated below:
 - a. Metal Canopy Panels: Manufacturer's standard sample size. Include fasteners, closures, and other metal canopy accessories.
 - b. Flashing and Trim: Nominal 12 inches long. Include fasteners and other exposed accessories.
- B Informational Submittals:
 - 1. Qualification Data: For installer.
- C Closeout Submittals:
 - 1. Maintenance Data: For metal canopies to include in maintenance manual.

1.5 QUALITY ASSURANCE

- A Installer Qualifications: Manufacturer of metal canopies or installer acceptable to the manufacturer.
- B Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of canopies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, one another, and adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.
 - 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.

1.6 DELIVERY, STORAGE, AND HANDLING

- A Deliver components, sheets, metal canopy panels, and other manufactured items so as not to be damaged or deformed. Package metal canopy panels for protection during transportation and handling.
- B Unload, store, and erect metal canopy panels in a manner to prevent bending, warping, twisting, and surface damage.
- C Stack canopy roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal canopy panels to ensure dryness. Do not store metal canopy panels in contact with other materials that might cause staining, denting, or other surface damage.
- D Protect strippable protective covering on metal canopy panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

1.7 PROJECT CONDITIONS

- A Weather Limitations: Do not proceed with installation until existing and forecasted weather conditions permit assembly of metal canopies to be performed according to manufacturer's written instructions and warranty requirements.
- B Field Measurements: Where canopies are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.

PART 2 PRODUCTS**2.1 PERFORMANCE REQUIREMENTS**

- A General: Provide metal canopies able to withstand applicable loads and thermal and structural movements indicated without failure. Failure includes the following:
 - 1. Deflection exceeding specified limits.
 - 2. Framing members transferring stresses, including those caused by thermal and structural movement.
 - 3. Noise or vibration created by thermal and structural movement and wind.
 - 4. Loosening or weakening of fasteners, attachments, and other components.
- B Deflection Limits: Deflection of the entire length of framing members in any direction is limited to 1/180 of clear span or 3/4 inch, whichever is smaller, unless otherwise indicated.
- C Structural Loads: Provide canopies, including anchorage, able to withstand the effects of the following design loads when supporting full dead loads:
 - 1. Wind Loads: As indicated on the Drawings.
- D Thermal Movement: Provide metal canopies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling and other detrimental effects.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F material surfaces.

2.2 METAL CANOPIES

- A Building Supported Canopies:
 - 1. Basis-of-Design Product: Subject to compliance with the Contract Documents, design is based on the following.
 - a. "Lumishade" hanger rod canopy as manufactured by Mapes Architectural Canopies.
 - 2. Acceptable Manufacturers: Subject to compliance with the Contract Documents provide the basis-of-design product or comparable approved product by one of the following.
 - a. MASA Architectural Canopies.
 - b. SKYSCAPE Architectural Canopies.

2.3 MATERIALS

- A Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated and with not less than the strength and durability properties of alloy and temper required by structural loads.
 - 1. Aluminum Plate and Sheet: ASTM B 209
 - 2. Aluminum Extrusions: ASTM B221
 - 3. Extruded Structural Pipe and Round Tubing: ASTM B429/B429M, standard weight (Schedule 40).
 - 4. Drawn Seamless Tubing: ASTM B 210
- B Brackets and Reinforcements: Provide manufacturer's standard high-strength brackets and reinforcements. Provide nonstaining, nonferrous shims to install and align metal canopies.
- C Flashing and Trim: Manufacturer's standard, prepainted with coil coating; finished to match adjacent metal panels.
- D Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories; compatible with adjacent materials.
 - 1. Movement Joints: Provide slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.
 - 2. Masonry Inserts: Zinc-coated cast-iron, malleable-iron, or steel inserts; hot-dip galvanized according to ASTM A 123.
- E Bituminous Paint: Cold-applied asphalt mastic paint complying with SSPC-Paint 12, except containing no asbestos, and formulated for 30-mil thickness per coat.
- F Accessories: As supplied, recommended, or required by the manufacturer and as necessary for a complete installation.

2.4 FABRICATION

- A General: Fabricate and finish metal canopies and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
 - 1. Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
 - 2. Fabricate components to drain water passing joints and to drain condensation and moisture occurring or migrating within system to the exterior.
 - 3. Fabricate components to accommodate expansion, contraction, and field adjustment, and to provide for minimum clearance and shimming at perimeters.
 - 4. Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
 - 5. Fit and assemble components to greatest extent practicable before finishing.
 - 6. Fit and secure joints with screw and spline, internal reinforcement, or welding.
 - 7. Reinforce members as required to retain fastener threads.
 - 8. Where fasteners are exposed to view, countersink bolt or screw heads and finish to match framing.
 - 9. Weld components before finishing and in concealed locations to greatest extent practicable to minimize distortion.
 - 10. Before shipping, assemble, mark, and disassemble components that cannot be permanently shop assembled.
 - 11. Prepare framing to receive anchor and connection devices and fasteners.

2.5 FINISHES

- A General: Comply with the NAAMM publication Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designating finishes.
- B High-Performance Organic Finish, 2-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.
 - 1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Color and Gloss: As selected by Architect from manufacturer's full range of standard and custom colors to match existing canopies and Architect's approved sample.

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine substrates and conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting metal canopy performance.
- B Do not proceed with installation until unsatisfactory conditions have been corrected.
 1. Installation of metal canopies indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A Metal Protection: As follows:
 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended in writing by manufacturer for this purpose.
 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
 3. Where aluminum will contact pressure-treated wood, separate dissimilar materials by methods recommended in writing by manufacturer.

3.3 INSTALLATION

- A General: Comply with manufacturer's written instructions for installation of metal canopies.
 1. Fit joints to produce hairline joints free of burrs and distortion.
 2. Rigidly secure nonmovement joints.
 3. Accommodate thermal movements.
 4. Install metal canopies to allow drainage of water without ponding.
- B Erection Tolerances: Install metal canopy components true in plane, accurately aligned, and without warp or rack. Adjust framing to comply with the following tolerances:
 1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 10 feet; 1/4 inch over total length.
 2. Alignment: Where surfaces abut in line and at corners and where surfaces are separated by less than 3 inches, limit offset from true alignment to less than 1/32 inch; otherwise, limit offset from true alignment to 1/8 inch.

3.4 CLEANING

- A Clean metal canopies immediately after installation according to manufacturer's written recommendations.
 1. Remove any temporary protective coverings and strippable coatings from prefinished metal surfaces. Remove labels and markings from all components.

3.5 PROTECTION

- A General: Institute protective procedures and install protective materials as required to ensure metal canopies will be without damage at Substantial Completion.

END OF SECTION 10 73 16

SECTION 12 36 61.16 - SOLID SURFACING COUNTERTOPS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Solid surface material countertops.
 - 2. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. AWI: Architectural Woodwork Institute.
 - 2. ISFA: International Surface Fabricators Association.
 - 3. SCAQMD: South Coast Air Quality Management District.
 - 4. VOC: Volatile Organic Compounds.
- B Definitions:
 - 1. Manufacturer: Means the solid surface material manufacturer unless otherwise indicated.

1.4 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: Include the following.
 - a. Product data for countertop material.
 - b. Current Health Product Declaration.
 - c. Current Environmental Product Declaration.
 - d. Adhesive VOC content disclosure data.
 - 2. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
- B Informational Submittals:
 - 1. Qualification Data: For fabricator.
- C Closeout Submittals:
 - 1. Maintenance Data: For solid surfacing countertops to include in maintenance manuals. Include product data for care products used or recommended by the manufacturer.

1.5 QUALITY ASSURANCE

- A Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.
- B Installer Qualifications: Fabricator of countertops.

1.6 FIELD CONDITIONS

- A Field Measurements: Verify dimensions of countertops by field measurements before countertop fabrication is complete.

1.7 COORDINATION

- A Coordinate locations of items that will penetrate countertops or backsplashes.

PART 2 PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

- A Solid Surface Material: Homogeneous-filled plastic resin complying with ISFA 2-01.

1. Basis-of-Design Product (SSM-1): Subject to compliance with the Contract Documents design is based on the product indicated in the Finish Material Legend on the Drawings as manufactured by the following.
 - a. LX Hausys. (HIMACS)
 2. Acceptable Manufacturers: Subject to compliance with the Contract Documents, provide the basis-of-design product or comparable approved product by one of the following.
 - a. DuPont de Nemours, Inc. (Corian)
 - b. Wilsonart LLC.
- B Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 FABRICATION

- A Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI publication Architectural Woodwork Standards.
1. Grade: Custom.
- B Countertop and Backsplash Configuration: As indicated on the Drawings.
- C Fabricate tops with shop-applied edges unless otherwise indicated. Comply with the manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
- D Joints: Fabricate countertops without joints. If joints are unavoidable, join in field with joints at locations indicated and as follows:
1. Joint Locations: Not within 18 inches of a sink and not where a countertop section less than 36 inches long would result, unless unavoidable.
- E Cutouts and Holes: Drill countertops in shop for items indicated on the Drawings.

2.3 INSTALLATION MATERIALS

- A Adhesives: Water-resistant type supplied, recommended, or required by the solid surfacing and adhesive manufacturers to suit products and substrate conditions indicated.
1. Allowable VOC Content: Adhesives, adhesive bonding primers, and adhesive primers must comply with SCAQMD Rule 1168 VOC limits.
 - a. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene).
- B Sealant: Comply with applicable requirements in Section 07 92 00 Joint Sealants.

2.4 ACCESSORIES

- A Accessories: As supplied, recommended, or required by the manufacturer and as necessary for a complete installation.

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine substrates to receive solid surface material countertops and backsplashes and conditions under which countertops will be installed, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B Do not proceed with installation until unsatisfactory conditions have been corrected.
1. Installation of solid surfacing countertops and backsplashes indicates acceptance of surfaces and conditions.

3.2 INSTALLATION

- A Install countertops level to a tolerance of 1/8 inch in 8 feet; no more than 1/4 inch. Do not exceed 1/64-inch difference between planes of adjacent units.
- B Install countertops by one of the following methods, as applicable and indicated on the Drawings:

1. Direct to Base Units: Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 2. Subtops:
 - a. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
 - b. Secure countertops to subtops with adhesive according to manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions.
- C Joints in countertop material is not allowed. If joints are unavoidable, Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
1. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- D Install backsplashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- E Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.
- F Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

END OF SECTION 12 36 61.16

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SECTION 12 36 61.19 - QUARTZ AGGLOMERATE COUNTERTOPS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A Section Includes:
 - 1. Quartz agglomerate countertops.
 - 2. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation.

1.3 REFERENCES

- A Acronyms and Abbreviations:
 - 1. AWI: Architectural Woodwork Institute.
 - 2. ISFA: International Surface Fabricators Association.
 - 3. SCAQMD: South Coast Air Quality Management District.
 - 4. VOC: Volatile Organic Compounds.
- B Definitions:
 - 1. Manufacturer: Means the quartz agglomerate material manufacturer unless otherwise indicated.

1.4 SUBMITTALS

- A Action Submittals:
 - 1. Product Data: For countertop materials; include Health Product Declaration and Environmental Product Declaration. Indicate VOC content for adhesive.
 - 2. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
 - 3. Samples: For countertop material, 6 inches square.
- B Informational Submittals:
 - 1. Qualification Data: For fabricator.
- C Closeout Submittals:
 - 1. Maintenance Data: For quartz agglomerate countertops to include in maintenance manuals. Include product data for care products used or recommended by the manufacturer.

1.5 QUALITY ASSURANCE

- A Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.
- B Installer Qualifications: Fabricator of countertops.

1.6 FIELD CONDITIONS

- A Field Measurements: Verify dimensions of countertops by field measurements before countertop fabrication is complete.

1.7 COORDINATION

- A Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 PRODUCTS

2.1 QUARTZ AGGLOMERATE COUNTERTOP MATERIALS

- A Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of polymers, resins, and pigment and complying with ISFA 3-01.

1. Basis-of-Design Products (QZ): Subject to compliance with the Contract Documents design is based on the products indicated in the Finish Material Legend on the Drawings as manufactured by the following.
 - a. Cosentino Global. (Silestone)
 2. Acceptable Manufacturers: Subject to compliance with the Contract Documents provide the basis-of-design products or comparable approved products by one of the following.
 - a. Cambria.
 - b. Caesarstone.
- B Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 FABRICATION

- A General: Fabricate countertops according to manufacturer's written instructions and the AWI publication Architectural Woodwork Standards.
1. AWI Grade: Custom.
- B Countertop Configuration: As indicated on the Drawings.
- C Backsplash Configuration: As indicated on the Drawings, if applicable.
- D Joints: Fabricate countertops without joints. If joints are unavoidable, join in field with joints at locations indicated and as follows:
1. Joint Locations: Not within 18 inches of a sink and not where a countertop section less than 36 inches long would result, unless unavoidable.
- E Cutouts and Holes: Provide the following as applicable.
1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 - a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.
 2. Fittings: Drill countertops in shop for plumbing fittings and similar items.

2.3 INSTALLATION MATERIALS

- A Adhesive: Product supplied, recommended, or required by the manufacturer.
1. Allowable VOC Content: Adhesives, adhesive bonding primers, and adhesive primers must comply with SCAQMD Rule 1168 VOC limits.
 - a. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene).
- B Sealant: Comply with applicable requirements in Section 07 92 00 Joint Sealants.

2.4 ACCESSORIES

- A Accessories: As supplied, recommended, or required by the manufacturer as necessary for a complete installation.

PART 3 EXECUTION

3.1 EXAMINATION

- A Examine substrates to receive quartz agglomerate countertops and conditions under which countertops will be installed, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B Do not proceed with installation until unsatisfactory conditions have been corrected.
1. Installation of countertops indicates acceptance of surfaces and conditions.

3.2 INSTALLATION

- A Install countertops level to a tolerance of 1/8 inch in 8 feet; no more than 1/4 inch. Do not exceed 1/64-inch difference between planes of adjacent units.
- B Install countertops as follows:

1. Installation over Subtops: Secure countertops to subtops with adhesive according to quartz agglomerate manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- C Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- D Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.
- E Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
- F Apply sealant to gaps at walls; comply with Section 07 92 00 Joint Sealants.

END OF SECTION 12 36 61.19

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SECTION 22 05 16 - EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Flexible pipe connectors.

1.2 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Product Data:
 - 1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
- C Design Data: Indicate selection calculations.
- D Manufacturer's Instructions: Indicate manufacturer's installation instructions, special procedures, and external controls.
- E Maintenance Data: Include adjustment instructions.
- F Project Record Documents: Record installed locations of flexible pipe connectors, expansion joints, anchors, and guides.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A Comply with UL (DIR) requirements.

2.2 FLEXIBLE PIPE CONNECTORS - COPPER PIPING

- A Manufacturers:
 - 1. The Metraflex Company
 - 2. Unisource Manufacturing, Inc
 - 3. Substitutions: Refer to Division 01
- B Inner Hose: Bronze.
- C Exterior Sleeve: Braided bronze.
- D Maximum Service Temperature: 450 degrees F.
- E End Connections: Threaded.
- F Maximum offset: 3/4 inch on each side of installed center line.
- G Application: Copper piping.

2.3 EXPANSION JOINTS AND LOOPS - HOSE AND BRAID

- A Manufacturers:
 - 1. Flex-Weld, Inc
 - 2. The Metraflex Company
 - 3. Unisource Manufacturing, Inc
 - 4. Substitutions: Refer to Division 01.
- B Provide flexible loops with two flexible sections of hose and braid, two 90 degree elbows, and 180 degree return with support brackets, air release valve, and plugged drain port.
- C Maximum Allowable Motion: 3 inch in the x, y, and z planes with no thrust loads to the building structure.
- D Maximum Working Pressure: 150 psi at 800 degrees F.
- E Construction: Class 150, schedule 40, bronze hose and double braid assembly with carbon steel fittings, including elbows and threaded end connections sized to match pipe segment.
 - 1. Selected Product to Accommodate:
 - a. Angular Rotation: 15 degrees.
 - b. Force developed by 1.5 times specified maximum allowable operating pressure.
 - 2. Provide necessary accessories including, but not limited to, swivel joints.

2.4 ACCESSORIES

A Pipe Alignment Guides:

1. Manufacturers:
 - a. Flex-Weld, Inc
 - b. The Metraflex Company
 - c. Substitutions: Refer to Division 01
2. Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inches travel.

PART 3 EXECUTION

3.1 INSTALLATION

- A Install in accordance with manufacturer's instructions.
- B Install in accordance with EJMA (Expansion Joint Manufacturers Association) Standards.
- C Install flexible pipe connectors on pipes connected to vibration isolated equipment. Provide line size flexible connectors.
- D Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.
- E Anchor pipe to building structure where required. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.
- F Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.

END OF SECTION 22 05 16

SECTION 22 05 17 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Pipe sleeves.

1.2 SUBMITTALS

- A Refer to Division 01 for additional requirements
- B Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

1.3 QUALITY ASSURANCE

- A Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.
- B Installer Qualifications: Company specializing in performing work of the type specified this section.
 - 1. Approved by manufacturer.
- C Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

1.4 DELIVERY, STORAGE, AND HANDLING

- A Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.
- B Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

1.5 WARRANTY

- A Refer to Division 01, for additional warranty requirements.
- B Correct defective Work within a 3 year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 PIPE SLEEVES

- A Manufacturers:
 - 1. American Polywater Corporation
 - 2. Flexicraft Industries
 - 3. Substitutions: Refer to Division 01
- B Vertical Piping:
 - 1. Sleeve Length: 2 inches above finished floor.
 - 2. Provide sealant for watertight joint.
- C Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
- D Pipe Passing Through Below Grade Exterior Walls:
 - 1. Zinc coated or cast iron pipe.
 - 2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.
- E Pipe Passing Through Concrete masonry or rated walls
 - 1. Galvanized steel pipe or black iron pipe with asphalt coating.
 - 2. Connect sleeve with floor plate except in mechanical rooms.
- F Clearances:
 - 1. Provide allowance for insulated piping.
 - 2. Wall, Floor, Partitions, and Beam Flanges: 1 inch greater than external pipe diameter.
 - 3. All Rated Openings: Caulked tight with fire stopping material complying with ASTM E814 in accordance with Section 07 84 00 to prevent the spread of fire, smoke, and gases.

PART 3 EXECUTION**3.1 PREPARATION**

- A Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B Remove scale and foreign material, from inside and outside, before assembly.

3.2 INSTALLATION

- A Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- B Install piping to conserve building space, to not interfere with use of space and other work.
- C Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D Structural Considerations: Do not penetrate building structural members unless indicated.
- E Provide sleeves when penetrating floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
 - 1. Underground Piping: Caulk pipe sleeve watertight with mechanically expandable chloroprene inserts with bitumen sealed metal components.
 - 2. Aboveground Piping:
 - a. Pack solid using mineral fiber complying with ASTM C592.
 - b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
 - 3. All Rated Openings: Caulk tight with fire stopping material complying with ASTM E814 in accordance with Divisoin 07 to prevent the spread of fire, smoke, and gases.
 - 4. Caulk exterior wall sleeves watertight with mechanically expandable chloroprene inserts with mastic-sealed components.
- F When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.3 CLEANING

- A Upon completion of work, clean all parts of the installation.
- B Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.
- C See Divisoin 01 for additional requirements.

END OF SECTION 22 05 17

SECTION 22 05 19 - METERS AND GAUGES FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Pressure gauges.
- B Thermometers.
- C Pressure-temperature test plugs.

1.2 SUBMITTALS

- A See Section Refer to Division 01
- B Product Data: Provide red-marked product data sheets for each furnished item with associated components and accessories.
- C Project Record Documents: Record actual locations of components and instrumentation.
- D Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section Refer to Division 01 for additional provisions.

PART 2 PRODUCTS

2.1 PRESSURE GAUGES

- A Manufacturers:
 - 1. Dwyer Instruments, Inc
 - 2. Moeller Instrument Company, Inc
 - 3. Omega Engineering
 - 4. Substitutions: Refer to Division 01
- B Bourdon Tube for Liquids and Gases:
 - 1. Dial Size and Cover: 4-1/2 inch diameter scale with polycarbonate window.
 - 2. Dial Text and Markings: Black color on white background with scaled kPa and psi units.
 - 3. Accuracy: ASME B40.100, adjustable industrial grade (A) with 1 percent at mid-range of span.
 - 4. Process Connection: Lower-back, 1/4 inch NPT male except where noted.
 - 5. Gauge Wetted Materials: Brass case and brass socket rated to match process pressure and temperature range.

2.2 THERMOMETERS

- A Manufacturers:
 - 1. Dwyer Instruments, Inc
 - 2. Moeller Instrument Company, Inc
 - 3. Weksler Glass Thermometer Corp
 - 4. Substitutions: Refer to Division 01
- B General:
 - 1. Product Compliance: ASTM E1.
 - 2. Lens: Clear glass, except where stated.
 - 3. Accuracy: One percent, when tested in accordance with ASTM E77, except where stated.
 - 4. Scale: Black markings depicting dual scale in both degrees F and C where expected process value falls half-span of standard temperature range.
- C Thermometers - Adjustable Angle: 7 inch v-shape aluminum case with clear glass window scale, 6 inch NPT stem, red or blue organic non-toxic liquid filled glass tube, and adjustable joint with positive locking device allowing 360 degrees in horizontal plane or 180 degrees in vertical plane adjustments.
- D Thermometers - Dial Type:
 - 1. Adjustable Angle: 5 inch diameter dial with black pointer, stainless steel case, silicone damping bimetal element, hermetically sealed shatterproof-lens, recalibrating screw, and 2-1/2 inch NPT stem.

2.3 PRESSURE-TEMPERATURE TEST PLUGS:

- A Size: 500 psi capacity; 1/2 inch MPT brass fitting with gasket, cap, and retaining strap for 1/8 inch pressure gauge or temperature probe.
- B Wetted Materials per Temperature Range:
 - 1. Up to 200 degrees F: Brass probe with neoprene core.
- C Accessories: Brass, lever-handle cock and snubber-filter.

PART 3 EXECUTION**3.1 EXAMINATION**

- A Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports, and test plugs.

3.2 INSTALLATION

- A Install metering products in accordance with manufacturer's instructions for intended fluid type and service.
- B Install pressure gauges as follows:
 - 1. At Pumps: Place single gauge before strainer, suction side and discharge side.
 - 2. Include gauge cock and pressure snubber (pulsation-damper) to isolate each gauge and extend nipples for insulation clearance.
 - 3. Include siphons on high temperature systems and select type according to service rating.
 - 4. Adjust gauges to selected viewing angle, clean thoroughly, and calibrate to zero.
- C Install thermometers as follows:
 - 1. Water Heaters: Place upstream and downstream of heater. Add one on the inlet end when using steam as the water heating medium.
 - 2. Piping: Install thermometers in branch butt weld connection fitting or socket-weld thermowell. Enlarge pipes smaller than 2-1/2 inch to accommodate sockets. Ensure sockets are above insulation clearance.
- D Locate PT (pressure-temperature) test plugs adjacent to control device sockets.

END OF SECTION 22 05 19

SECTION 22 05 23 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Angle valves.
- B Ball valves.
- C Butterfly valves.
- D Check valves.
- E Flow limiting valves.
- F Gate valves.
- G Globe valves.

1.2 ABBREVIATIONS AND ACRONYMS

- A CWP: Cold working pressure.
- B EPDM: Ethylene propylene copolymer rubber.
- C NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D NRS: Non-rising stem.
- E OS&Y: Outside screw and yoke.
- F PTFE: Polytetrafluoroethylene.
- G RS: Rising stem.
- H TFE: Tetrafluoroethylene.
- I WOG: Water, oil, and gas.

1.3 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- C Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- D Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.
- E Maintenance Materials: Furnish Owner with one wrench for every five plug valves, in each size of square plug valve head.
 - 1. See Division 01 for additional provisions.

1.4 QUALITY ASSURANCE

- A Manufacturer:
 - 1. Obtain valves for each valve type from single manufacturer.
 - 2. Company must specialize in manufacturing products specified in this section, with not less than three years of experience.
- B Welding Materials and Procedures: Comply with ASME BPVC-IX.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Prepare valves for shipping as follows:
 - 1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
 - 2. Protect valve parts exposed to piped medium against rust and corrosion.
 - 3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
 - 4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.
 - 5. Secure check valves in either the closed position or open position.
 - 6. Adjust butterfly valves to closed or partially closed position.
- B Use the following precautions during storage:
 - 1. Maintain valve end protection and protect flanges and specialties from dirt.
 - a. Provide temporary inlet and outlet caps.
 - b. Maintain caps in place until installation.

2. Store valves in shipping containers and maintain in place until installation.
 - a. Store valves indoors in dry environment.
 - b. Store valves off the ground in watertight enclosures when indoor storage is not an option.
- 1.6 EXERCISE THE FOLLOWING PRECAUTIONS FOR HANDLING:
- A Handle large valves with sling, modified to avoid damage to exposed parts.
 - B Avoid the use of operating handles or stems as rigging or lifting points.

PART 2 PRODUCTS

2.1 APPLICATIONS

- A See drawings for specific valve locations.
- B Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).
- C Provide the following valves for the applications if not indicated on drawings:
 1. Shutoff: Ball, butterfly, gate or plug.
 2. Dead-End: Single-flange butterfly (lug) type.
 3. Throttling: Provide globe, angle, ball, or butterfly.
 4. Swing Check (Pump Outlet):
 - a. 2 inch and Smaller: Bronze swing check valves with bronze or nonmetallic disc.
 - b. 2-1/2 inch and Larger for Domestic Water: Iron swing check valves with closure control, metal or resilient seat check valves.
 - c. 2-1/2 inch and Larger for Sanitary Waste and Storm Drainage: Iron swing check valves with lever and weight or spring.
- D Substitutions of valves with higher CWP classes or WSP ratings for same valve types are permitted when specified CWP ratings or WSP classes are not available.
- E Required Valve End Connections for Non-Wafer Types:
 1. Copper Tube:
 - a. 2 inch and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
 - b. 2-1/2 inch to 4 inch: Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below.
 - c. 5 inch and Larger: Grooved or flanged ends.
- F Domestic, Hot and Cold Water Valves:
 1. 2 inch and Smaller:
 - a. Bronze and Brass: Provide with solder-joint or threaded ends.
 - b. Bronze Angle: Class 125, bronze disc.
 - c. Ball: One piece, full port, brass with brass trim.
 - d. Bronze Swing Check: Class 125, bronze disc.
 - e. Bronze Gate: Class 125, NRS.
 - f. Bronze Globe: Class 125, bronze disc.
 2. 2-1/2 inch and Larger:
 - a. Iron, 2-1/2 inch to 4 inch: Provide with threaded or flanged ends.
 - b. Iron Ball: Class 150.
 - c. Iron Single-Flange Butterfly: 200 CWP, EPDM seat, aluminum-bronze disc.
 - d. Iron Grooved-End Butterfly: 175 CWP.
 - e. Iron Swing Check: Class 125, metal seats.
 - f. Iron Swing Check with Closure Control: Class 125, lever and spring.
 - g. Iron Grooved-End Swing Check: 300 CWP.
 - h. Iron Center-Guided Check: Class 125, compact-wafer, metal seat.
 - i. Iron Plate-Type Check: Class 125; single plate; metal seat.
 - j. Iron Gate: Class 125, NRS.
 - k. Iron Globe: Class 125.
- G Sanitary Waste Water Valves:
 1. 2 inch and Smaller:
 - a. Bronze and Brass: Provide with solder-joint.

- b. Bronze Angle: Class 125, bronze disc.
- c. Ball: One piece, full port, brass with brass trim.
- d. Bronze Swing Check: Class 125, bronze disc.
- e. Bronze Gate: Class 125, NRS.
- f. Bronze Globe: Class 125, bronze disc.
- 2. 2-1/2 inch and Larger:
 - a. Iron, 2-1/2 inch to 4 inch: Provide with threaded ends.
 - b. Iron Ball: Class 150.
 - c. Iron Swing Check: Class 125, metal seats.
 - d. Iron Swing Check with Closure Control: Class 125, lever and spring.
 - e. Iron Grooved-End Swing Check: 300 CWP.
 - f. Iron Gate: Class 125, NRS.
 - g. Iron Globe: Class 125.
 - h. Lubricated Plug: Class 125, regular gland.

2.2 GENERAL REQUIREMENTS

- A Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
- B Valve Sizes: Match upstream piping unless otherwise indicated.
- C Valve Actuator Types:
 - 1. Gear Actuator: Quarter-turn valves 8 inch and larger.
 - 2. Handwheel: Valves other than quarter-turn types.
 - 3. Hand Lever: Quarter-turn valves 6 inch and smaller except plug valves.
 - 4. Wrench: Plug valves with square heads.
 - 5. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator, of size and with chain for mounting height, as indicated in the "Valve Installation" Article.
- D Insulated Piping Valves: With 2 inch stem extensions and the following features:
 - 1. Gate Valves: Rising stem.
 - 2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
 - 3. Butterfly Valves: Extended neck.
 - 4. Memory Stops: Fully adjustable after insulation is installed.
- E Valve-End Connections:
 - 1. Threaded End Valves: ASME B1.20.1.
 - 2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
 - 3. Pipe Flanges and Flanged Fittings 1/2 inch through 24 inch: ASME B16.5.
 - 4. Solder Joint Connections: ASME B16.18.
 - 5. Grooved End Connections: AWWA C606.
- F General ASME Compliance:
 - 1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
 - 2. Solder-joint Connections: ASME B16.18.
 - 3. Building Services Piping Valves: ASME B31.9.
- G Potable Water Use:
 - 1. Certified: Approved for use in compliance with NSF 61 and NSF 372.
 - 2. Lead-Free Certified: Wetted surface material includes less than 0.25 percent lead content.
- H Valve Bypass and Drain Connections: MSS SP-45.
- I Source Limitations: Obtain each valve type from a single manufacturer.

2.3 BRONZE, ANGLE VALVES

- A Class 125; CWP Rating: 200 psi:
 - 1. Comply with MSS SP-80, Type 1.
 - 2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
 - 3. End Connections: Pipe thread.
 - 4. Stem: Bronze.
 - 5. Disc: Bronze.

6. Packing: Asbestos free.
7. Handwheel: Bronze or aluminum.

2.4 BRASS, BALL VALVES

- A Two Piece, Full Port with Brass Trim and Female Thread, Male thread, or Solder Connections:
1. Comply with MSS SP-110.
 2. WSP Rating: 150 psi.
 3. WOG Rating: 600 psi.
 4. Body: Forged brass, low lead compliant.
 5. Seats: PTFE.
 6. Ball: Chrome-plated brass.
 7. Operator: Lockable handle, memory stop, and stem extension.

2.5 IRON, BALL VALVES

- A Class 125, Full Port, Stainless Steel Trim:
1. Comply with MSS SP-72.
 2. CWP Rating: 200 psi.
 3. Body: ASTM A536 Grade 65-45-12, ductile iron.
 4. End Connections: Flanged.
 5. Seats: PTFE.
 6. Stem: Stainless steel.
 7. Ball: Stainless steel.
 8. Operator: Lever with locking handle.

2.6 IRON, SINGLE FLANGE BUTTERFLY VALVES

- A Wafer and Lug Style:
1. Class 125, or Class 150 flanges.
 2. Comply with MSS SP-67, Type I.
 3. Lug Style, Service Pressure Ratings:
 - a. 150 psi for sizes 14 to 24 inch.
 - b. 250 psi for sizes 2 to 12 inch.
 4. Body Material: ASTM A126, cast iron or ASTM A536, ductile iron.
 5. Stem: One or two-piece stainless steel.
 6. Seat: EPDM.
 7. Disc: Aluminum-bronze.
 8. Finish: Epoxy coated.
 9. Operator: Lockable handle over direct-mount actuator base.

2.7 BRASS, INLINE CHECK VALVES

- A Class 150:
1. WOG Rating: 200 psi.
 2. Maximum Service Temperature: 250 degrees F.
 3. Body: Forged brass.
 4. Disc: Forged brass.
 5. Seal: PTFE, bubble-tight.
 6. End Connections: Threaded.

2.8 BRASS, HORIZONTAL SWING CHECK VALVES

- A Class 125, Threaded End Connections:
1. WOG Rating: 200 psi.
 2. Body: Forged brass.
 3. Disc: Forged brass.
 4. Hinge-Pin, Screw, and Cap: Forged brass.
- B Class 125, Press End Connections:
1. WOG Rating: 200 psi.

2. Body: Forged brass.
3. Disc: Forged brass.
4. Hinge-Pin, Screw, and Cap: Forged brass.

2.9 BRONZE, SWING CHECK VALVES

A General:

1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B Class 125:

1. Pressure and Temperature Rating: MSS SP-80, Type 3.
2. Design: Y-pattern, horizontal or vertical flow.
3. WOG Rating: 200 psi.
4. Body: Bronze, ASTM B62.
5. End Connections: Threaded.
6. Disc: Bronze.

C Class 150:

1. Pressure and Temperature Rating: MSS SP-80, Type 3.
2. Design: Y-pattern, horizontal or vertical flow.
3. WSP Rating: 150 psi.
4. WOG Rating: 300 psi.
5. Body: Bronze, ASTM B62.
6. End Connections: Threaded or soldered.
7. Disc: Bronze.

2.10 IRON, HORIZONTAL SWING CHECK VALVES

A Class 125:

1. Pressure and Temperature Rating: MSS SP-71, Type I.
2. Design: T-body style for clear or full waterways.
3. WOG Rating: 200 psi.
4. WSP Rating: 125 psi at 450 degrees F.
5. Body: ASTM A126, gray cast iron with bolted bonnet.
6. End Connections: Flanged.
7. Trim: Bronze.
8. Seat Ring and Disc Holder: Bronze.
9. Gasket: Asbestos free.

B Class 250:

1. Comply with MSS SP-71, Type I.
2. CWP Rating: 500 psi.
3. Design: T-body style for clear or full waterway.
4. Body: ASTM A126, gray iron with bolted bonnet.
5. End Connections: Flanged.
6. Trim: Bronze.
7. Metal Seat.
8. Gasket: Asbestos free.

2.11 IRON, SWING CHECK VALVES WITH CLOSURE CONTROL

A Class 125 with Lever and Spring-Closure Control.

1. Comply with MSS SP-71, Type I.
2. Description:
 - a. CWP Rating: 200 psi.
 - b. Design: Clear or full waterway.
 - c. Body: ASTM A126, gray iron with bolted bonnet.
 - d. Ends: Flanged or threaded as indicated.
 - e. Trim: Bronze.
 - f. Gasket: Asbestos free.

- g. Closer Control: Factory installed, exterior lever, and spring or weight.

2.12 IRON, CENTER-GUIDED CHECK VALVES

- A Class 125, Compact-Wafer:
 - 1. Comply with MSS SP-125.
 - 2. CWP Rating: 200 psi.
 - 3. Body: ASTM A126 gray iron.
 - 4. Metal Seat: Unleaded bronze.
- B Class 125, Globe:
 - 1. Comply with MSS SP-125.
 - 2. CWP Rating: 200 psi.
 - 3. Style: Spring loaded.
 - 4. End Connections: Flanged.
 - 5. Metal Seat: Unleaded bronze.
- C Class 150, Compact-Wafer:
 - 1. Comply with MSS SP-125.
 - 2. CWP Rating: 300 psi.
 - 3. Body: ASTM A395/A395M or ASTM A536, ductile iron.
 - 4. Metal Seat: Unleaded bronze.
- D Class 150, Globe:
 - 1. Comply with MSS SP-125.
 - 2. CWP Rating: 300 psi.
 - 3. Body: ASTM A395/A395M or ASTM A536, ductile iron.
 - 4. Style: Spring loaded.
 - 5. End Connections: Flanged.
 - 6. Metal Seat: Unleaded bronze.
- E Class 250, Compact-Wafer:
 - 1. Comply with MSS SP-125.
 - 2. CWP Rating: 400 psi.
 - 3. Body: ASTM A126, gray iron.
 - 4. Style: Spring loaded.
 - 5. Metal Seat: Unleaded bronze.
- F Class 250, Globe:
 - 1. Comply with MSS SP-125.
 - 2. Body Material: ASTM A126, gray iron.
 - 3. Style: Spring loaded.
 - 4. End Connections: Flanged.
 - 5. Metal Seat: Unleaded bronze.

2.13 IRON, PLATE TYPE CHECK VALVES

- A Class 125 Single-Plate:
 - 1. Comply with API STD 594.
 - 2. CWP Rating: 200 psi.
 - 3. Design: Wafer, spring-loaded plate.
 - 4. Body: ASTM A126, gray iron.
 - 5. Resilient Seat: EPDM.
- B Class 250, Single-Plate:
 - 1. Comply with API STD 594.
 - 2. CWP Rating: 400 psi.
 - 3. Design: Wafer, spring-loaded plate.
 - 4. Body: ASTM A126, gray iron.
 - 5. Resilient Seat: NBR.

2.14 FLOW LIMITING VALVES

- A Size: As indicated on drawings, female threaded.

- B Flow Setting: As indicated on drawings.
- C Flow Accuracy: Plus or minus 5 percent.
- D Body and Cap: Lead-free brass.
- E Cap and Plug: Lead-free brass.
- F Cartridge: Stainless steel with replaceable EPDM seal.
- G Maximum Service Pressure: 600 psi, WOG.
- H Maximum Service Temperature: 250 degrees F.
- I Accessories: Provide hanging tag and test-plug outlet extensions.

2.15 BRONZE, GATE VALVES

- A General:
 - 1. Fabricate from dezincification resistant material.
 - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B Rising Stem or OS&Y:
 - 1. Pressure-Temperature Range: MSS SP-80, Type I.
 - 2. Class 125:
 - a. WSP Rating: 125 psi, saturated.
 - b. CWP Rating: 200 psi.
 - 3. Class 150: CWP Rating; 300 psi.
 - 4. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
 - 5. End Connections: Threaded or solder.
 - 6. Stem: Bronze.
 - 7. Disc: Solid wedge; bronze.
 - 8. Packing: Asbestos free.
 - 9. Handwheel Operator: Malleable iron or aluminum.
- C Non-Rising Stem or NRS
 - 1. Pressure-Temperature Range: MSS SP-80, Type I.
 - 2. Class 125:
 - a. WSP Rating: 125 psi, saturated.
 - b. CWP Rating: 200 psi.
 - 3. Class 150: CWP Rating; 300 psi.
 - 4. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
 - 5. Ends Connections: Threaded or solder.
 - 6. Stem: Bronze.
 - 7. Disc: Solid wedge; bronze.
 - 8. Packing: Asbestos free.
 - 9. Handwheel Operator: Malleable iron or aluminum.

2.16 IRON, GATE VALVES

- A Bolted Bonnet: OS&Y; Rising Stem:
 - 1. Pressure and Temperature Rating: MSS SP-70, Type I.
 - 2. Class 125: WOG Rating; 200 psi.
 - 3. Class 250: WOG Rating; 500 psi.
 - 4. Body: ASTM A126, gray iron with bolted bonnet.
 - 5. End Connections: Flanged.
 - 6. Trim: Bronze.
 - 7. Disc: Solid wedge.
 - 8. Packing and Gasket: Asbestos free.

2.17 BRONZE, GLOBE VALVES

- A General:
 - 1. Fabricate from dezincification resistant material.
 - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B Class 125 and Class 250:
 - 1. Class 125:

- a. WOG Rating: 200 psi.
- b. WSP Rating: 125 psi, saturated.
2. Class 250: WOG Rating; 300 psi.
3. Comply with MSS SP-80, Type 1.
4. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
5. End Connections: Threaded or solder.
6. Bonnet: NRS; Non-rising Stem.
7. Non-Rising Stem: Bronze.
8. Disc: PTFE.
9. Packing: Asbestos free.
10. Handwheel Operator: Malleable iron.

2.18 IRON, GLOBE VALVES

- A Class 125 and Class 250:
 1. Class 125, WOG Rating: 200 psi.
 2. Class 250, WOG Rating: 500 psi.
 3. Comply with MSS SP-85, Type I.
 4. Body: Gray iron; ASTM A126, with bolted bonnet.
 5. Bonnet: OS&Y; Rising Stem.
 6. Connection Ends: Flanged.
 7. Trim: Bronze.
 8. Packing and Gasket: Asbestos free, adjustable.
 9. Operator: Handwheel or chainwheel.
 10. Temperature Range: Minus 20 to 150 degrees F.
 11. Pressure and Temperature Rating: ASME B16.1.

PART 3 EXECUTION

3.1 EXAMINATION

- A Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.
- B Verify valve parts to be fully operational in all positions from closed to fully open.
- C Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
- D Should valve is determined to be defective, replace with new valve.

3.2 INSTALLATION

- A Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
- B Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.
- C Where valve support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- D Install check valves where necessary to maintain direction of flow as follows:
 1. Lift Check: Install with stem plumb and vertical.
 2. Swing Check: Install horizontal maintaining hinge pin level.
 3. Orient plate-type and center-guided into horizontal or vertical position, between flanges.
- E Provide chainwheels on operators for valves 4 inch and larger where located 96 inches or more above finished floor, terminating 60 inches above finished floor.

END OF SECTION 22 05 23

SECTION 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Strut systems for pipe or equipment support.
- B Beam clamps.
- C Pipe hangers.
- D Pipe rollers and roller supports.
- E Pipe supports, guides, shields, and saddles.
- F Anchors and fasteners.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Division 03.

1.3 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
- C Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.
 - 1. Application of protective inserts, saddles, and shields at pipe hangers for each type of insulation and hanger.
- D Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.4 QUALITY ASSURANCE

- A Comply with applicable building code.
- B Installer Qualifications for Field-Welding: As specified in Division 05.
- C Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A Provide required hardware to hang or support piping, equipment, or fixtures with related accessories as necessary to complete installation of plumbing work.

- B Provide hardware products listed, classified, and labeled as suitable for intended purpose.
- C Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 2.0. Include consideration for vibration, equipment operation, and shock loads where applicable.
- D Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
- E Fire Resistance: Provide hardware rated for 90 minutes resistance unless specifically indicated by the authority having jurisdiction.
- F Vibration Isolation and Seismic Restraint Requirements: See Division 22.
- G Materials for Metal Fabricated Supports: Comply with Division 05
 - 1. Zinc-Plated Steel: Electroplated in accordance with ASTM B633 unless stated otherwise.
 - 2. Galvanized Steel: Hot-dip galvanized in accordance with ASTM A123/A123M or ASTM A153/A153M unless stated otherwise.
- H Corrosion Resistance: Use corrosion-resistant metal-based materials fully compatible with exposed piping materials and suitable for the environment where installed.
 - 1. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - 2. Outdoor, Damp, or Wet-Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.

2.2 STRUT SYSTEMS FOR PIPE OR EQUIPMENT SUPPORT

- A Strut Channels:
 - 1. ASTM A653/A653M galvanized steel bracket with clamps for surface mounting of piping or plumbing equipment support.
 - 2. Channel or Bracket Kits: Include rods, brackets, end-fixed fittings, covers, clips, and other related hardware required to complete sectional trapeze section for piping or other support.
- B Hanger Rods:
 - 1. Threaded zinc-plated steel unless otherwise indicated.
- C Channel Nuts:
 - 1. Provide carbon steel channel nut with epoxy copper or zinc finish and long, regular, or short spring as indicated on drawings.

2.3 BEAM CLAMPS

- A MSS SP-58 types 19 through 23, 25 or 27 through 30 based on required load.
- B C-Clamp: MSS SP-58 type 23, malleable iron and steel with plain, stainless steel, and zinc finish.
- C Small or Junior Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish. For inverted usage provide manufacturer listed size(s).
- D Wide Mouth Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish.
- E Centerload Beam Clamp with Extension Piece: MSS SP-58 type 30, malleable iron with plain finish.
- F FM (AG) and UL (DIR) Approved Beam Clamp: MSS SP-58 type 19, plain finish.
- G Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
- H Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.

2.4 PIPE HANGERS

- A Clevis Hangers, Adjustable:
 - 1. Copper Tube: MSS SP-58 type 1, epoxy-plated copper.
 - 2. Standard-Duty: MSS SP-58 type 1, zinc-colored, epoxy plated.
 - 3. FM (AG) listed: Pipe sizes 2-1/2 to 8 inch.

2.5 PIPE CLAMPS

- A Riser Clamps:
 - 1. Manufacturers:

- a. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
- 2. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
- 3. MSS SP-58 type 1 or 8, carbon steel or steel with epoxy plated, plain, stainless steel, or zinc plated finish.
- 4. Copper Tube Pipe Clamp: MSS SP-58 type 8, epoxy plated copper.
- 5. UL (DIR) listed: Pipe sizes 1/2 to 8 inch.
- B Extension Split Pipe Clamp:
 - 1. Manufacturers:
 - a. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 - 2. MSS SP-58 type 12, hinged split ring and yoke roller hanger with epoxy copper or plain finish.
 - 3. Material: ASTM A47/A47M malleable iron or ASTM A36/A36M carbon steel.
 - 4. Provide hanger rod and nuts of the same type and material for a given pipe run.
 - 5. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.
- C Strut Clamps:
 - 1. Manufacturers:
 - a. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 - 2. Pipe Clamp: Two-piece rigid, universal, or outer diameter type, carbon steel with epoxy copper or zinc finish.
 - 3. Cushioned Pipe or Tubing Strut Clamp: Provide strut clamp with thermoplastic elastomer cushion having dielectric strength of 670 V/mil.
 - 4. Service Temperature Range: Minus 65 to 275 degrees F.
- D Insulation Coupling:
 - 1. Manufacturers:
 - a. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 - 2. Two bolt-type clamps designed for installation under insulation.
 - 3. Material: Carbon steel with epoxy copper or zinc finish.

2.6 PIPE ROLLERS AND ROLLER SUPPORTS

- A Manufacturers:
 - 1. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
- B MSS SP-58 type 43 based on required load, nonconductive and corrosion resistant.
- C Steel Yoke Type: MSS SP-58 type 44, vertically adjustable, nonconductive, and corrosion resistant.
- D Material: Zinc plated ASTM A36/A36M carbon steel or ASTM A47/A47M malleable iron.

2.7 PIPE SUPPORTS, GUIDES, SHIELDS, AND SADDLES

- A Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.
- B Stanchions:
 - 1. Manufacturers:
 - a. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 - 2. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
 - 3. Provide coated or plated saddles to isolate steel hangers from dissimilar metal tube or pipe.
 - 4. For pipe runs, use stanchions of same type and material where vertical adjustment is required for stationary pipe.
- C U-Bolts:
 - 1. Manufacturers:

2. MSS SP-58 type 24, carbon steel u-bolt for pipe support or anchoring.
- D Intermediate Anchors and Pipe Alignment Guides:
 1. Pipe Sizes 6 inch and Smaller: Minimum clearance of 0.16 inch.
 2. Pipe Size 8 inch: 0.625 inch U-bolt with double nuts providing minimum clearance of 0.28 inch.
 3. Pipe Size 10 inch: 0.75 inch U-bolt.
 4. Pipe Sizes 12 to 16 inch: 0.875 inch U-bolt.
 5. Pipe Sizes 18 to 30 inches: 1 inch U-bolt.
 6. Use pipe clamps with oversize pipe sleeve that provides clearance around pipe.
- E Pipe Alignment Guides:
 1. Pipe Sizes 8 inch and Smaller: Spider or sleeve type.
 2. Pipe Sizes 10 inch and Larger: Roller type.
- F Pipe Shields for Insulated Piping:
 1. Manufacturers:
 - a. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. MSS SP-58 type 40, ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.
 3. General Construction and Requirements:
 - a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
 - b. Shields Material: Galvanized sheet metal.
 - c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
 - d. Service Temperature: Minus 40 to 178 degrees F.
 - e. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
- G Pipe Supports:
 1. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
 2. Liquid Temperatures Up to 122 degrees F:
 - a. Overhead Support: MSS SP-58 types 1, 3 through 12 clamps.
 - b. Support From Below: MSS SP-58 types 35 through 38.
 3. Operating Temperatures from 122 to 446 degrees F:
 - a. Overhead Support: MSS SP-58 type 1 or 3 through 12 clamps with appropriate saddle of MSS SP-58 type 40 for insulated pipe.
 - b. Roller Chair: MSS SP-58 types 41 or 43 through 46 roller chair support with appropriate saddle of MSS SP-58 type 39 for insulated pipe.
 - c. Sliding Support: MSS SP-58 types 35 through 38.
- H Nonpenetrating Pipe Supports:
 1. Manufacturers:
 - a. Source Limitations: Furnish channels/struts and associated fittings, accessories, and hardware produced by a single manufacturer.
- I Pipe Supports, Thermal Insulated:
 1. General Requirements:
 - a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
 - b. Pipe insulation protection shields to be provided at the hanger points and guide locations on pipes requiring insulation as indicated on drawings.
 - c. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
 - d. Provide pipe supports for 1/2 to 30 inch iron pipes.
 - e. Insulation inserts to consist of rigid phenolic foam insulation surrounded by 360 degree, PVC jacketing.
- J Copper Pipe Supports:
 1. Manufacturers:
 - a. Source Limitations: Furnish supports, associated fittings, accessories, and hardware produced by single manufacturer.

2.8 ANCHORS AND FASTENERS

- A Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
- B Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
- C Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
- D Hollow Masonry: Use toggle bolts.
- E Hollow Stud Walls: Use toggle bolts.
- F Steel: Use beam ceiling clamps, beam clamps, machine bolts, or welded threaded studs.
- G Beam Ceiling Flanges: ASTM A47/A47M Grade 32510, malleable iron or stainless steel with copper, plain, stainless steel, or zinc finish.
- H Sheet Metal: Use sheet metal screws.
- I Wood: Use wood screws.
- J Plastic and lead anchors are not permitted.
- K Powder-actuated fasteners are permitted only as follows:
 - 1. Where approved by Architect.
- L Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.
- M Preset Concrete Inserts: Continuous metal strut channel and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - 1. Channel Material: Use galvanized steel.
 - 2. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch minimum base metal thickness.
 - 3. Manufacturer: Same as manufacturer of metal strut channel framing system.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify that field measurements are as indicated.
- B Verify that mounting surfaces are ready to receive support and attachment components.
- C Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A Install products in accordance with manufacturer's instructions.
- B Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- D Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G Field-Welding (where approved by Architect): Comply with Division 05.
- H Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.
- I Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 4 inch high concrete pad constructed in accordance with Section 03 30 00.

- 5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- J Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.
- K Secure fasteners according to manufacturer's recommended torque settings.
- L Remove temporary supports.

3.3 FIELD QUALITY CONTROL

- A See Section Refer to Division 1 for additional requirements.
- B Inspect support and attachment components for damage and defects.
- C Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION 22 05 29

SECTION 22 05 53 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

1.2 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Schedules:
 - 1. Submit plumbing component identification schedule listing equipment, piping, and valves.
 - 2. Detail proposed component identification data in terms of of wording, symbols, letter size, and color coding to be applied to corresponding product.
 - 3. Valve Data Format: Include id-number, location, function, and model number.
- C Product Data: Provide manufacturers catalog literature for each product required.
- D Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- E Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.1 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

- A Nameplates:
 - 1. Heat exchangers, water heaters, and other heat transfer products.
 - 2. Control panels, transducers, and other related control equipment products.
 - 3. Pumps, tanks, filters, water treatment devices, and other plumbing equipment products.
- B Tags:
 - 1. Piping: 3/4 inch diameter and smaller.
 - 2. Manual operated and automated control valves.
 - 3. Instrumentation, relays, gauges, and other related control equipment products.
- C Pipe Markers: 3/4 inch diameter and higher.

2.2 NAMEPLATES

- A Manufacturers:
 - 1. Brimar Industries, Inc
 - 2. Kolbi Pipe Marker Co
 - 3. Seton Identification Products
 - 4. Substitutions: Refer to Division 01
- B Description: Laminated piece with up to three lines of text.
 - 1. Letter Color: Black.
 - 2. Letter Height: 1/2 inch.
 - 3. Background Color: White.
 - 4. Nameplate Height: 1-1/2 inch.

2.3 TAGS

- A Manufacturers:
 - 1. Advanced Graphic Engraving
 - 2. Brimar Industries, Inc
 - 3. Craftmark Pipe Markers
 - 4. Kolbi Pipe Marker Co
 - 5. Substitutions: Refer to Division 01
- B Metal: Brass, 19 gauge 1-1/2 inch in diameter with smooth edges, engraved, smooth edges, and corrosion-resistant ball chain. Up to three lines of text.
- C Valve Tag Chart: Typewritten 12-point letter size list in anodized aluminum frame.
- D Piping: 3/4 inch diameter and smaller. Include corrosion resistant chain. Identify service, flow direction, and pressure.

2.4 PIPE MARKERS

- A Manufacturers:
 - 1. Brady Corporation
 - 2. Brimar Industries, Inc
 - 3. Craftmark Pipe Markers
 - 4. Kolbi Pipe Marker Co
 - 5. Seton Identification Products
 - 6. Substitutions: Refer to division 1
- B Comply with ASME A13.1.
- C Flexible Marker: Factory fabricated, semi-rigid, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid conveyed.
- D Flexible Tape Marker: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.
- E Underground Flexible Marker: Bright-colored continuously printed ribbon tape, minimum 6 inches wide by 4 mil, 0.004 inch thick, manufactured for direct burial service.
- F Identification Scheme, ASME A13.1:
 - 1. Primary: External Pipe Diameter, Uninsulated or Insulated.
 - a. 3/4 to 1-1/4 inches: Use 8 inch field-length with 1/2 inch text height.
 - b. 1-1/2 to 2 inches: Use 8 inch field-length with 3/4 inch text height.
 - c. 2-1/2 to 6 inches: Use 12 inch field-length with 1-1/4 inch text height.
 - d. 8 to 10 inches: Use 24 inch field-length with 2-1/2 inch text height.
 - e. Over 10 inches: Use 32 inch field-length with 3-1/2 inch text height.
 - 2. Secondary: Color scheme per fluid service. Refer to Wake County Guidelines.
 - 3. Tertiary: Other Details.
 - a. Directional flow arrow.

PART 3 EXECUTION

3.1 PREPARATION

- A Degrease and clean surfaces to receive identification products.
- B Prepare surfaces for stencil painting, see Division 09.

3.2 INSTALLATION

- A Install tags in clear view and align with axis of piping
- B Apply stencil painted identification in compliance with Section 09 91 23 requirements. Identify unit with assigned id-number and area being served using pipe marking rules.
- C Install plastic pipe markers in accordance with manufacturer's instructions.
- D Apply ASME A13.1 Pipe Marking Rules:
 - 1. Place pipe marker adjacent to changes in direction.
 - 2. Place pipe marker adjacent each valve port and flange end.
 - 3. Place pipe marker at both sides of floor and wall penetrations.
 - 4. Place pipe marker every 25 to 50 feet interval of straight run.

END OF SECTION 22 05 53

SECTION 22 07 19 - PLUMBING PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Flexible elastomeric cellular insulation.
- B Glass fiber insulation.
- C Weather barrier coatings.
- D Jacketing and accessories.

1.2 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.3 QUALITY ASSURANCE

- A Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of experience.
- B Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 3 years of experience.

1.4 DELIVERY, STORAGE, AND HANDLING

- A Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.5 FIELD CONDITIONS

- A Maintain ambient conditions required by manufacturers of each product.
- B Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 GLASS FIBER INSULATION

- A Manufacturers:
 - 1. CertainTeed Corporation
 - 2. Johns Manville Corporation
 - 3. Knauf Insulation
 - 4. Owens Corning Corporation
 - 5. Substitutions: Refer to Division 01.
- B Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm.
- D Insulating Cement: ASTM C449.

2.3 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A Manufacturers:
 - 1. Aeroflex USA
 - 2. Armacell LLC

3. K-Flex USA LLC
4. Substitutions: Refer to Division 01
- B Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
 1. Minimum Service Temperature: Minus 40 degrees F.
 2. Maximum Service Temperature: 220 degrees F.
 3. Connection: Waterproof vapor barrier adhesive.
- C Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
- D Weather Barrier: Air dried, contact adhesive, compatible with insulation and ASTM E84 compliant.

2.4 WEATHER BARRIER COATINGS

- A Weather-Resistive Barrier Coating: Fire-resistive, UV resistant, water-based mastic for use over closed cell polyethylene and polyurethane foam insulation; applied with glass fiber or synthetic reinforcing mesh.
 1. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A, when tested in accordance with ASTM E84.
 2. Water Vapor Permeance: Greater than 1.0 perm in accordance with ASTM E96/E96M.
 3. Resistance to Fungal Growth: No growth when tested in accordance with ASTM D5590.

2.5 JACKETING AND ACCESSORIES

- A Aluminum Jacket:
 1. Comply with ASTM B209/B209M, Temper H14, minimum thickness of 0.016 inch with factory-applied polyethylene and kraft paper moisture barrier on the inside surface.
 2. Thickness: 0.016 inch sheet.
 3. Finish: Smooth.
 4. Joining: Longitudinal slip joints and 2 inch laps.
 5. Fittings: 0.016 inch thick die-shaped fitting covers with factory-attached protective liner.
 6. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.
- B Aluminum-Foil Laminate Jacket:
 1. Factory-applied, pressure sensitive adhesive jacketing on paper release liner.
 2. Finish: Aluminum smooth.
 3. Comply with ASTM C1775.
- C Stainless Steel Jacket: ASTM A666/A666M, Type 304 stainless steel.
 1. Thickness: 0.010 inch.
 2. Finish: Smooth.
 3. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.
- D Reinforced Tape:
 1. FSK tape suitable for sealing seams between insulation, insulated pipe bends, and fittings resulting in a tight, smooth surface without wrinkles.
 2. Comply with UL 723 or ASTM E84.
 3. Moisture Vapor Permeability: 0.00 perm inch, when tested in accordance with ASTM E96/E96M.
 4. Finish: Match insulation.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify that piping has been tested before applying insulation materials.
- B Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

- A Install in accordance with manufacturer's instructions.
- B Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

- C Glass fiber insulated pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- D For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- E For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- F Glass fiber insulated pipes conveying fluids above ambient temperature:
 - 1. Provide standard jackets, with vapor barrier, factory-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- G Inserts and Shields:
 - 1. Application: Piping 1-1/2 inches diameter or larger.
 - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert Location: Between support shield and piping and under the finish jacket.
 - 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 - 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- H Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, see Section 07 84 00.
- I Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with aluminum jacket.
- J Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.
- K Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil, 0.001 inch thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.
- L Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.3 SCHEDULES

- A Plumbing Systems:
 - 1. Domestic Hot Water Supply:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: 1-1/4" and less
 - 2) Thickness: 1 inch.
 - b. Glass Fiber Insulation:
 - 1) Pipe Size Range: 1-1/2" and larger
 - 2) Thickness: 1-1/2 inch.
 - 2. Domestic Hot Water Recirculation:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: 1-1/4" and less.
 - 2) Thickness: 1 inch.
 - b. Glass Fiber Insulation:
 - 1) Pipe Size Range: 1-1/2" and larger
 - 2) Thickness: 1-1/2 inch.

3. Domestic Cold Water: glass Fiber Insulation 1/2" thick
4. Chilled Drinking Water Supply: Flexible Elastomeric Insulation 1/2" thick
5. Chilled Drinking Water Recirculation: Flexible Elastomeric Insulation 1/2" Thick
- B Cooling Systems:
 1. Cold Condensate Drains: Flexible Elastomeric Insulation 1/2" thick
- C Other Systems:
 1. Piping Exposed to Freezing with Heat Tracing: Glass Fiber Insulation 1" thick with aluminum jacket

END OF SECTION 22 07 19

SECTION 22 10 05 - PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Sanitary waste piping, buried within 5 feet of building.
- B Sanitary waste piping, above grade.
- C Domestic water piping, buried within 5 feet of building.
- D Domestic water piping, above grade.
- E Pipe flanges, unions, and couplings.
- F Pipe hangers and supports.
- G Balancing valves.
- H Flow-balancing valves.
- I Pressure reducing valves.
- J Pressure relief valves.
- K Pressure-temperature valves.
- L Strainers.

1.2 SUBMITTALS

- A Refer to Division 1 for submittal procedures.
- B Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C Welders' Certificates: Submit certification of welders' compliance with ASME BPVC-IX.
- D Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.
- E Sustainable Design Documentation: For products meeting regulatory lead-content restrictions.
- F Project Record Documents: Record actual locations of valves.

1.3 QUALITY ASSURANCE

- A Perform work in accordance with applicable codes.
- B Valves: Manufacturer's name and pressure rating marked on valve body.
- C Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.
- D Welder Qualifications: Certified in accordance with ASME BPVC-IX.
- E Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.4 DELIVERY, STORAGE, AND HANDLING

- A Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B Provide temporary protective coating on cast iron and steel valves.
- C Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.5 FIELD CONDITIONS

- A Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.
- B Plenum-Installed Acid Waste Piping: Flame-spread index equal or below 25 and smoke-spread index equal or below 50 according to ASTM E84 or UL 723 tests.

2.2 SANITARY WASTE PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A Cast Iron Pipe: ASTM A74 service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.

2.3 SANITARY WASTE PIPING, ABOVE GRADE

- A Cast Iron Pipe: ASTM A74, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joint Seals: ASTM C564 neoprene gaskets.
- B Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: CISPI 310, neoprene gaskets and heavy duty stainless steel clamp-and-shield assemblies.

2.4 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A Copper Pipe: ASTM B42, hard drawn.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
 - 2. Joints: AWS A5.8M/A5.8, BCuP copper and silver braze.
- B Copper Pipe: ASTM B88 (ASTM B88M), Type K (A), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.

2.5 DOMESTIC WATER PIPING, ABOVE GRADE

- A Copper Pipe: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.
 - 3. Mechanical Press Sealed Fittings: ASME B16.51 or IAPMO/ANSI/CAN Z1117, ICC (IPC), and IAPMO (UPC) approved, NSF 61 and NSF 372 certified, with EPDM seals.

2.6 PIPE FLANGES, UNIONS, AND COUPLINGS

- A Unions for Pipe Sizes 3 inch and Under:
 - 1. Ferrous Pipe: Class 150 malleable iron threaded unions.
 - 2. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.
- B Flanges for Pipe Sizes Over 1 inch:
 - 1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
 - 2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C No-Hub Couplings:
 - 1. Testing: In accordance with ASTM C1277 and CISPI 310.
 - 2. Gasket Material: Neoprene complying with ASTM C564.
 - 3. Band Material: Stainless steel.
 - 4. Eyelet Material: Stainless steel.
- D Shielded, Heavy Duty No-Hub Couplings:
 - 1. Testing: In accordance with ASTM C1540 and FM 1680.
 - 2. Gasket Material: Neoprene complying with ASTM C564.
 - 3. Band Material: Stainless steel.
 - 4. Eyelet Material: Stainless steel.

2.7 PIPE HANGERS AND SUPPORTS

- A See Division 22 for additional requirements.
- B Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.

- a. Cold and Hot Pipe Sizes 6 inch and Larger: Double hangers.
3. Trapeze Hangers: Welded steel channel frames attached to structure.
4. Vertical Pipe Support: Steel riser clamp.
5. Floor Supports: Concrete pier or steel pedestal with floor flange; fixture attachment.
6. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified; and as follows:
 - a. Bases: High-density polypropylene.
 - b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 - c. Steel Components: Stainless steel or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 - d. Attachment and Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion-resistant material.
 - e. Height: Provide minimum clearance of 8 inches under pipe to top of roofing.
- C Plumbing Piping - Drain, Waste, and Vent:
 1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
 2. Hangers for Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
 3. Wall Support for Pipe Sizes to 3 inch: Cast iron hook.
 4. Wall Support for Pipe Sizes 4 inch and Over: Welded steel bracket and wrought steel clamp.
 5. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- D Plumbing Piping - Water:
 1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
 2. Hangers for Cold Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
 3. Hangers for Hot Pipe Sizes 2 to 4 inch: Carbon steel, adjustable, clevis.
 4. Hangers for Hot Pipe Sizes 6 inch and Larger: Adjustable steel yoke, cast iron pipe roll, double hanger.

2.8 BALANCING VALVES

- A Manufacturers:
- B Construction: Class 125, brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
- C Manual Operated Y-Pattern Globe, Size 1/2 to 2 inch:
 1. Class 125, brass or bronze body, multi-turn handwheel, memory stop, variable orifice, soldered connections, dual PT (hot and cold pressure-temperature) test ports for 300 psi, minus 4 to 250 deg F WOG service.
- D Automatic Flow Limiting Cartridge, Size 3/4 inch:
 1. Class 125, brass or bronze body, stainless steel cartridge, threaded connections with built-in union, dual PT (hot and cold pressure-temperature) test ports for 400 psi, 0.5 gpm WOG service.
- E Automatic Flow Limiting Cartridge with Ball Valve, Size 1/2 to 1 inch:
 1. Class 125, brass or bronze body, stainless steel cartridge, leak-proof stem, threaded or soldered connections with built-in union, dual PT (hot and cold pressure-temperature) test ports for 400 psi, 0.25 to 1.5 gpm WOG service.
- F Calibration: Control flow within five percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

2.9 FLOW-BALANCING VALVES

- A Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
- B Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

2.10 PRESSURE REDUCING VALVES

- A 2 inch and Smaller:
 - 1. ASSE 1003, bronze body, stainless steel, and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.
 - 2. Pressure Reducing Pilot-Operator:
 - a. Operating Range: 5 to 50 psi.
 - b. Connected into brass or bronze pilot piping and fittings.
 - c. Fixed flow restrictor, pressure gauges, and isolation valves.
- B 2 inch and Larger:
 - 1. ASSE 1003, cast iron body with interior lining complying with AWWA C550, bronze fitted, elastomeric diaphragm and seat disc, flanged.
 - 2. Pressure Reducing Pilot-Operator:
 - a. Operating Range: 10 to 80 psi.
 - b. Connected into brass or bronze pilot piping and fittings.
 - c. Fixed flow restrictor, strainer, pressure gauges, and isolation valves.
- C Pilot Operated:
 - 1. Cast bronze, 1-1/2 to 8 inch, NPS in size with flanged end connections. Rated for 300 psi inlet pressure with outlet discharge field-set to system inlet pressure.

2.11 PRESSURE RELIEF VALVES

- A ANSI Z21.22, AGA certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.

2.12 PRESSURE-TEMPERATURE VALVES

- A ANSI Z21.22, AGA certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME BPVC-IV certified and labelled.

2.13 STRAINERS

- A Size 1/2 inch to 3 inch:
 - 1. Class 150, threaded forged bronze Y-pattern body, stainless steel perforated mesh screen with cap, and rated for 150 psi, 250 deg F WOG service.
- B Size 2 inch and Smaller:
 - 1. Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
 - 2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
- C Size 1-1/2 inch to 4 inch:
 - 1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.
- D Size 5 inch and Larger:
 - 1. Class 125, flanged iron body, basket pattern with 1/8 inch stainless steel perforated screen.

PART 3 EXECUTION**3.1 EXAMINATION**

- A Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

- A Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B Remove scale and dirt, on inside and outside, before assembly.
- C Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

- A Install in accordance with manufacturer's instructions.
- B Provide non-conducting dielectric connections wherever jointing dissimilar metals.

- C Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E Group piping whenever practical at common elevations.
- F Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H Locate valves above accessible ceilings where possible; provide access where valves and fittings cannot be located above accessible ceilings.
 - 1. Coordinate size and location of access doors with Architect.
- I Establish elevations of buried piping outside the building to ensure not less than 3 ft of cover.
- J Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
- K Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.
- L Provide support for utility meters in accordance with requirements of utility companies.
- M Prepare exposed, unfinished pipe, fittings, supports, and accessories for finish painting.
- N Install bell and spigot pipe with bell end upstream.
- O Install valves with stems upright or horizontal, not inverted. See Division 22.
- P Install water piping to ASME B31.9.
- Q Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- R Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Support horizontal piping as indicated.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
 - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 8. Provide copper plated hangers and supports for copper piping.
 - 9. Prime coat exposed steel hangers and supports. Hangers and supports located in pipe shafts, and suspended ceiling spaces are not considered exposed.
 - 10. Provide hangers adjacent to motor-driven equipment with vibration isolation; see Division 22.
 - 11. Support cast iron drainage piping at every joint.
- S When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.4 APPLICATION

- A Install unions downstream of valves and at equipment or apparatus connections.
- B Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D Install globe valves for throttling, bypass, or manual flow control services.
- E Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.
- F Provide spring-loaded check valves on discharge of water pumps.
- G Provide flow controls in water recirculating systems where indicated.

3.5 FIELD TESTS AND INSPECTIONS

- A Verify and inspect systems according to requirements by the Authority Having Jurisdiction. In the absence of specific test and inspection procedures proceed as indicated below.
- B Domestic Water Systems:
 - 1. Perform hydrostatic testing for leakage prior to system disinfection.
 - 2. Test Preparation: Close each fixture valve or disconnect and cap each connected fixture.
 - 3. General:
 - a. Fill the system with water and raise static head to 10 psi above service pressure. Minimum static head of 50 to 150 psi. As an exception, certain codes allow a maximum static pressure of 80 psi.
- C Test Results: Document and certify successful results, otherwise repair, document, and retest.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A Prior to starting work, verify system is complete, flushed, and clean.
- B Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- C Inject disinfectant, free chlorine in liquid, powder, tablet, or gas form throughout system to obtain 50 to 80 mg/L residual.
- D Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E Maintain disinfectant in system for 24 hours.
- F If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- H Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.7 SERVICE CONNECTIONS

- A Provide new sanitary sewer services. Before commencing work, check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

END OF SECTION 22 10 05

SECTION 22 10 06 - PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Drains.
- B Cleanouts.
- C Washing machine outlet boxes.
- D Ice maker outlet boxes.
- E Water hammer arrestors.
- F Mixing valves.
- G Floor drain trap seals.

1.2 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
- D Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
- E Sustainable Design Documentation: Submit appropriate evidence that materials used in potable water systems comply with the specified requirements.
- F Operation Data: Indicate frequency of treatment required for interceptors.
- G Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- H Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, and water hammer arrestors.
- I Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Division 01 for additional provisions.
 - 2. Extra Loose Keys for Outside Hose Bibbs: One.

1.3 QUALITY ASSURANCE

- A Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years experience.

1.4 DELIVERY, STORAGE, AND HANDLING

- A Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.2 DRAINS

- A Floor Drains:
- B Floor Drain:
 - 1. ASME A112.6.3; lacquered cast iron or stainless steel, two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze extra heavy duty strainer.
- C Floor Sink:
 - 1. Round lacquered cast iron body with integral seepage pan, epoxy coated interior, aluminum dome strainer, nickel bronze frame, full grate and half grate.

2.3 CLEANOUTS

- A Cleanouts at Exterior Surfaced Areas:
 - 1. Round cast nickel bronze access frame and non-skid cover.

- B Cleanouts at Exterior Unsurfaced Areas:
 - 1. Line type with lacquered cast iron body and round epoxy coated gasketed cover.
- C Cleanouts at Interior Finished Floor Areas:
 - 1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.
- D Cleanouts at Interior Finished Wall Areas:
 - 1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.
- E Cleanouts at Interior Unfinished Accessible Areas: Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

2.4 WASHING MACHINE OUTLET BOXES

- A Description: Plastic preformed rough-in box with brass quarter-turn ball valves or single lever-handle valves, socket for 2 inch waste, and slip-in finishing cover.
- B Provide fire-rated outlet-box assembly for installation in 1- and 2-hour rated walls.
- C Accessories:
 - 1. Water-hammer arrestors.
 - 2. Support brackets for installation between framing studs.

2.5 ICE MAKER OUTLET BOXES

- A Description: Plastic preformed square or round rough-in box with brass quarter-turn ball valve, and slip-in finishing cover.
- B Provide fire-rated outlet-box assembly for installation in 1- and 2-hour rated walls.
- C Accessories:
 - 1. Water-hammer arrestors.
 - 2. Support brackets for installation between framing studs.

2.6 WATER HAMMER ARRESTORS

- A Water Hammer Arrestors:
 - 1. Stainless steel construction, piston type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range minus 100 to 300 degrees F and maximum 250 psi working pressure.

2.7 MIXING VALVES

- A Automatic Temperature Control Mixing Valves:
 - 1. Valve: ASSE 1069, bronze or brass body; thermostatic element; corrosion- and lime-resistant internal components; integral locking temperature adjustment; integral check valves with strainer screens on inlets.
 - 2. Finish: Rough bronze.
 - 3. Accessories:
 - a. Shut-off valve on outlet.

2.8 FLOOR DRAIN TRAP SEALS

- A Description: Push-fit EPDM or silicone fitting with a one-way membrane.

PART 3 EXECUTION

3.1 INSTALLATION

- A Install in accordance with manufacturer's instructions.
- B Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C Encase exterior cleanouts in concrete flush with grade.
- D Install floor cleanouts at elevation to accommodate finished floor.

- E Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.
- F Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatory sinks, washing machine outlets, or equipment as noted.
- G Install air chambers on hot and cold water supply piping to each fixture or group of fixtures (each washroom). Fabricate same size as supply pipe or 3/4 inch minimum, and minimum 18 inches long.

END OF SECTION 22 10 06

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SECTION 22 14 26 - ROOF DRAINS (ALTERNATE)

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Water test of below grade storm drain leaders and roof drains.
 - 2. Replacement of existing roof drain components.

1.2 SUBMITTALS

- A. Refer to Section 01 33 00 - Submittal Procedures.
- B. Product Data: Manufacturer's Product Data Sheets for materials specified certifying material complies with specified requirements.
- C. Manufacturer's Instructions: Latest edition of the Manufacturer's current material specifications and installation instructions.
- D. Shop Drawings: Include plans, elevations, sections and details.

1.3 QUALITY ASSURANCE

- A. Ensure plumbing systems and components are installed by licensed, qualified personnel.
- B. Ensure roof drains, couplings, piping, supports, fixtures, pipe hangers, fasteners, fittings, etc. are installed in compliance with the referenced plumbing code, and installed in accordance with the component manufacturer's published guidelines and instructions, and referenced standards.
- C. Field test completed storm drain systems as required by the referenced plumbing code.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials in the manufacturer's original sealed and labeled packaging.
- B. Storage: Store materials to prevent damage and not encumber Owner's operations.
- C. Handling: Handle materials in such a manner as to prevent damage and contamination.

1.5 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Install roof drains and associated plumbing during periods of no precipitation to prevent water from entering the building.
 - 2. Prevent damage to the building and contents during roof drain and associated plumbing installations.
 - 3. Comply with applicable rules and regulations of Authorities Having Jurisdiction pertaining to storm sewage systems.
 - 4. Flood test roof drain systems to verify functional operation prior to roof replacement operations and report deficiencies to Engineer and Owner.
- B. Protection:
 - 1. Ensure roof drainage systems remain in service and restore to operational before leaving the site.
 - 2. Protect building interior and exterior surfaces during construction.

PART 2 PRODUCTS

2.1 ROOF DRAINS

- A. Existing Roof Drains: Replace clamping ring and strainer dome to match existing drain manufacturer and model with cast iron adjustable extension, clamping ring, and strainer dome. Replace bolts with stainless steel clamping ring bolts. Restore threads as necessary using taps to ensure positive fastening; clean metal shavings, chips and debris before fastening clamping ring. Acceptable manufacturers include:

1. Josam Company
2. Smith Manufacturing Company
3. Zurn Industries, Inc.
4. Engineer's accepted equivalent.

PART 3 EXECUTION

3.1 INSPECTION

- A. Conduct a pre-job conference including the Engineer, Contractor, and the Owner's representative prior to the installation of roof drains and associated piping and plumbing fixtures.
- B. Verify that conditions are acceptable to begin the installation.
- C. Inspect daily the plumbing installation to ensure conditions remain satisfactory.

3.2 PREPARATION

- A. Inspect building components and conditions before proceeding with plumbing installation.
- B. Inspect the piping route and hanger attachment points to ensure conditions are satisfactory to install piping and associated plumbing fixtures for the completed drainage system.
- C. Route piping to maintain working spaces around electrical equipment by NEC.
- D. Do not route piping and fixtures to interfere with the service of in-place equipment and systems.
- E. Do not close off or obstruct streets, walks or other adjacent occupied facilities without permission from Owner, Engineer, and Authorities Having Jurisdiction.

3.3 ROOF DRAIN INSTALLATION

- A. Install roof drains and associated components in accordance with the drain manufacturer's published instructions.
- B. Install roof drains, piping and associated plumbing to meet applicable requirements of the local plumbing, building and fire code.

3.4 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred.
 1. Submit separate reports for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball of cylinder of size not less than 92.5 percent of piping diameter.
 - c. Crushed, broken, cracked or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping on watertight joints.
 3. Replace defective piping and repeat inspections.
 4. Reinspect and repeat procedure until results are satisfactory.

3.5 CLEANING

- A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

END OF SECTION 22 05 00

SECTION 22 30 00 - PLUMBING EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Tankless electric water heaters.
- B Commercial electric water heaters.
- C Diaphragm-type compression tanks.
- D Point-of-use water filters.
- E In-line circulator pumps.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.3 SUBMITTALS

- A See Division 01 for submittals procedures.
- B Product Data:
 - 1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
 - 2. Provide electrical characteristics and connection requirements.
- C Shop Drawings:
 - 1. Indicate heat exchanger dimensions, size of tapings, and performance data.
 - 2. Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tapings, and drains.
- D Project Record Documents: Record actual locations of components.
- E Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
- F Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- G Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Division 01 for additional provisions.

1.4 QUALITY ASSURANCE

- A Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of experience.
- B Certifications:
 - 1. Water Heaters: NSF approved.
 - 2. Electric Water Heaters: UL listed and labeled to UL 174.
 - 3. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.6 WARRANTY

- A See Division 01 for additional warranty requirements.
- B Warranty: Provide 5-year (from the date of substantial completion - parts and labor year 1) warranty for domestic water heaters.

PART 2 PRODUCTS

2.1 WATER HEATERS

- A Manufacturers:
 - 1. A.O. Smith Water Products Co
 - 2. Bock Water Heaters, Inc

3. Bradford White Corporation
4. Substitutions: Refer to Division 01
- B Tankless Electric Water Heater:
 1. Minimum Efficiency Required: ASHRAE Std 90.1 I-P.
 2. Heater Type: Self-contained, wall-mounted unit capable of handling listed capacity, water-inlet strainer, removable thermally-insulated front panel, and threaded water pipe-end connections.
 3. Heater-Heat Exchanger: Stainless steel, thermally insulated and encased assembly in corrosion-resistant steel jacket; baked-on enamel finish.
 4. Safeties: Provide internal safeties for water flow, electrical load, and thermal load.
 5. Controls: Color touchscreen interface for internal controls; temperature range adjustable from 120 to 170 degrees F using flanged or screw-in nichrome elements. Wire double-element units so elements do not operate simultaneously.
 6. Accessories: Provide inlet ball valve and outlet ball valve.
- C Commercial Electric Water Heaters:
 1. Type: Factory-assembled and wired, electric, vertical storage.
 2. Minimum Efficiency Required: ASHRAE Std 90.1 I-P.
 3. Tank: Glass lined welded steel; 4 inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber encased in corrosion-resistant steel jacket; baked-on enamel finish.
 4. Controls: Automatic immersion water thermostat; externally adjustable temperature range from 60 to 180 degrees F, flanged or screw-in nichrome elements, high temperature limit thermostat.
 5. Accessories:
 - a. Water Connections: Brass.
 - b. Dip Tube: Brass.
 - c. Drain valve.
 - d. Anode: Magnesium.
 - e. Temperature and Pressure Relief Valve: ASME labeled.
 6. Heating Elements: Flange-mounted immersion elements; individual elements sheathed with Incoloy corrosion-resistant metal alloy, rated less than 75 W/sq in.

2.2 DIAPHRAGM-TYPE COMPRESSION TANKS

- A Manufacturers:
 1. Amtrol Inc
 2. Bell & Gossett, a brand of Xylem, Inc
 3. Taco, Inc
- B Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.
- C Accessories: Pressure gauge and air-charging fitting, tank drain; precharge to 12 psig.

2.3 POINT-OF-USE WATER FILTERS

- A Point-of-Use Application: Provide for faucets, ice makers, and sinks.
- B Type: Disposable, side positioned, line or tap installed cartridge, canister, or showerhead filter.
- C Construction: Polymer based material housing with built-in female threaded connections, and internal specific or composite filtering media such as activated carbon, sand, gravel, calcite, limestone, or other mineral media suitable to reduce intended contaminants.
- D Internal Filter Media: Chemical-free, pH-resilient materials proven to reduce bacteria, chlorine, odors, sediment, and trace metals down to the 0.2 micron particle size.
- E Maximum Service Requirements: 100 psi and 130 degrees F.

2.4 IN-LINE CIRCULATOR PUMPS

- A Manufacturers:
 1. Armstrong Fluid Technology

- 2. Bell & Gossett, a brand of Xylem, Inc
- B Casing: Bronze, rated for 125 psig working pressure, with stainless steel rotor assembly.
- C Impeller: Bronze.
- D Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.
- E Seal: Carbon rotating against a stationary ceramic seat.
- F Drive: Flexible coupling.

PART 3 EXECUTION

3.1 INSTALLATION

- A Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions required for applicable certifications.
- B Electrical Work: Provide automatic control and protective devices with associated wiring to interconnect related interfaced devices required for specified operation.
- C Coordinate system, equipment, and piping work with applicable electrical, vent, drain, and waste support interconnections as included or provided by other trades.
- D Domestic Water Storage Tanks:
- E Pumps:
 - 1. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
- F Coordinate BAS, BMS, or Integrated Automation linking between unit controller(s) and remote front-end interface.

3.2 FIELD QUALITY CONTROL

- A See Division 01 for additional requirements.

END OF SECTION 22 30 00

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SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Flush valve water closets.
- B Wall hung urinals.
- C Lavatories.
- D Under-lavatory pipe supply covers.
- E Bi-level, electric water coolers.

1.2 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C Manufacturer's Instructions: Indicate installation methods and procedures.
- D Sustainable Design Documentation: Submit appropriate evidence that materials used in potable water systems comply with the specified requirements.
- E Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- F Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Division 01 for additional provisions.

1.3 QUALITY ASSURANCE

- A Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of experience.

1.4 DELIVERY, STORAGE, AND HANDLING

- A Accept fixtures on-site in factory packaging. Inspect for damage.
- B Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.5 WARRANTY

- A See Division 01 for additional warranty requirements.
- B Provide five year (from the date of substantial completion - parts and labor year 1) warranty for electric water cooler.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.
- B Water Efficiency: EPA WaterSense label is required for all water closets, urinals, lavatory faucets, and showerheads.
- C Maximum Fixture or Faucet Supply Pressure: 60 psi unless stated otherwise.

2.2 REGULATORY REQUIREMENTS

- A Comply with applicable codes for installation of plumbing systems.
- B Comply with UL (DIR) requirements.
- C Perform work in accordance with local health department regulations.
- D Provide certificate of compliance from Authority Having Jurisdiction indicating approval of installation.

2.3 FLUSH VALVE WATER CLOSETS

- A Water Closets:

1. Vitreous china, ASME A112.19.2, Floor or wall mounted, siphon jet flush action, china bolt caps.
 2. Flush Valve: Exposed (top spud).
 3. Flush Operation: Sensor operated.
 4. Handle Height: 44 inches or less.
 5. Manufacturers:
 - a. Kohler Company
 - b. Zurn Industries, LLC
 - c. Substitutions: Refer to Division 01
- B Flush Valves:
1. Manufacturers:
 - a. Sloan Valve Company
 - b. Zurn Industries, LLC
 - c. Substitutions: Refer to Division 01
 2. Sensor-Operated:
 - a. Type: ASME A112.19.5; chloramine-resistant clog-resistant dual-seat diaphragm valve complete with vacuum breaker, stops and accessories.
 - b. Mechanism: Solenoid-operated piston or electronic motor-actuated operator with low-voltage powered (unless indicated otherwise) infrared sensor, and mechanical override or override push button.
 - c. Supplied Volume Capacity: 1.1 gal per flush.
 3. Exposed Type: Chrome-plated, escutcheon, integral screwdriver stop.
- C Toilet Seats:
1. Plastic: Solid, white finish, elongated shape, open front, slow-closing hinged seat cover, extended back complete with self-sustaining hinges, and brass bolts with covers.
- D Water Closet Carriers:
1. Manufacturers:
 - a. Jay R. Smith Manufacturing Company
 - b. JOSAM Company
 - c. Zurn Industries, LLC
 - d. Substitutions: Refer to Division 01
 2. ASME A112.6.1M; adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.

2.4 WALL HUNG URINALS

- A Manufacturers:
1. American Standard, Inc
 2. Kohler Company
 3. Mansfield Plumbing Products LLC
 4. Zurn Industries, LLC
 5. Substitutions: Refer to Division 01
- B Vitreous china, ASME A112.19.2, wall hung with side shields and concealed carrier.
1. Consumption Volume: 0.125 gal per flush, maximum.
 2. Flush Style: Washout.
 3. Flush Valve: Exposed (top spud).
 4. Flush Operation: Sensor operated.
 5. Trapway Outlet: Integral.
 6. Removable stainless steel strainer.
- C Flush Valves:
1. Manufacturers:
 - a. Sloan Valve Company
 - b. Zurn Industries, LLC
 - c. Substitutions: See Division 01
 2. Sensor-Operated:

- a. Type: ASME A112.19.5; chloramine-resistant, clog-resistant dual-seat diaphragm valve with vacuum breaker, stops and accessories.
 - b. Mechanism: Solenoid-operated piston or electronic motor-actuated operator with low-voltage powered infrared sensor, and mechanical override or override push button.
 - c. Supplied Volume Capacity: 0.125 gal (0.47 L) per flush.
- D Urinal Carriers:
- 1. Manufacturers:
 - a. Jay R. Smith Manufacturing Company
 - b. JOSAM Company
 - c. Zurn Industries, LLC
 - d. Substitutions: Refer to Division 01
 - 2. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs.

2.5 LAVATORIES

A Wall-Hung Basin:

- 1. Vitreous China, Grade A: ASME A112.19.2; white, rectangular (unless indicated otherwise) commercial-grade sink with predrilled holes, rear-center drain, front overflow, and hanger. Size as indicated on drawings with 4-inch centerset spacing.
- 2. Products:
 - a. Mansfield Plumbing Products LLC; _____:
 - b. PROFLO
 - c. Substitutions: See Division 01
- 3. Carrier:
 - a. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, concealed arm supports, bearing plate and studs.
 - b. Manufacturers:
 - 1) Jay R. Smith MFG. Co
 - 2) JOSAM Company
 - 3) Zurn Industries, LLC
 - 4) Substitutions: See Division 01

B Drop-In Basin:

- 1. Vitreous China: ASME A112.19.2; self-rimming, white, rectangular shape (unless indicated otherwise), front overflow, seal of putty, caulking, or concealed vinyl gasket, and white finish. Size as indicated on drawings with 4-inch centerset spacing.
- 2. Products:
 - a. Pelican Int'l
 - b. Mansfield Plumbing Products LLC
 - c. PROFLO; Rockaway - 19 x 16, Oval: www.ferguson.com/#sle.
 - d. Substitutions: See Division 01

C Under-Mount Basin:

- 1. Vitreous China: ASME A112.19.2; white interior, oval shape (unless indicated otherwise), front overflow, seal of putty, caulking, or concealed vinyl gasket, and white exterior finish. Size as indicated on drawings.
- 2. Products:
 - a. Mansfield Plumbing Products LLC
 - b. Pelican Int'l
 - c. PROFLO; Comstock Series - 15 x 12, Oval: www.ferguson.com/#sle.

D Supply Faucet:

- 1. Deck Mounted Faucet Manufacturers:
 - a. Kohler Company
 - b. Zurn Industries, LLC
 - c. Substitutions: See Division 01.
- 2. ASME A112.18.1; chrome plated combination supply fitting with open grid strainer, water economy aerator with maximum flow of 0.5 gpm, single lever handle.

3. Single-Lever Handle, Supply Faucet: ASME A112.18.1; deck-mount, ceramic cartridge disc valve, open grid strainer, and maximum flow of 1.2 gpm.
- E Metered Faucet:
 1. ASME A112.18.1; chrome plated metered mixing faucet with low voltage operated solenoid operator and infrared sensor, aerator and cover plate, open grid strainer.
- F Sensor Operated Faucet:
 1. Cast brass, chrome plated, deck mounted with sensor located on neck of spout.
 2. Spout Style: Standard.
 3. Power Supply:
 - a. Wired: As indicated on drawings.
 - b. Wireless:
 - 1) Battery: Replaceable alkaline or lithium type with 200,000 cycles, minimum.
 - 2) Mini-Turbine: Sensor-operated hydro-powered micro-turbine that charges battery and powers mechanism using water flow energy.
 - 3) Low Battery Warning: Provide red or yellow colored indicator to light periodically at 30 days of remaining capacity and continuously 2 weeks prior to get fully discharged.
 4. Mixing Valve: Internal, automatic.
 5. Water Supply: 3/8 inch compression connections.
 6. Aerator: Vandal resistant, 0.5 gpm, laminar flow device.
 7. Automatic Shut-off: 10 seconds.
 8. Finish: Polished chrome.
 9. Manufacturers:
 - a. Chicago Faucet Company
 - b. Sloan Valve Company
 - c. Toto USA; _____:
 - d. Watts
 - e. Zurn Industries, LLC
 - f. Substitutions: See Division 01. . .
- G Accessories:
 1. Offset waste with perforated open strainer.
 2. Screwdriver stops.
 3. Flexible supplies.

2.6 UNDER-LAVATORY PIPE SUPPLY COVERS

- A Manufacturers:
 1. Plumberex Specialty Products, Inc
 2. McGuire Prowrap
 3. Substitutions: Refer to Division 01.
- B General:
 1. Insulate exposed drainage piping including hot, cold and tempered water supplies under lavatories or sinks per ADA Standards.
 2. Exterior Surfaces: Smooth nonabsorbent with no finger recessed indentations for easy cleaning.
 3. Construction: 1/8 inch PVC with antimicrobial, antifungal and UV resistant properties.
 - a. Provide one piece injected molded design with internal bridge at top of J-bend to prevent separating.
 - b. Comply with ASTM E84 for flame and smoke development.
 - c. Comply with ASTM C1822 Type III for covers on accessible lavatory piping.
 - d. Comply with ASME A112.18.9 for covers on accessible lavatory piping.
 - e. Comply with ICC A117.1.
 - f. Microbial and Fungal Resistance for Interior and Exterior: Comply with ASTM G21.
 4. Color: High gloss white.
 5. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces. No cable ties allowed.

2.7 BI-LEVEL, ELECTRIC WATER COOLERS

- A Manufacturers:
 - 1. Elkay Manufacturing Company
 - 2. Haws Corporation
 - 3. Oasis International
 - 4. Substitutions: See Division 01.
- B Water Cooler: Bi-level, electric, mechanically refrigerated; surface mounted, ADA compliant; stainless steel top, stainless steel body, elevated anti-squirt bubbler with stream guard, automatic stream regulator, push button, mounting bracket; integral air cooled condenser and stainless steel grille.
 - 1. Capacity: 8 gph of 50 degrees F water with inlet at 80 degrees F and room temperature of 90 degrees F, when tested in accordance with ASHRAE Std 18.
 - 2. Electrical: 115 VAC, 60 Hertz compressor, 6 foot cord and plug for connection to electric wiring system including grounding connector.
- C Bottle Filler: Materials to match fountain.

2.8 HOSE BIB BOXES

- A Material: 316 stainless steel.
- B Finish: Satin.
- C Mount in wall fully recessed.
- D Provide with one-valve supply.
- E Provide with NPT PVC ball valves and fittings.
- F Provide with internal hose drain bracket and waste outlet.
- G Provide with concealed hinge door and cam cylinder lock keyed alike.

PART 3 EXECUTION**3.1 EXAMINATION**

- A Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B Verify that electric power is available and of the correct characteristics.
- C Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.2 PREPARATION

- A Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

- A Install each fixture with trap, easily removable for servicing and cleaning.
- B Provide chrome-plated rigid or flexible supplies to fixtures with screwdriver stops, reducers, and escutcheons.
- C Install components level and plumb.
- D Install and secure fixtures in place with wall supports and bolts.
- E Solidly attach water closets to floor with lag screws. Lead flashing is not intended to hold fixture in place.

3.4 INTERFACE WITH WORK OF OTHER SECTIONS

- A Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.5 ADJUSTING

- A Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.6 CLEANING

- A Clean plumbing fixtures and equipment.

B See Division 01 for additional requirements.

3.7 PROTECTION

- A Protect installed products from damage due to subsequent construction operations.
- B Do not permit use of fixtures by construction personnel.
- C Repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 22 40 00

SECTION 23 05 13 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A General construction and requirements.
- B Applications.
- C Single phase electric motors.
- D Three phase electric motors.

1.2 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.
- C Test Reports: Indicate test results verifying nominal efficiency and power factor for three phase motors larger than 1/2 horsepower.
- D Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.
- E Operation Data: Include instructions for safe operating procedures.
- F Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.3 QUALITY ASSURANCE

- A Manufacturer Qualifications: Company specializing in manufacture of electric motors, and their accessories, with minimum three years documented product development, testing, and manufacturing experience.
- B Comply with NFPA 70.
- C Provide certificate of compliance from Authority Having Jurisdiction indicating approval of high efficiency motors.
- D Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

- A Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering.

1.5 WARRANTY

- A See Division 01 for additional warranty requirements.
- B Provide five year manufacturer warranty for motors larger than 20 horsepower.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A Baldor Electric Company/ABB Group: www.baldor.com/#sle.
- B Leeson Electric Corporation: www.leeson.com/#sle.
- C Regal-Beloit Corporation (Century): www.centuryelectricmotor.com/#sle.
- D Substitutions: See Division 01.

2.2 GENERAL CONSTRUCTION AND REQUIREMENTS

- A Electrical Service: See plans. Refer to Electrical documents for additional information.
- B Nominal Efficiency:
NEMA Premium Efficiency
- C Construction:
 - 1. Open drip-proof type except where specifically noted otherwise.
 - 2. Design for continuous operation in 104 degrees F environment.

- 3. Design for temperature rise in accordance with NEMA MG 00001 limits for insulation class, service factor, and motor enclosure type.
- D Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- E Wiring Terminations:
 - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
 - 2. For fractional horsepower motors where connection is made directly, provide conduit connection in end frame.

2.3 APPLICATIONS

- A Exception: Motors less than 250 watts, for intermittent service may be the equipment manufacturer's standard and need not comply with these specifications.
- B Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.
- C Motors located in exterior locations and air cooled condensers: Totally enclosed type.
- D Motors located in outdoors: Totally enclosed weatherproof epoxy-treated type.

2.4 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

- A Starting Torque: Exceeding one fourth of full load torque.
- B Starting Current: Up to six times full load current.
- C Multiple Speed: Through tapped windings.
- D Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

2.5 THREE PHASE POWER - SQUIRREL CAGE MOTORS

- A Starting Torque: Between 1 and 1-1/2 times full load torque.
- B Starting Current: Six times full load current.
- C Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.
- D Design, Construction, Testing, and Performance: Comply with NEMA MG 00001 for Design B motors.
- E Insulation System: NEMA Class B or better.
- F Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.
- G Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
- H Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter; refer to Division 26.
- I Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA STD 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
- J Sound Power Levels: To NEMA MG 00001.
- K Part Winding Start Above 254T Frame Size: Use part of winding to reduce locked rotor starting current to approximately 60 percent of full winding locked rotor current while providing approximately 50 percent of full winding locked rotor torque.
- L Weatherproof Epoxy Sealed Motors: Epoxy coat windings with rotor and starter surfaces protected with epoxy enamel; bearings double shielded with waterproof non-washing grease.
- M Nominal Efficiency: As indicated at full load and rated voltage when tested in accordance with IEEE 112.
- N Nominal Power Factor: As indicated at full load and rated voltage when tested in accordance with IEEE 112.

PART 3 EXECUTION

3.1 INSTALLATION

- A Install in accordance with manufacturer's instructions.
- B Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- C Check line voltage and phase and ensure agreement with nameplate.

END OF SECTION 23 05 13

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SECTION 23 05 16 - EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

1.2 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Product Data:
 - 1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
- C Design Data: Indicate selection calculations.
- D Manufacturer's Instructions: Indicate manufacturer's installation instructions, special procedures, and external controls.
- E Maintenance Data: Include adjustment instructions.
- F Project Record Documents: Record installed locations of flexible pipe connectors, expansion joints, anchors, and guides.
- G Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Refer to Division 01 for additional provisions.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A Comply with UL (DIR) requirements.

2.2 FLEXIBLE PIPE CONNECTORS - STEEL PIPING

- A Manufacturers:
 - 1. Flex-Weld, Inc
 - 2. Mercer Rubber Company
 - 3. The Metraflex Company
 - 4. Unisource Manufacturing, Inc
 - 5. Substitutions: See Division 01.
- B Inner Hose: Bronze.
- C Exterior Sleeve: Double braided, stainless steel.
- D Pressure Rating: 200 psi up to 6 inch.
- E Maximum Service Temperature: 250 degrees F.
- F End Connections: As specified for pipe joints.
- G Size: Use pipe sized units.
- H Maximum offset: 1 inch on each side of installed center line.

2.3 FLEXIBLE PIPE CONNECTORS - COPPER PIPING

- A Manufacturers:
 - 1. Mercer Rubber Company
 - 2. The Metraflex Company
 - 3. Unisource Manufacturing, Inc
 - 4. Substitutions: Division 01.
- B Inner Hose: Bronze.
- C Exterior Sleeve: Braided bronze.
- D Pressure Rating: 125 psi up to 2 inch.
- E Maximum Service Temperature: 250 degrees F.
- F End Connections: As specified for pipe joints.
- G Size: Use pipe sized units.
- H Maximum offset: 1 inch on each side of installed center line.
- I Application: Copper piping.

2.4 EXPANSION JOINTS AND LOOPS - HOSE AND BRAID

- A Manufacturers:
 - 1. Flex-Hose Co. Inc
 - 2. Flex-Weld, Inc
 - 3. The Metraflex Company
 - 4. Unisource Manufacturing, Inc
 - 5. Substitutions: See Division 01.
- B Provide flexible loops with two flexible sections of hose and braid, two 90 degree elbows, and 180 degree return with support brackets, air release valve, and plugged drain port.
- C Maximum Allowable Motion: 3 inch in the x, y, and z planes with no thrust loads to the building structure
- D Maximum Working Pressure: 150 psi at 120 degrees F.
- E Construction: Class 150, schedule 40, stainless steel hose and braid assembly with carbon steel fittings, including elbows and flanged end connections sized to match pipe segment
 - 1. Selected Product to Accommodate:
 - a. Compression and Expansion Axial Deflection.
 - b. Angular Rotation: 15 degrees.
 - c. Force developed by 1.5 times specified maximum allowable operating pressure.
 - 2. Provide necessary accessories including, but not limited to, swivel joints, limit stops, and internal guides.

2.5 ACCESSORIES

- A Pipe Alignment Guides:
 - 1. Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inches travel.
- B Engineered Riser Anchor Clamps:
 - 1. Applications:
 - a. Provide one clamp to serve as a riser clip.
 - 1) Verify the total load of filled pipe to be supported will be a safety factor of one less than the maximum loading of the clamp per the manufacturer's instructions.
 - b. Provide one clamp above and one clamp below the slab to anchor pipe.
 - 1) Coordinate with the structural engineer to determine the maximum thrust loading calculated for the slab or floor structure. Use the maximum thrust loading calculations to verify the clamps will be a safety factor of one less than the maximum loading of clamp per the manufacturer's instructions.
 - 2. Provide two piece, ductile iron in compliance with ASTM A536. Use with metal pipes with an outer diameter of 2.5 inches to 8 inches.
- C Swivel Joints:
 - 1. Fabricated steel body, double ball bearing race, field lubricated, with rubber (Buna-N) o-ring seals.

PART 3 EXECUTION

3.1 INSTALLATION

- A Install in accordance with manufacturer's instructions.
- B Install in accordance with EJMA (Expansion Joint Manufacturers Association) Standards.
- C Install flexible pipe connectors on pipes connected to vibration isolated equipment. Provide line size flexible connectors.
- D Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.
- E Anchor pipe to building structure where required. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.

- F Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.

END OF SECTION 23 05 16

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SECTION 23 05 23 - GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Angle valves.
- B Globe valves.
- C Ball valves.
- D Butterfly valves.
- E Check valves.
- F Gate valves.

1.2 ABBREVIATIONS AND ACRONYMS

- A CWP: Cold working pressure.
- B EPDM: Ethylene propylene copolymer rubber.
- C NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D NRS: Nonrising stem.
- E OS&Y: Outside screw and yoke.
- F PTFE: Polytetrafluoroethylene.
- G RS: Rising stem.
- H TFE: Tetrafluoroethylene.
- I WOG: Water, oil, and gas.
- J WSP: Working steam pressure.

1.3 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- C Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- D Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

1.4 QUALITY ASSURANCE

- A Manufacturer:
 - 1. Obtain valves for each valve type from single manufacturer.
 - 2. Company must specialize in manufacturing products specified in this section, with not less than three years of experience.
- B Welding Materials and Procedures: Comply with ASME BPVC-IX.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Prepare valves for shipping as follows:
 - 1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
 - 2. Protect valve parts exposed to piped medium against rust and corrosion.
 - 3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
 - 4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.
 - 5. Secure check valves in either the closed position or open position.
 - 6. Adjust butterfly valves to closed or partially closed position.
- B Use the following precautions during storage:
 - 1. Maintain valve end protection and protect flanges and specialties from dirt.
 - 2. Store valves in shipping containers and maintain in place until installation.
 - a. Store valves indoors in dry environment.
- C Exercise the following precautions for handling:
 - 1. Handle large valves with sling, modified to avoid damage to exposed parts.
 - 2. Avoid the use of operating handles or stems as rigging or lifting points.

PART 2 PRODUCTS

2.1 APPLICATIONS

- A Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).
- B Provide the following valves for the applications if not indicated on drawings:
 - 1. Throttling (Hydronic): Butterfly and Ball.
 - 2. Isolation (Shutoff): Butterfly and Ball.
 - 3. Swing Check (Pump Outlet):
 - a. Size 2 inch and Smaller: Bronze with bronze disc.
 - b. Size 2-1/2 inch and Larger: Iron with center-guided with resilient seat.
 - 4. Dead-End: Butterfly, single-flange (lug) type.
- C Substitutions of valves with higher CWP classes or WSP ratings for same valve types are permitted when specified CWP ratings or WSP classes are not available.
- D Heating Hot Water Valves:
 - 1. Size 2 inch and Smaller, Brass and Bronze Valves:
 - a. Threaded ends.
 - b. Angle: Bronze disc, Class 125.
 - c. Ball: Full port, two piece, stainless steel trim.
 - d. Swing Check: Bronze disc, Class 125.
 - e. Gate: OS&Y, Class 125.
 - f. Globe: Bronze disc, Class 125.
 - 2. Size 2-1/2 inch and Larger, Iron Valves:
 - a. 2-1/2 inch to 4 inch: Flanged ends.
 - b. Single-Flange Butterfly: 14 inch to 24 inch, aluminum-bronze disc, EPDM seat, 150 CWP.
 - c. Butterfly: High performance, single flange, Class 150.
 - d. Swing Check: Metal seats, Class 125.
 - e. Gate: OS&Y, Class 125.
 - f. Globe: 2-1/2 inch to 12 inch, Class 125.

2.2 GENERAL REQUIREMENTS

- A Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
- B Valve Sizes: Match upstream piping unless otherwise indicated.
- C Valve Actuator Types:
 - 1. Gear Actuator: Quarter-turn valves 8 inch and larger.
 - 2. Handwheel: Valves other than quarter-turn types.
 - 3. Hand Lever: Quarter-turn valves 4 inch and smaller.
- D Valves in Insulated Piping: Provide 2 inch stem extensions and the following features:
 - 1. Gate Valves: Rising stem.
 - 2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
 - 3. Butterfly Valves: Extended neck.
 - 4. Memory Stops: Fully adjustable after insulation is installed.
- E Valve-End Connections:
 - 1. Threaded End Valves: ASME B1.20.1.
 - 2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
 - 3. Pipe Flanges and Flanged Fittings 1/2 inch through 24 inch: ASME B16.5.
- F General ASME Compliance:
 - 1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
 - 2. Building Services Piping Valves: ASME B31.9.
- G Bronze Valves:
 - 1. Fabricate from dezincification resistant material.
 - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- H Valve Bypass and Drain Connections: MSS SP-45.

I Source Limitations: Obtain each valve type from a single manufacturer.

2.3 BRONZE, ANGLE VALVES

A CWP Rating: Class 125: 200 psi and Class 150: 300 psi:

1. Comply with MSS SP-80, Type 1.
2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
3. Ends: Threaded.
4. Stem: Bronze.
5. Disc: Bronze, PTFE, or TFE.
6. Packing: Asbestos free.
7. Handwheel: Bronze or aluminum.

2.4 BRONZE, GLOBE VALVES

A CWP Rating: Class 125: 200 psi:

1. Comply with MSS SP-80, Type 1.
2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
3. Ends: Threaded or solder joint.
4. Stem and Disc: Bronze or PTFE.
5. Packing: Asbestos free.
6. Handwheel: Bronze.

2.5 IRON, GLOBE VALVES

A CWP Ratings: Class 125: 200 psi and Class 250: 500 psi:

1. Comply with MSS SP-85, Type I.
2. Body: Gray iron; ASTM A126, with bolted bonnet.
3. Ends: Flanged.
4. Trim: Bronze.
5. Packing and Gasket: Asbestos free.
6. Operator: Handwheel or chainwheel.

2.6 BRASS, BALL VALVES

A One Piece, Full Port with Brass Trim and Threaded Connections:

1. Comply with MSS SP-110.
2. CWP Rating: 200 psi.
3. Body: Forged brass.
4. Ends: Threaded.
5. Seats: PTFE or TFE.
6. Stem: Brass.
7. Ball: Chrome-plated brass.

B Two Piece, Full Port with Brass Trim and Female Thread, Male thread, or Solder Connections:

1. Comply with MSS SP-110.
2. SWP Rating: 150 psi.
3. WOG Rating: 600 psi.
4. Vacuum Rating: 28.9 in-Hg.
5. Body: Forged brass.
6. Seats: PTFE.
7. Stem: Brass.
8. Ball: Chrome-plated brass.

2.7 BRONZE, BALL VALVES

A General:

1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B Two Piece, Full Port with Bronze or Brass Trim:

1. Comply with MSS SP-110.

2. WSP Rating: 150 psi.
3. WOG Rating: 400 psi.
4. Body: Forged bronze or dezincified-brass alloy.
5. End Connections: Pipe thread or solder.
6. Seats: PTFE.
7. Stem: Bronze or brass.
8. Ball: Chrome plated brass.

2.8 CARBON STEEL, BALL VALVES

- A Class 150, Full Port, Stainless Steel Trim, Flanged:
1. Comply with MSS SP-72.
 2. WOG Rating: 300 psi.
 3. WSP Rating: 150 psi.
 4. Body: Carbon steel, ASTM A216/A216M, Type WCB.
 5. Seats: PTFE.
 6. Stem: Stainless steel.
 7. Ball: Stainless steel, vented.
 8. Size: 1/2 to 12 inches.

2.9 IRON, SINGLE FLANGE BUTTERFLY VALVES

- A Wafer and Lug Style:
1. Comply with MSS SP-67, Type I.
 2. Wafer Style, CWP Ratings:
 - a. Sizes 2 to 12 inch: 200 psi.
 - b. Sizes 14 to 24 inch: 150 psi.
 3. Body Material: ASTM A126 cast iron or ASTM A536 ductile iron.
 4. Stem: One or two-piece stainless steel.
 5. Seat: NBR.
 6. Disc: Aluminum-bronze.

2.10 HIGH-PERFORMANCE, SINGLE FLANGE BUTTERFLY VALVES

- A Lug type; Bidirectional dead end service without downstream flange:
1. Comply with MSS SP-68.
 2. Class 150: CWP Rating: 285 psi at 100 degrees F.
 3. Body: Provide carbon steel, cast iron, ductile Iron, or stainless steel.
 4. Seat: Metal or reinforced PTFE.
 5. Offset stem: Stainless steel.
 6. Disc: Carbon steel.
 7. Operator: Gear operator with handwheel over direct-mount actuator base.

2.11 BRASS, INLINE CHECK VALVES

- A Class 150: CWP Rating: 200 psi .
- B Maximum Service Temperature: 250 degrees F.
- C Body: Forged brass.
- D Disc: Forged brass.
- E Seal: PTFE, bubble tight.
- F End-Connections: Threaded.

2.12 BRONZE, SWING CHECK VALVES

- A Class 125:
1. Pressure and Temperature Rating: MSS SP-80, Type 3.
 2. Design: Y-pattern, horizontal or vertical flow.
 3. WSP Rating: 200 psi.
 4. Body: Bronze, ASTM B62.
 5. End Connections: Threaded or soldered.

- 6. Disc: Bronze.
- B Class 150:
 - 1. Pressure and Temperature Rating: MSS SP-80, Type 3.
 - 2. Design: Y-pattern, horizontal or vertical flow.
 - 3. CWP Rating: 300 psi.
 - 4. Body: Bronze, ASTM B62.
 - 5. End Connections: Threaded or soldered.
 - 6. Disc: Bronze.

2.13 CARBON STEEL, SWING CHECK VALVES

- A Class 150:
 - 1. Design: T-pattern, horizontal or vertical flow.
 - 2. Body and Disc: ASTM A216/A216M.
 - 3. CWP Rating: 150 psi.
 - 4. End Connections: Flanged.
 - 5. Pressure and Temperature Rating: ASME B16.34.

2.14 IRON, CENTER-GUIDED CHECK VALVES

- A Class 125, Compact-Wafer:
 - 1. Comply with MSS SP-125.
 - 2. Sizes 2-1/2 to 12 inch: CWP Rating; 200 psi.
 - 3. Sizes 14 to 24 inch: CWP Rating; 150 psi.
 - 4. Body Material: ASTM A126, gray iron.
 - 5. Resilient Seat: EPDM or NBR.
- B Class 125, Globe:
 - 1. Comply with MSS SP-125.
 - 2. Sizes 2-1/2 to 12 inch: CWP Rating; 200 psi.
 - 3. Sizes 14 to 24 inch: CWP Rating; 150 psi.
 - 4. Body Material: ASTM A126, gray iron.
 - 5. Style: Spring loaded.
 - 6. Ends: Flanged.
 - 7. Resilient Seat: EPDM or NBR.

2.15 BRONZE, GATE VALVES

- A Nonrising Stem (NRS) or Rising Stem (RS):
 - 1. Comply with MSS SP-80, Type I.
 - 2. Class 125: CWP Rating; 200 psi.
 - 3. Class 150: CWP Rating; 300 psi.
 - 4. Body Material: Bronze with integral seat and union-ring bonnet.
 - 5. Ends: Threaded.
 - 6. Stem: Bronze.
 - 7. Disc: Solid wedge; bronze.
 - 8. Packing: Asbestos free.
 - 9. Handwheel: Malleable iron, bronze, or aluminum.

2.16 IRON, GATE VALVES

- A NRS or OS&Y:
 - 1. Comply with MSS SP-70, Type I.
 - 2. Class 125:
 - a. Sizes 2-1/2 to 12 inch, CWP Rating; 200 psi.
 - b. Sizes 14 to 24 inch, CWP Rating; 500 psi.
 - 3. Class 250:
 - a. Sizes 2-1/2 to 12 inch, CWP Rating; 500 psi.
 - b. Sizes 14 to 24 inch, CWP Rating; 300 psi.
 - 4. Body Material: Gray iron with bolted bonnet.

5. Ends: Flanged.
6. Trim: Bronze.
7. Disc: Solid wedge.
8. Packing and Gasket: Asbestos free.

2.17 CARBON STEEL, GATE VALVES

A Class 150:

1. Body and Disc: ASTM A216/A216M.
2. CWP Rating: 150 psi.
3. Bolted Bonnet: OS&Y; Rising Stem.
4. End Connections: Flanged.
5. Packing and Gasket: Asbestos free.
6. Pressure and Temperature Rating: ASME B16.34.

B Class 300:

1. Body and Disc: ASTM A216/A216M.
2. CWP Rating: 300 psi.
3. Bolted Bonnet: OS&Y; Rising Stem.
4. End Connections: Flanged.
5. Packing and Gasket: Asbestos free.
6. Pressure and Temperature Rating: ASME B16.34.

PART 3 EXECUTION

3.1 EXAMINATION

- A Discard all packing materials and verify that valve interior, including threads and flanges, are completely clean without signs of damage or degradation that could result in leakage.
- B Verify valve parts to be fully operational in all positions from closed to fully open.
- C Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
- D Should valve is determined to be defective, replace with new valve.

3.2 INSTALLATION

- A Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
- B Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.
- C Where valve support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welds.
- D Install check valves where necessary to maintain direction of flow as follows:
 1. Lift Check: Install with stem plumb and vertical.
 2. Swing Check: Install horizontal maintaining hinge pin level.
 3. Orient plate-type and center-guided into horizontal or vertical position, between flanges.

END OF SECTION 23 05 23

SECTION 23 05 29 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Support and attachment components.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination:

1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
2. Coordinate the work with other trades to provide additional framing and materials required for installation.
3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

- B Sequencing:

1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Division 03.

1.3 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
- C Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

1.4 QUALITY ASSURANCE

- A Comply with applicable building code.
- B Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.
- D Installer Qualifications for Field-Welding: As specified in Division 05.
- E Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 SUPPORT AND ATTACHMENT COMPONENTS

- A General Requirements:

1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.

3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 15 %. Include consideration for vibration, equipment operation, and shock loads where applicable.
 4. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
 - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B Materials for Metal Fabricated Supports: Comply with Division 05
- C Strut Channels:
1. ASTM A653/A653M galvanized steel bracket with clamps for surface mounting of piping or plumbing equipment support.
 2. Channel or Bracket Kits: Include rods, brackets, end-fixed fittings, covers, clips, and other related hardware required to complete sectional trapeze section for piping or other support.
- D Channel Nuts:
1. Provide carbon steel channel nut with epoxy copper or zinc finish and long, regular, or short spring.
- E Hanger Rods:
1. Threaded zinc-plated steel unless otherwise indicated.
- F Thermal Insulated Pipe Supports:
1. General Requirements:
 - a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
 - b. Surface Burning Characteristics: Flame spread index/smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.
 - c. Pipe supports to be provided for nominally sized, 1/2 to 30 inch iron pipes.
 2. Pipe insulation protection shields to be provided at the hanger points and guide locations on pipes requiring insulation.
- G Pipe Supports:
1. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
 2. Liquid Temperatures Up To 180 degrees F:
 - a. Overhead Support: MSS SP-58 Types 1, 3 through 12.
 - b. Support From Below: MSS SP-58 Types 35 through 38.
 3. Operating Temperatures from 122 to 446 degrees F:
 - a. Overhead Support: MSS SP-58 Type 1 or 3 through 12, with appropriate saddle of MSS SP-58 Type 40 for insulated pipe.
 - b. Roller Support: MSS SP-58 Types 41 or 43 through 46, with appropriate saddle of MSS SP-58 Type 39 for insulated pipe.
- H Beam Clamps:
1. MSS SP-58 types 19 through 23, 25 or 27 through 30 based on required load.
 2. Beam C-Clamp: MSS SP-58 type 23, malleable iron and steel with plain, stainless steel, and zinc finish.
 3. Small or Junior Beam Clamp: MSS SP-58 type 19, malleable iron with zinc finish. For inverted usage provide manufacturer listed size(s).
 4. Wide Mouth Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish.
 5. Centerload Beam Clamp with Extension Piece: MSS SP-58 type 30, malleable iron with plain finish.
 6. FM (AG) and UL (DIR) Approved Beam Clamp: MSS SP-58 type 19, plain finish,

7. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
 8. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
- I Riser Clamps:
1. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
 2. MSS SP-58 type 1 or 8, carbon steel or steel with epoxy plated, plain, stainless steel, or zinc plated finish.
 3. Medium Split Horizontal Pipe Clamp: MSS SP-58 type 4, carbon steel or stainless steel with epoxy plated, plain, stainless steel, or zinc plated finish.
 4. Copper Tube Pipe Clamp: MSS SP-58 type 8, epoxy plated copper.
 5. UL (DIR) listed: Pipe sizes 1/2 to 8 inch.
- J U-Bolts:
1. MSS SP-58 Type 24, carbon steel u-bolt for pipe support or anchoring.
- K Offset Pipe Clamps: Double-leg design two-piece pipe clamp.
- L Strut Clamps:
1. Pipe Clamp: Two-piece rigid, universal, or outer diameter type, carbon steel with epoxy copper or zinc finish.
 2. Cushioned Pipe or Tubing Strut Clamp: Provide strut clamp with thermoplastic elastomer cushion having dielectric strength of 670 V/mil.
 3. Service Temperature Range: Minus 65 to 275 degrees F.
- M Insulation Clamps:
1. Two bolt-type clamps designed for installation under insulation.
 2. Material: Carbon steel with epoxy plated or galvanized steel finish.
- N Pipe Hangers:
1. Split Ring Hangers:
 - a. Provide hinged split ring and yoke roller hanger with epoxy copper or plain finish.
 - b. Material: ASTM A47/A47M malleable iron or ASTM A36/A36M carbon steel.
 - c. Provide hanger rod and nuts of the same type and material for a given pipe run.
 - d. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.
 2. Swivel Ring Hangers, Adjustable:
 - a. MSS SP-58 Type 10, epoxy-painted, zinc-colored.
 - b. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
 - c. FM (AG) and UL (DIR) listed for specific pipe size runs and loads.
 3. Clevis Hangers, Adjustable:
 - a. Copper Tube: MSS SP-58 Type 1, epoxy-plated copper.
 - b. Standard-Duty: MSS SP-58 Type 1, zinc-colored, epoxy plated.
 - c. UL (DIR) listed: Pipe sizes 2-1/2 to 8 inch.
- O Pipe Alignment Guides:
1. Pipe Sizes 8 inch and Smaller: Spider or sleeve type.
 2. Pipe Sizes 10 inch and Larger: Roller type.
- P Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.
- Q Pipe Shields for Insulated Piping:
1. MSS SP-58 Type 40, ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel
 2. General Construction and Requirements:
 - a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
 - b. Shields Material: UV-resistant polypropylene with glass fill.
 - c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
 - d. Minimum Service Temperature: Minus 40 degrees F.
 - e. Maximum Service Temperature: 200 degrees F.

- f. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
- R Anchors and Fasteners:
 - 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 - 2. Hollow Masonry: Use toggle bolts.
 - 3. Hollow Stud Walls: Use toggle bolts.
 - 4. Steel: Use beam-ceiling clamps, beam clamps, machine bolts, or welded threaded studs.
 - 5. Beam Ceiling Flanges: ASTM A47/A47M Grade 32510, malleable iron or stainless steel with copper, plain, stainless steel, or zinc finish.
 - 6. Sheet Metal: Use sheet metal screws.
 - 7. Plastic and lead anchors are not permitted.
 - 8. Powder-actuated fasteners are permitted only as follows:
 - a. Where approved by Architect.
 - b. Use only threaded studs; do not use pins.
 - 9. Hammer-driven anchors and fasteners are permitted only as follows:
 - a. Nails are permitted for attachment of nonmetallic boxes to wood frame construction (when specified).
 - b. Staples are permitted for attachment of nonmetallic-sheathed cable to wood frame construction (when specified).
 - 10. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify that field measurements are as indicated.
- B Verify that mounting surfaces are ready to receive support and attachment components.
- C Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A Install products in accordance with manufacturer's instructions.
- B Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- D Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.
- H Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- I Secure fasteners according to manufacturer's recommended torque settings.
- J Remove temporary supports.

3.3 FIELD QUALITY CONTROL

- A See Division 01 for additional requirements.
- B Inspect support and attachment components for damage and defects.
- C Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION 23 05 29

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SECTION 23 05 48 - VIBRATION AND SEISMIC CONTROLS FOR HVAC

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Vibration isolation requirements.
- B Vibration-isolated equipment support bases.
- C Vibration isolators.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination:
 - 1. Coordinate selection and arrangement of vibration isolation and/or seismic control components with the actual equipment to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Division 03

1.3 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Design Documents: Prepare and submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, details, and calculations.
- C Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.
 - 1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification methods for spring element load capacities.
- D Shop Drawings - Vibration Isolation Systems:
 - 1. Include dimensioned plan views and sections indicating proposed arrangement of vibration isolators; indicate equipment weights and static deflections.

1.4 QUALITY ASSURANCE

- A Comply with applicable building code.
- B Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 VIBRATION ISOLATION REQUIREMENTS

- A Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing HVAC equipment and/or HVAC connections to vibration-isolated equipment.
- B Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:
- C General Requirements:
 - 1. Select vibration isolators to provide required static deflection.

2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.
- D Equipment Isolation: As Required.
- E Piping Isolation:
 1. Provide vibration isolators for piping supports:
 - a. Located in equipment rooms.
 - b. Located within 50 feet of connected vibration-isolated equipment and pressure-regulating valve (PRV) stations.
 2. Suspended Piping, Nonseismic Applications: Use resilient material isolator hangers, spring isolator hangers, or combination resilient material/spring isolator hangers.

2.2 VIBRATION ISOLATORS

- A General Requirements:
 1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.
 2. Spring Elements for Spring Isolators:
 - a. Color code or otherwise identify springs to indicate load capacity.
 - b. Lateral Stability: Minimum lateral stiffness to vertical stiffness ratio of 0.8.
 - c. Designed to operate in the linear portion of their load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
 - d. Designed to provide additional travel to solid of not less than 50 percent of rated deflection at rated load.
 - e. Selected to provide designed deflection of not less than 75 percent of specified deflection.
 - f. Selected to function without undue stress or overloading.
- B Vibration Isolators for Nonseismic Applications:
 1. Resilient Material Isolator Pads:
 - a. Description: Single or multiple layer pads utilizing elastomeric (e.g., neoprene, rubber) or fiberglass isolator material.
 - b. Pad Thickness: As required for specified minimum static deflection; minimum 0.25 inch thickness.
 - c. Multiple Layer Pads: Provide bonded, galvanized sheet metal separation plate between each layer.
 2. Resilient Material Isolator Mounts, Nonseismic:
 - a. Description: Mounting assemblies for bolting equipment to supporting structure utilizing elastomeric (e.g., neoprene, rubber) or fiberglass isolator material; fail-safe type.

2.3 ACOUSTICAL AND VIBRATION ISOLATORS

- A General Requirements:
 1. Acoustical Isolation System: Through-stud isolators, pipe clamps, riser clamp pads, neoprene and felt lining material and associated support brackets.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify that field measurements are as shown on the drawings.
- B Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.
- C Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A Install products in accordance with manufacturer's instructions.
- B Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C Secure fasteners according to manufacturer's recommended torque settings.

- D Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.
- E Vibration Isolation Systems:
 - 1. Clean debris from beneath vibration-isolated equipment that could cause short-circuiting of isolation.
 - 2. Use elastomeric grommets for attachments where required to prevent short-circuiting of isolation.
 - 3. Adjust isolators to be free of isolation short circuits during normal operation.
 - 4. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.

3.3 FIELD QUALITY CONTROL

- A See Division 01, for additional requirements.
- B Inspect vibration isolation and/or seismic control components for damage and defects.
- C Vibration Isolation Systems:
 - 1. Verify isolator static deflections.
 - 2. Verify vibration isolation performance during normal operation; investigate sources of isolation short circuits.
- D Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

END OF SECTION 23 05 48

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SECTION 23 05 53 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Nameplates.
- B Tags.
- C Adhesive-backed duct markers.
- D Pipe markers.

1.2 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D Product Data: Provide manufacturers catalog literature for each product required.
- E Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.1 IDENTIFICATION APPLICATIONS

- A Air Terminal Units: Tags.
- B Control Panels: Nameplates.
- C Dampers: Ceiling tacks, where located above lay-in ceiling.
- D Ductwork: Nameplates.
- E Instrumentation: Tags.
- F Major Control Components: Nameplates.
- G Piping: Pipe markers.
- H Small-sized Equipment: Tags.
- I Tanks: Nameplates.
- J Thermostats: Nameplates.
- K Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.2 NAMEPLATES

- A Letter Color: White.
- B Letter Height: 1/4 inch.
- C Background Color: Black.
- D Plastic: Comply with ASTM D709.

2.3 TAGS

- A Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- B Metal Tags: Stainless Steel with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- C Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.4 ADHESIVE-BACKED DUCT MARKERS

- A Material: High gloss acrylic adhesive-backed vinyl film; printed with UV and chemical resistant inks.
- B Style: Individual Label.
- C Color as follows: Supply & Return Duct: Matching Wake County Guidelines.

2.5 PIPE MARKERS

- A Color: Comply with ASME A13.1.

- B Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- C Color code as follows: Matching Wake County Guidelines

PART 3 EXECUTION

3.1 PREPARATION

- A Degrease and clean surfaces to receive adhesive for identification materials.
- B Prepare surfaces in accordance with Division 09 for stencil painting.

3.2 INSTALLATION

- A Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B Install tags with corrosion resistant chain.
- C Apply stencil painting in accordance with Division 09.
- D Install plastic pipe markers in accordance with manufacturer's instructions.
- E Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- F Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- G Use pipe markers on piping 24 inch diameter and smaller.
 - 1. Identify service and flow direction for hydronic piping.
 - 2. Install in clear view and align with axis of piping.
 - 3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- H Install ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION 23 05 53

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Testing, adjustment, and balancing of air systems.
- B Testing, adjustment, and balancing of hydronic, steam, and refrigerating systems.
- C Field quality-control testing of Laboratory fume hoods.
- D Measurement of final operating condition of HVAC systems.
- E Sound measurement of equipment operating conditions.
- F Vibration measurement of equipment operating conditions.
- G Commissioning activities.

1.2 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- C TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
 - 1. Submit to Architect.
 - 2. Submit to the Commissioning Authority and Construction Manager.
 - 3. Submit six weeks prior to starting the testing, adjusting, and balancing work.
 - 4. Include certification that the plan developer has reviewed Contract Documents, the equipment and systems, and the control system with the Architect and other installers to sufficiently understand the design intent for each system.
 - 5. Include at least the following in the plan:
 - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - c. Identification and types of measurement instruments to be used and their most recent calibration date.
 - d. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - e. Final test report forms to be used.
 - f. Detailed step-by-step procedures for TAB work for each system and issue, including:
 - 1) Terminal flow calibration (for each terminal type).
 - 2) Diffuser proportioning.
 - 3) Branch/submain proportioning.
 - 4) Total flow calculations.
 - 5) Rechecking.
 - 6) Diversity issues.
 - g. Expected problems and solutions, etc.
 - h. Criteria for using air flow straighteners or relocating flow stations and sensors; analogous explanations for the water side.
 - i. Details of how TOTAL flow will be determined; for example:
 - 1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
 - 2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.
 - j. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and methods to verify this.
 - k. Confirmation of understanding of the outside air ventilation criteria under all conditions.

- l. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
 - m. Method of checking building static and exhaust fan and/or relief damper capacity.
 - n. Proposed selection points for sound measurements and sound measurement methods.
 - o. Methods for making coil or other system plant capacity measurements, if specified.
 - p. Time schedule for TAB work to be done in phases (by floor, etc.).
 - q. Description of TAB work for areas to be built out later, if any.
 - r. Time schedule for deferred or seasonal TAB work, if specified.
 - s. False loading of systems to complete TAB work, if specified.
 - t. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
 - u. Interstitial cavity differential pressure measurements and calculations, if specified.
 - v. Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
 - w. Procedures for formal progress reports, including scope and frequency.
 - x. Procedures for formal deficiency reports, including scope, frequency and distribution.
- D Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.
- E Progress Reports.
- F Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 1. Submit under provisions of Division 01.
 - 2. Submit to the the Commissioning Authority within two weeks after completion of testing, adjusting, and balancing.
 - 3. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 4. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
 - 5. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 6. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 7. Units of Measure: Report data in I-P (inch-pound) units only.
 - 8. Include the following on the title page of each report:
 - a. Name of Testing, Adjusting, and Balancing Agency.
 - b. Project name.
 - c. Project location.
 - d. Report date.
- G Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

- A Perform total system balance in accordance with one of the following:
 - 1. AABC (NSTSB), AABC National Standards for Total System Balance.
 - 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
 - 3. SMACNA (TAB).
 - 4. Maintain at least one copy of the standard to be used at project site at all times.
- B Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

- C Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D TAB Agency Qualifications:
 - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 - 2. Having minimum of three years experience.
 - 3. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
 - c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.
- E TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.2 EXAMINATION

- A Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Fans are rotating correctly.
 - 7. Fire, smoke, fire-smoke and volume dampers are in place and in the proper position.
 - 8. Air coil fins are cleaned and combed.
 - 9. Access doors are closed and duct end caps are in place.
 - 10. Air outlets are installed and connected.
 - 11. Duct system leakage is minimized.
 - 12. Hydronic systems are flushed, filled, and vented.
 - 13. Pumps are rotating correctly.
 - 14. Proper strainer baskets are clean and in place. Start-up strainer baskets have been removed and are zip-tied to the strainer served.
 - 15. Service and balance valves are open.
- B Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

3.3 PREPARATION

- A Hold a pre-balancing meeting at least one week prior to starting TAB work.
 - 1. Require attendance by all installers whose work will be tested, adjusted, or balanced.
- B Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.
- C Provide additional balancing devices as required.

3.4 ADJUSTMENT TOLERANCES

- A Air Handling Systems: Adjust to within plus or minus 10 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 10 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.5 RECORDING AND ADJUSTING

- A Field Logs: Maintain written logs including:
 - 1. Running log of events and issues.

2. Discrepancies, deficient or uncompleted work by others.
 3. Contract interpretation requests.
 4. Lists of completed tests.
- B Ensure recorded data represents actual measured or observed conditions.
 - C Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
 - D Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
 - E After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
 - F Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
 - G At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.
 - H Check and adjust systems approximately six months after final acceptance and submit report.

3.6 AIR SYSTEM PROCEDURE

- A Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C Measure air quantities at air inlets and outlets.
- D Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- F Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- I Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
- L Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.
- M Check multi-zone units for motorized damper leakage. Adjust air quantities with mixing dampers set first for cooling, then heating, then modulating.
- N For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.
- O On fan powered VAV boxes, adjust air flow switches for proper operation.

3.7 WATER SYSTEM PROCEDURE

- A Adjust water systems to provide required or design quantities.
- B Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

- C Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- D Effect system balance with automatic control valves fully open to heat transfer elements.
- E Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.
- F Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.8 COMMISSIONING

- A See Division 01 and Division for additional requirements.
- B Perform prerequisites prior to starting commissioning activities.
- C Fill out Prefunctional Checklists for:
 - 1. Air side systems.
 - 2. Water side systems.
- D Furnish to the Commissioning Authority, upon request, any data gathered but not shown in the final TAB report.
- E Re-check minimum outdoor air intake flows and maximum and intermediate total airflow rates for 100 percent of the air handlers plus a random sample equivalent to 10 percent of the final TAB report data as directed by Commissioning Authority.
 - 1. Original TAB agency shall execute the re-checks, witnessed by the Commissioning Authority.
 - 2. Use the same test instruments as used in the original TAB work.
 - 3. Failure of more than 10 percent of the re-checked items of a given system shall result in the rejection of the system TAB report; rebalance the system, provide a new system TAB report, and repeat random re-checks.
 - 4. For purposes of re-check, failure is defined as follows:
 - a. Air Flow of Supply and Return: Deviation of more than 10 percent of instrument reading.
 - b. Minimum Outside Air Flow: Deviation of more than 20 percent of instrument reading; for inlet vane or VFD OSA compensation system using linear proportional control, deviation of more than 30 percent at intermediate supply flow.
 - c. Temperatures: Deviation of more than one degree F.
 - d. Air and Water Pressures: Deviation of more than 10 percent of full scale of test instrument reading.
 - e. Sound Pressures: Deviation of more than 3 decibels, with consideration for variations in background noise.
 - 5. For purposes of re-check, a whole system is defined as one in which inaccuracies will have little or no impact on connected systems; for example, the air distribution system served by one air handler or the hydronic chilled water supply system served by a chiller or the condenser water system.
- F In the presence of the Commissioning Authority, verify that:
 - 1. Final settings of all valves, splitters, dampers and other adjustment devices have been permanently marked.
 - 2. The air system is being controlled to the lowest possible static pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from fan to diffuser having all balancing dampers wide open and that during full cooling of all terminal units taking off downstream of the static pressure sensor, the terminal unit on the critical leg has its damper 90 percent or more open.
 - 3. The water system is being controlled to the lowest possible pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from the pump to the coil having all balancing valves wide open and that during full cooling the cooling coil valve of that leg is 90 percent or more open.

3.9 SCOPE

- A Test, adjust, and balance the air, hydronic, and plumbing systems as shown on the design documents.

3.10 MINIMUM DATA TO BE REPORTED

END OF SECTION 23 05 93

SECTION 23 07 13 - DUCT INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Duct insulation.
- B Duct liner.
- C Weather barrier coatings.
- D Jacketing and accessories.

1.2 SUBMITTALS

- A Refer to Division 1 for submittal procedures.
- B Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.3 QUALITY ASSURANCE

- A Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.
- B Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum 3 years of experience and approved by manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

- A Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
- B Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.5 FIELD CONDITIONS

- A Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 GLASS FIBER, FLEXIBLE

- A Manufacturer:
 - 1. CertainTeed Corporation
 - 2. Johns Manville
 - 3. Knauf Insulation
 - 4. Owens Corning Corporation
 - 5. Substitutions: Refer to Division 01
- B Insulation: ASTM C553; flexible, noncombustible blanket.
 - 1. K value: .27 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Maximum Service Temperature: 250 degrees F.
 - 3. Maximum Water Vapor Absorption: 5.0 percent by weight.
- C Vapor Barrier Jacket:
 - 1. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
 - 2. Secure with pressure-sensitive tape.

- D Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure-sensitive rubber-based adhesive.
- E Indoor Vapor Barrier Mastic:
 - 1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- F Outdoor Vapor Barrier Mastic:
 - 1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- G Tie Wire: Annealed steel, 16 gauge, 0.0508 inch diameter.

2.3 GLASS FIBER, RIGID

- A Manufacturer:
 - 1. CertainTeed Corporation
 - 2. Johns Manville
 - 3. Owens Corning Corporation
 - 4. Substitutions: Refer to Division 01
- B Insulation: ASTM C612; rigid, noncombustible blanket.
 - 1. K Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Maximum Service Temperature: 250 degrees F.
 - 3. Maximum Water Vapor Absorption: 5.0 percent.
 - 4. Maximum Density: 8.0 pcf.
- C Vapor Barrier Jacket:
 - 1. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
 - 2. Secure with pressure-sensitive tape.
- D Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure-sensitive rubber-based adhesive.
- E Indoor Vapor Barrier Finish:
 - 1. Cloth: Untreated; 9 oz/sq yd weight, glass fabric.

2.4 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A Manufacturers:
 - 1. Aeroflex USA
 - 2. Armacell LLC
 - 3. K-Flex USA LLC
 - 4. Substitutions: Refer to Division 01
- B Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1, in sheet form.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 220 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.
- C Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
- D Weather Barrier Coating: Air dried, contact adhesive, compatible with insulation and ASTM E84 compliant.

2.5 JACKETING AND ACCESSORIES

- A Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire-retardant lagging adhesive.
- B Aluminum Jacket:
 - 1. Manufacturers:
 - a. 3 mM VentureClad.
 - b. Johns Manville.
 - c. Substitutions: Refer to Division 1
 - 2. Comply with ASTM B209/B209M, Temper H14, minimum thickness of 0.016 inch with factory-applied polyethylene and kraft paper moisture barrier on the inside surface.

3. Thickness: 0.016 inch sheet.
 4. Finish: Smooth.
 5. Joining: Longitudinal slip joints and 2 inch laps.
 6. Fittings: 0.016 inch thick die-shaped fitting covers with factory-attached protective liner.
 7. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.
- C Reinforced Tape:
1. FSK tape suitable for sealing seams between insulation, insulated elbows, and fittings resulting in a tight, smooth surface without wrinkles.
 2. Comply with UL 723 or ASTM E84.
 3. Moisture Vapor Permeability: 0.00 perm inch, when tested in accordance with ASTM E96/E96M.
- D UL181 Tape for Rigid and Flexible Ductwork:
1. Comply with UL 181A for rigid ductwork.
 2. Comply with UL 181B for flexible ductwork.
 3. Aluminum foil coated with pressure-sensitive adhesive on paper release liner.
 4. Foil tape suitable for sealing seams between insulation, insulated elbows, and fittings resulting in a tight, smooth surface without wrinkles.
 5. Finish: Printed with UL Listing for identification.

2.6 DUCT LINER

- A Manufacturers:
1. Aeroflex USA
 2. Armacell LLC
 3. Knauf Insulation
 4. Owens Corning Corporation
 5. Substitutions: Referto Division 01
- B Elastomeric Foam Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1, in sheet form.
1. Minimum Service Temperature: Minus 40 degrees F.
 2. Maximum Service Temperature: 220 degrees F.
 3. Fungal Resistance: No growth when tested according to ASTM G21.
 4. Apparent Thermal Conductivity: Maximum of 0.28 at 75 degrees F.
 5. Minimum Noise Reduction Coefficients:
 6. Erosion Resistance: Does not show evidence of breaking away, flaking off, or delamination at velocities of 10,000 fpm when tested in accordance with ASTM C1071.
 7. Connection: Waterproof vapor barrier adhesive.
- C Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation. Comply with ASTM C916.
- D Glass Fiber Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; flexible blanket, rigid board, and preformed round liner board; impregnated surface and edges coated with poly vinyl acetate polymer, acrylic polymer, or black composite.
1. Fungal Resistance: No growth when tested according to ASTM G21.
 2. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
 3. Service Temperature: Up to 250 degrees F.
 4. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.
 5. Minimum Noise Reduction Coefficients:
 - a. 1 inch Thickness: 0.45.
- E Adhesive: Waterproof, fire-retardant type, ASTM C916.
- F Liner Fasteners: Galvanized steel, self-adhesive pad with integral head.

PART 3 EXECUTION

3.1 EXAMINATION

- A Test ductwork for design pressure prior to applying insulation materials.
- B Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION

- A Install in accordance with manufacturer's instructions.
- B Install in accordance with NAIMA National Insulation Standards.
- C Insulated Ducts Conveying Air Below Ambient Temperature:
 - 1. Provide insulation with vapor barrier jackets.
 - 2. Finish with tape and vapor barrier jacket.
 - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 - 4. Insulate entire system, including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- D Insulated Ducts Conveying Air Above Ambient Temperature:
 - 1. Provide with or without standard vapor barrier jacket.
 - 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- E Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces 12: Finish with aluminum jacket.
- F Exterior Applications: Provide insulation with vapor barrier jacket. Cover with caulked aluminum jacket with seams located on bottom side of horizontal duct section.
- G Slope exterior ductwork to shed water.
- H External Duct Insulation Application:
 - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
 - 2. Secure insulation without vapor barrier with staples, tape, or wires.
 - 3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
 - 4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
 - 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
- I Duct and Plenum Liner Application:
 - 1. Adhere insulation with adhesive for 90 percent coverage.
 - 2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
 - 3. Seal and smooth joints. Seal and coat transverse joints.
 - 4. Seal liner surface penetrations with adhesive.
 - 5. Duct dimensions indicated are net inside dimensions required for airflow. Increase duct size to allow for insulation thickness.

3.3 SCHEDULES

- A Exhaust Ducts Within 10 ft of Exterior Openings: Flexible Glass Fiber 2" thick
- B Outside Air Intake Ducts: Duct Wrap Flexible Glass Fiber 2" thick
- C Plenums: Glass Fiber Rigid 1" thick
- D Plenums (Cooling System): Glass Fiber 1-1/2" thick
- E Supply Ducts: Duct Wrap Flexible Glass Fiber 2" thick
- F Supply Ducts From Fans to Vertical Ducts in Shafts (Cooling System): Flexible Glass Fiber 2" thick
- G Supply Ducts in Vertical Shafts (Cooling Systems): Flexible glass Fiber 2" thick
- H Supply ducts After Terminal Boxes: Flexible Glass
- I Return and Relief Ducts in Mechanical Rooms: Flexible Glass fiber 1" thick
- J Ducts Exposed to Outdoors: Glass Fiber Rigid 2" thick

END OF SECTION 23 07 13

SECTION 23 07 19 - HVAC PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Piping insulation.

1.2 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.3 QUALITY ASSURANCE

- A Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of experience.
- B Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 3 years of experience.

1.4 DELIVERY, STORAGE, AND HANDLING

- A Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.5 FIELD CONDITIONS

- A Maintain ambient conditions required by manufacturers of each product.
- B Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 GLASS FIBER, RIGID

- A Manufacturers:
 - 1. Johns Manville Corporation
 - 2. Knauf Insulation
 - 3. Owens Corning Corporation
 - 4. Substitutions: Refer to division 1.
- B Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- D Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- E Vapor Barrier Lap Adhesive: Compatible with insulation.

2.3 CELLULAR GLASS

- A Manufacturers:
 - 1. Owens Corning Corporation; FOAMGLAS: www.owenscorning.com/en-us/#sle.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B Pipe and Tubing Insulation: ASTM C552, Type II, Grade 6.
 - 1. K Value: 0.35 at 100 degrees F.
 - 2. Service Temperature Range: From 250 degrees F to 800 degrees F.
 - 3. Water Vapor Permeability: 0.005 perm inch maximum per inch.
 - 4. Water Absorption: 0.5 percent by volume, maximum.

- 5. Density: A minimum of 6.12 pcf.
- C Block Insulation: ASTM C552, Type I, Grade 6.
 - 1. K Value: 0.35 at 100 degrees F.
 - 2. Service Temperature: 800 degrees F, maximum.
 - 3. Water Vapor Permeability: 0.005 perm inch maximum per inch.
 - 4. Water Absorption: 0.5 percent by volume, maximum.

PART 3 EXECUTION

3.1 EXAMINATION

- A Test piping for design pressure, liquid tightness, and continuity prior to applying insulation materials.
- B Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

- A Install in accordance with manufacturer's instructions.
- B Exposed Piping: Locate insulation and cover seams in least visible locations.
- C Insulated Pipes Conveying Fluids Below Ambient Temperature:
 - 1. Insulate entire system, including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- D Glass Fiber Insulated Pipes Conveying Fluids Below Ambient Temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- E For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- F Glass Fiber Insulated Pipes Conveying Fluids Above Ambient Temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied, or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- G Inserts and Shields:
 - 1. Application: Piping 1-1/2 inches diameter or larger.
 - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert location: Between support shield and piping and under the finish jacket.
 - 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 - 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- H Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, see Section 07 84 00.
- I Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping. Provide two coats of UV-resistant finish for flexible elastomeric cellular insulation without jacketing.

3.3 SCHEDULE

- A Heating Systems:
 - 1. Heating Water Supply and Return: Glass Fiber Rigid

END OF SECTION 23 07 19

SECTION 23 09 13 - INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

PART 1 GENERAL

1.1 SECTION INCLUDES

A Wall-, Surface-, and Duct-Mounted Sensors:

1. IAQ (indoor air quality) sensors.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.3 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.
- C Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.
- D Project Record Documents: Record actual location of control components, including panels, thermostats, and sensors.
 1. Revise shop drawings to reflect actual installation and operating sequences.
- E Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Division 01 for additional provisions.

1.4 WARRANTY

- A See Division 01 for additional warranty requirements.

PART 2 PRODUCTS

2.1 EQUIPMENT - GENERAL

- A Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.2 WALL-, SURFACE-, AND DUCT-MOUNT SENSORS

- A IAQ (Indoor Air Quality) Sensors:
 1. Manufacturers:
 - a. Automated Logic, a company of Carrier Global Corporation
 - b. Substitutions: See Division 01.
 2. Form Factor: Surface mounted, desk mounted, or single-gang electrical-box-mounted module made of high-impact plastic or other resilient material.
 3. Display: LCD screen with 3-button interface for setpoint control.
 4. Setpoint Control: Adjust temperature and humidity.
 5. Temperature Sensor:
 - a. Solid-state, integrated circuit type, 32 to 122 deg F range.
 - b. Accuracy: Plus/minus two percent within 0.1 deg resolution.
 6. CO₂ (Carbon Dioxide) Monitoring Sensor:
 - a. Non-dispersive infrared (NDIR) type, 0 to 100 %RH range.
 - b. Accuracy: Plus/minus 30 ppm within three percent of measured value.
 7. Humidity Monitoring Sensor:
 - a. Thin-film capacitive, replaceable type, 0 to 2,000 or 5,000 ppm range, noncondensing.
 - b. Accuracy: Plus/minus two percent within 1.5 percent of measured value.
 8. BAS, SCADA, or other Integrated Automation Link: ASHRAE Std 135 BACnet MS/TP.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify existing conditions before starting work.
- B Verify that systems are ready to receive work.
- C Beginning of installation means installer accepts existing conditions.
- D Sequence work to ensure installation of components is complementary to installation of similar components in other systems.
- E Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.
- F Ensure installation of components is complementary to installation of similar components.
- G Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

3.2 INSTALLATION

- A Install in accordance with manufacturer's instructions.
- B Check and verify location of thermostats with plans and room details before installation. Locate 42 inches above floor. Align with lighting switches; see Section 26 27 26.
- C Provide guards on thermostats in public areas.
- D Provide conduit and electrical wiring in accordance with Division 26. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

3.3 MAINTENANCE

- A See Division 01 for additional requirements relating to maintenance service.

END OF SECTION 23 09 13

SECTION 23 21 13 - HYDRONIC PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Hydronic system requirements.
- B Heating water piping, above grade.
- C Chilled water piping, buried.
- D Equipment drains and overflows.
- E Pipe hangers and supports.
- F Unions, flanges, mechanical couplings, and dielectric connections.
- G Valves:
- H Flow controls.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination: Coordinate the installation of Piping with size, location and installation of service utilities.
- B Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.3 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Welders Certificate: Include welders certification of compliance with ASME BPVC-IX.
- C Product Data:
 - 1. Include data on pipe materials, pipe fittings, valves, and accessories.
 - 2. Provide manufacturers catalog information.
- D Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- E Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Refer to Division 01

1.4 QUALITY ASSURANCE

- A Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of experience.
- B Installer Qualifications: Company specializing in performing work of the type specified in this section, with minimum 3 years of experience.
- C Welder Qualifications: Certify in accordance with ASME BPVC-IX.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B Provide temporary protective coating on cast iron and steel valves.
- C Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.6 FIELD CONDITIONS

- A Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.1 HYDRONIC SYSTEM REQUIREMENTS

- A Comply with ASME B31.9 and applicable federal, state, and local regulations.
- B Piping: Provide piping, fittings, hangers, and supports as required, as indicated, and as follows:
 - 1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.

2. Use non-conducting dielectric connections whenever jointing dissimilar metals.
3. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.
- C Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges or unions to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.
- D Valves: Provide valves where indicated:
 1. Provide drain valves where indicated, and if not indicated, provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch gate valves with cap; pipe to nearest floor drain.
 2. Isolate equipment using butterfly valves with lug end flanges.
 3. For throttling, bypass, or manual flow control services, use ball or butterfly valves.
 4. For throttling and isolation service in chilled and condenser water systems, use only butterfly valves.
 5. In heating water systems, butterfly valves may be used interchangeably with gate and globe valves.
 6. For shut-off and to isolate parts of systems or vertical risers, use ball or butterfly valves.
- E Welding Materials and Procedures: Comply with ASME BPVC-IX.

2.2 HEATING WATER PIPING, ABOVE GRADE

- A Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:
 1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D10.12M/D10.12 welded.
 2. Threaded Joints: ASME B16.3, malleable iron fittings.
 3. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.
- B Steel Pipe Sizes 12 Inches and Greater: ASTM A53/A53M, 3/8 inch wall, black, using one of the following joint types:
 1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D10.12M/D10.12 welded.
 2. Threaded Joints: ASTM A536 ductile iron fittings.
- C Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn, using one of the following joint types:
 1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.
 - a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
 - b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.

2.3 CHILLED WATER PIPING, BURIED

- A Steel Pipe: ASTM A53/A53M, Schedule 40, black.
- B Fittings: ASTM A234/A234M, wrought steel welding type.
- C Joints: Welded in accordance with AWS D10.12M/D10.12.
- D Steel Pipe Sizes 12 Inches and Greater: ASTM A53/A53M, 3/8 inch wall, black.
- E Fittings: ASTM A234/A234M, wrought steel welding type.
- F Joints: Welded in accordance with AWS D10.12M/D10.12.
- G Casing: (As specified below or approved equal)
 1. All underground chilled /heating lines with fluid temperatures up to 250°F shall be the POLY-THERM type, as manufactured by PERMA-PIPE®. All straight sections, fittings, anchors and other accessories shall be factory fabricated to job dimensions. Each system layout shall be computer analyzed by the piping system manufacturer to determine stress on the service pipe and anticipated thermal movement of the service pipe. The system design shall be in strict conformance with ANSI B31.1, latest edition. Factory trained field technical assistance shall be provided for critical periods of installation, unloading, field joint instruction and testing.

2. Internal piping shall be standard weight carbon steel. All joints shall be butt-welded for 2½ inches and greater, and socket or butt-welded for 2 inches and below. Where possible, straight sections shall be supplied in 40-foot random lengths with piping exposed at each end for field joint fabrication.
3. Service pipe insulation shall be spray applied 0.18 k-factor, R141B blowing agent, and nominal 2lb/ft³ density, polyurethane foam for straight sections and preformed polyurethane foam for all fittings. To ensure no voids are present, all insulation shall be inspected by one of the following three methods: visually checked prior to application of the protective jacket or infrared inspection of the entire length twenty-four hours after foaming is complete. The insulation shall be applied to the minimum thickness specified below. The insulation thickness shall not be less than indicated in these specifications for hot water piping systems:

Pipe Size (In.)	Insulation Thickness
1" to 6"	1
8" - 14"	1½
16" - 24"	2

4. All straight sections of the insulated piping system shall be filament wound, polyester resin/fiberglass reinforcement composite directly applied on the insulating foam. The manufacture shall have the option to filament wind fiberglass directly onto the polyurethane foam or inject foam into a fiberglass outer casing. Fiberglass outer casing allowed shall be A.O. Smith Red Thread or Ameron Bondstrand 3000. Thermoplastic casing material that are not rated for temperatures above 140°F will not be allowed.
5. The minimum thickness for FRP jacket shall be as follows:

a. Jacket Diameter (in)	Thickness (in)
b. Up to 15.5	080 inches;
c. 15.6 and 24.5	120 inches;
d. 24.6 and 31	160 inches;
e. 31.1 and 40	200 inches
6. All fittings of the insulated piping system shall be prefabricated to minimize field joints and jacketed in a chopped spray-up, polyester resin/fiberglass reinforcement composite, directly applied onto the insulating foam to a thickness related to the filament-wound jacket thickness.
7. The internal pipe shall be hydrostatically tested to 150 psig or 1½ times the operating pressure, whichever is greater. Insulation shall then be poured in place into the field weld area. All field applied insulation shall be placed only in straight sections. Field insulation of fittings shall not be acceptable. The mold for the polyurethane shall be made of clear adhesive backed polyester film. The installer shall seal the field joint area with a heat shrinkable adhesive backed wrap or with wrappings of glass reinforcement fully saturated with a catalyzed resin identical in properties to the factory-applied resin. Backfilling shall not begin until the heat shrink wrap has cooled or until the FRP lay-up has cured. All insulation and coating materials for making the field joint shall be furnished by the piping system manufacturer.
8. End seals, gland seals and anchors shall be designed and factory fabricated to prevent the ingress of moisture into the system.
9. A 4-inch layer of sand or fine gravel shall be placed and tamped in the trench to provide uniform bedding for the pipe. The entire trench width shall be evenly backfilled with a similar material as the bedding in 6-inch compacted layers to a minimum height of 6 inches above the top of the insulated piping system. The remaining trench shall be evenly and continuously backfilled in uniform layers with suitable excavated soil.
10. Installation to be inspected and certified by a factory representative prior to cover.

2.4 EQUIPMENT DRAINS AND OVERFLOWS

- A Steel Pipe: ASTM A53/A53M, Schedule 40 galvanized; using one of the following joint types:
 1. Threaded Joints: Galvanized cast iron, or ASME B16.3 malleable iron fittings.

- B Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn; using one of the following joint types:
1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings; ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.

2.5 PIPE HANGERS AND SUPPORTS

- A Provide hangers and supports that comply with MSS SP-58.
1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.
 3. Hangers for Cold Pipe Sizes 2 Inches and Greater: Carbon steel, adjustable, clevis.
 4. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
 5. Hangers for Hot Pipe Sizes 6 Inches and Greater: Adjustable steel yoke, cast iron roll, double hanger.
 6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Greater: Steel channels with welded spacers and hanger rods, cast iron roll.
 8. Vertical Support: Steel riser clamp.
 9. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 10. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 11. Floor Support for Hot Pipe Sizes 6 Inches and Greater: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
 12. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
 13. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
 14. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.
- B Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified; and as follows:
1. Bases: High-density polypropylene.
 2. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 3. Steel Components: Stainless steel or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 4. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion-resistant material.
 5. Height: Provide minimum clearance of 12 inches under pipe to top of roofing.

2.6 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

- A Unions for Pipe of 2 Inches and Less:
1. Ferrous Piping: 150 psi brass or malleable iron, threaded.
 2. Copper Pipe: Bronze, soldered joints.
- B Flanges for Pipe 2 Inches and Greater:
1. Ferrous Piping: 150 psig forged steel, slip-on.
 2. Copper Piping: Bronze.
 3. Gaskets: 1/16 inch thick, preformed neoprene.

PART 3 EXECUTION

3.1 PREPARATION

- A Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B Remove scale and dirt on inside and outside before assembly.
- C Prepare piping connections to equipment using jointing system specified.

- D Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- E After completion, fill, clean, and treat systems. See Section 23 25 00 for additional requirements.

3.2 INSTALLATION

- A Install in accordance with manufacturer's instructions.
- B Install heating water, glycol, chilled water, condenser water, and engine exhaust piping to ASME B31.9 requirements.
- C Route piping in orderly manner, parallel to building structure, and maintain gradient.
- D Install piping to conserve building space and to avoid interference with use of space.
- E Group piping whenever practical at common elevations.
- F Sleeve pipe passing through partitions, walls, and floors.
- G Install firestopping to preserve fire resistance rating of partitions and other elements.
- H Slope piping and arrange to drain at low points.
- I Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 23 05 16.
 - 1. Use flexible couplings in expansion loops.
- J Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
- K Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
 - 2. Support horizontal piping as scheduled.
 - 3. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inches minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 8. Provide copper plated hangers and supports for copper piping.
 - 9. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- L Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. See Section 23 07 19.
- M Provide access where valves and fittings are not exposed.
- N Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welds.
- O Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting.
- P Install valves with stems upright or horizontal, not inverted.

3.3 SCHEDULES

- A Hanger Spacing for Copper Tubing.
 - 1. 1/2 Inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
 - 2. 1 Inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
 - 3. 1-1/2 Inches and 2 Inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 - 4. 2-1/2 Inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
 - 5. 3 Inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
 - 6. 4 Inches: Maximum span, 12 feet; minimum rod size, 1/2 inch.
 - 7. 6 Inches: Maximum span, 14 feet; minimum rod size, 1/2 inch.
- B Hanger Spacing for Steel Piping.

1. 1/2 Inch, 3/4 Inch, and 1 Inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
2. 1-1/4 Inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
3. 1-1/2 Inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
4. 2 Inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
5. 2-1/2 Inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
6. 3 Inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.
7. 4 Inches: Maximum span, 14 feet; minimum rod size, 1/2 inch.
8. 6 Inches: Maximum span, 17 feet; minimum rod size, 1/2 inch.
9. 8 Inches: Maximum span, 19 feet; minimum rod size, 5/8 inch.
10. 10 Inches: Maximum span, 20 feet; minimum rod size, 3/4 inch.
11. 12 Inches: Maximum span, 23 feet; minimum rod size, 7/8 inch.
12. 14 Inches: Maximum span, 25 feet; minimum rod size, 1 inch.
13. 16 Inches: Maximum span, 27 feet; minimum rod size, 1 inch.
14. 18 Inches: Maximum span, 28 feet; minimum rod size, 1-1/4 inches.
15. 20 Inches: Maximum span, 30 feet; minimum rod size, 1-1/4 inches.

END OF SECTION 23 21 13

SECTION 23 21 14 - HYDRONIC SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Air vents.
- B Strainers.
- C Pressure-temperature test plugs.
- D Balancing valves.
- E Automatic flow control valves.
- F Flow meters.
- G Relief valves.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination: Coordinate the installation of piping with size, location and installation of service utilities.
- B Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.3 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description, model, and dimensions.
- C Certificates: Inspection certificates for pressure vessels from authority having jurisdiction.
- D Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.
- E Project Record Documents: Record actual locations of flow controls.
- F Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.
- G Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Refer to Division 01

1.4 QUALITY ASSURANCE

- A Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B Provide temporary protective coating on cast iron and steel valves.
- C Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.1 AIR VENTS

- A Manufacturers:
 - 1. Armstrong International, Inc
 - 2. Bell & Gossett, a brand of Xylem, Inc
 - 3. Taco, Inc
 - 4. Amtrol.
 - 5. Substitutions: See Division 01.
- B Manual Air Vent: Short vertical sections of 2-inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

- C Float Air Vent:
 - 1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
- D Maximum Fluid Pressure: 150 psi.
- E Maximum Fluid Temperature: 250 degrees F.

2.2 STRAINERS

- A Manufacturers:
 - 1. American Wheatley, a company of Global Flow Products, LLC
 - 2. Armstrong International, Inc
 - 3. Flexicraft Industries
 - 4. The Metraflex Company
 - 5. Substitutions: See Division 01.
- B Size 2 inch and Under:
 - 1. Provide threaded or sweat brass or iron body for up to 175 psi working pressure, Y-pattern strainer with 1/32 inch stainless steel perforated screen.
 - 2. Body Material by Fluid Service:
 - a. Cast Iron or Brass:
 - 1) Steam: Up to 250 psi at 450 degrees F.
 - 2) Liquids: Up to 400 psi at 150 degrees F.
- C Size 2-1/2 inch to 4 inch:
 - 1. Provide flanged iron body for up to 175 psi working pressure, up to 250 degrees F working temperature, Y-pattern strainer with 1/16 inch or 3/64 inch stainless steel perforated screen.
 - 2. Body Material by Fluid Service:
 - a. Cast Iron:
 - 1) Steam: Up to 125 psi at 350 degrees F.
 - 2) Liquids: Up to 200 psi at 150 degrees F.
- D Size 5 inch and Larger:
 - 1. Provide flanged or grooved iron body for up to 175 psi working pressure, basket pattern with 1/8 inch stainless steel perforated screen.
 - 2. Liquid Fluid Service: Up to 285 psi at 100 degrees F.

2.3 PRESSURE-TEMPERATURE TEST PLUGS

- A Manufacturers:
 - 1. Peterson Equipment Company Inc
 - 2. Sisco Manufacturing Company Inc
 - 3. Substitutions: See Division 01.
- B Construction: Brass body designed to receive temperature or pressure probe with removable protective cap, and Neoprene rated for minimum 200 degrees F.
- C Application: Use extended length plugs to clear insulated piping.

2.4 BALANCING VALVES

- A Manufacturers:
 - 1. American Wheatley, a company of Global Flow Products, LLC:
www.wheatleyhvac.com/#sle.
 - 2. Armstrong International, Inc
 - 3. Bell & Gossett, a brand of Xylem, Inc
 - 4. Taco, Inc
 - 5. Substitutions: See Division 01
- B Size 2 inch and Smaller:
 - 1. Provide ball or globe style with flow balancing, shut-off capabilities, memory stops, and minimum of two metering ports and female sweat, NPT threaded, press, or soldered connections.
 - 2. Metal construction materials consist of bronze, brass, or Stainless Steel.

3. Non-metal construction materials consist of Teflon, EPDM, engineered resin, or Buna.
4. Maximum Service Operation: 300 psi at 250 degrees F.
- C Size 2-1/2 inch and Larger:
 1. Provide ball, globe, or butterfly style with flow balancing, shut-off capabilities, memory stops, and minimum of two metering ports and flanged, grooved, or weld-end connections.
 2. Valve body construction materials consist of cast iron or carbon steel.
 3. Internal components construction materials consist of brass, aluminum bronze, bronze, Teflon, EPDM, engineered resin, or Buna

2.5 AUTOMATIC FLOW CONTROL VALVES

- A Manufacturers:
 1. Armstrong International
 2. Bell & Gossett, a brand of Xylem, Inc
 3. NIBCO INC
 4. Taco Inc
 5. Griswold.
 6. Substitutions: See Division 01.
- B Construction:
 1. Brass, bronze, or iron body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet with blowdown/backflush drain.
 2. Built-in lug-type outlet butterfly valve with 2-position handle.
- C Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, minimum pressure 2 psi.
- D Control Mechanism: Provide stainless steel or nickel-plated, brass piston or regulator cup, operating against stainless steel helical or wave formed spring or elastomeric diaphragm and polyphenylsulfone orifice plate.
- E Size: Match system flow capacity.
- F Accessories: Provide hanging tag, inlet in-line strainer, outlet ball valve, and PT test plug extension.

2.6 FLOW METERS

- A Manufacturers:
 1. Onicon.
 2. Substitutions: See Division 01.
- B Orifice principle by-pass circuit with direct reading gauge, soldered or flanged piping connections for 125 psi working pressure, with shut off valves, and drain and vent connections.

2.7 RELIEF VALVES

- A Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled.

2.8 PRESSURE INDEPENDENT VALVES

- A Manufacturers:
 1. Griswold Controls LLC
 2. Oventrop Corporation
 3. Substitutions: See Division 01
- B Size 2 inch and Smaller:
 1. Provide ball or globe style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and NPT threaded or soldered connections.
 2. Metal construction materials consist of bronze, brass, or ductile iron.
 3. Non-metal construction materials consist of Teflon, EPDM, or engineered resin.
- C Size 2-1/2 inch and Larger:
 1. Provide ball, globe, or butterfly style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and flanged connections.
 2. Valve body construction materials consist of carbon steel or ductile iron.

3. Internal components construction materials consist of brass, aluminum bronze, bronze, Teflon, EPDM, NORYL, engineered resin, or stainless steel.

2.9 AUTOMATIC FLOW LIMITING VALVES

- A Manufacturers:
 1. Griswold Controls LLC
 2. Hays Fluid Controls
 3. Autoflow.
 4. Substitutions: See Division 01
- B Size 1/2 inch to 14 inch:
 1. Provide ball or globe style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and NPT threaded or soldered connections.
 2. Metal construction materials consist of bronze or brass.
 3. Non-metal construction materials consist of Teflon, EPDM, or engineered resin.
- C Size 2-1/2 inch to 24 inch:
 1. Comply with ASME B16.5.
 2. Class: 150.
 3. Provide ball, globe, or butterfly style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and flanged connections.
 4. Valve body construction materials consist of cast iron, carbon steel, or ductile iron.
 5. Internal components construction materials consist of brass, aluminum bronze, bronze, Teflon, EPDM, NORYL, or engineered resin.

PART 3 EXECUTION

3.1 INSTALLATION

- A Install specialties in accordance with manufacturer's instructions.
- B Provide manual air vents at system high points and as indicated.
- C For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.
- D Provide valved drain and hose connection on strainer blowdown connection.
- E Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.
- F Pipe relief valve outlet to nearest floor drain.

3.2 MAINTENANCE

- A See Division 01 for additional requirements relating to maintenance service.
- B Explain corrective actions to Owner's maintenance personnel in person.

END OF SECTION 23 21 14

SECTION 23 31 00 - HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Metal ducts.
- B Flexible ducts.

1.2 SUBMITTALS

- A See Division 01 for submittal procedures.
- B Product Data: Provide data for duct materials and duct connections.
- C Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.3 QUALITY ASSURANCE

- A Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of experience.

1.4 FIELD CONDITIONS

- A Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A Provide UL Class 1 ductwork, fittings, hangers, supports, and appurtenances in accordance with NFPA 90A, NFPA 90B, and SMACNA (DCS) guidelines unless stated otherwise.
- B Provide metal duct unless otherwise indicated. Fibrous glass duct can be substituted at the Contractor's option.
- C Acoustical Treatment: Provide sound-absorbing liners and sectional silencers for metal-based ducts in compliance with Section 23 33 19.
- D Duct Shape and Material in accordance with Allowed Static Pressure Range:
 - 1. Round: Plus or minus 2 in-wc of galvanized steel.
 - 2. Rectangular: Plus or minus 1/2 in-wc of galvanized steel.
- E Duct Sealing and Leakage in accordance with Static Pressure Class:
 - 1. Duct Pressure Class and Material for Common Mechanical Ventilation Applications:
 - a. Supply Air: 1/2 in-wc pressure class, galvanized steel.
 - b. Return and Relief Air: 1/2 in-wc pressure class, galvanized steel.
 - c. General Exhaust Air: 1/2 in-wc pressure class, galvanized steel.
- F Duct Fabrication Requirements:
 - 1. Duct and Fitting Fabrication and Support: SMACNA (DCS) including specifics for continuously welded round and oval duct fittings.
 - 2. Use reinforced and sealed sheet-metal materials at recommended gauges for indicated operating pressures or pressure class.
 - 3. Construct tees, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide airfoil turning vanes of perforated metal with glass fiber insulation.
 - 4. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.
 - 5. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
 - 6. Provide turning vanes of perforated metal with glass fiber insulation when an acoustical lining is required.

7. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.2 METAL DUCTS

A Material Requirements:

1. Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
2. Aluminum: ASTM B209/B209M, aluminum sheet, alloy 3003-H14.
3. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.

B Rectangular Metal Duct:

1. Fabricated using single wall sheet steel with continuous joints to form rectangular sections.
2. Rectangular Double Wall Insulated: Rectangular spiral lock seam duct with galvanized steel outer wall, galvanized steel inner wall; fitting with the solid inner wall.
 - a. Insulation:
 - 1) Thickness: 1 inch.
 - 2) Material: Fiberglass.

C Round Metal Ducts:

1. Round Single Wall Duct: Round lock seam duct with galvanized steel outer wall.
2. Round Double Wall Insulated Duct: Round spiral lock seam duct with galvanized steel outer wall, galvanized steel inner wall; fitting with the solid inner wall.
 - a. Insulation:
 - 1) Thickness: 1 inch.
 - 2) Material: Fiberglass.
3. Round Connection System: Interlocking duct connection system in accordance with SMACNA (DCS).

D Connectors, Fittings, Sealants, and Miscellaneous:

1. Fittings: Manufacture with solid inner wall of perforated galvanized steel.
2. Transverse Duct Connection System: SMACNA "E" rated rigid class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips in accordance with SMACNA (DCS).
3. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - a. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - b. VOC Content: Not more than 250 g/L, excluding water.
 - c. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
 - d. For Use with Flexible Ducts: UL labeled.
4. Gasket Tape:
 - a. Provide butyl rubber gasket tape for a flexible seal between transfer duct connector (TDC), transverse duct flange (TDF), applied flange connections, and angle ring connections.
5. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.3 FLEXIBLE DUCTS

A Flexible Ducts: UL 181, Class 1, polyethylene film, mechanically fastened and rolled using galvanized steel to form spiral helix.

1. Insulation: R6 insulation with polyethylene vapor barrier film.
2. Pressure Rating: 10 in-wc positive and 5 in-wc negative.
3. Maximum Velocity: 5500 fpm.
4. Temperature Range: Minus 20 degrees F to 250 degrees F.

B Acoustic Flexible Ducts: UL 181, Class 1, spunbond nylon, mechanically fastened and rolled using galvanized steel to form spiral helix.

1. Insulation: Fiberglass insulation with metallic vapor barrier.
2. Inner Core: Spunbonded, nonwoven inner core.
3. Pressure Rating: 6 in-wc positive and 5 in-wc negative.
4. Maximum Velocity: 4000 fpm.
5. Temperature Range: Minus 20 degrees F to 250 degrees F.

PART 3 EXECUTION

3.1 INSTALLATION

- A Install, support, and seal ducts in accordance with SMACNA (DCS).
- B Install products following the manufacturer's instructions.
- C Comply with safety standards NFPA 90A and NFPA 90B.
- D During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering the ductwork system.
- E Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- F Duct sizes indicated are precise inside dimensions. For lined ducts, maintain sizes inside lining.
- G Provide openings in ductwork as indicated to accommodate thermometers and controllers. Provide pilot tube openings as indicated for testing of systems, complete with metal cap with spring device or screw to insure against air leakage. For openings, insulate ductwork and install insulation material inside a metal ring.
- H Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- I Connect terminal units to supply ducts with flexible duct connector. Do not use flex duct.
- J Connect diffusers or light troffer boots to low-pressure ducts with 5 feet maximum length of flexible duct held in place with strap or clamp.
- K Duct Accessories, Terminal Units, Inlets, and Outlets: Interconnect as indicated in Sections Division 23.
- L Duct Insulation: Provide duct insulation. See Division 23.

END OF SECTION 23 31 00

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SECTION 23 34 23 - HVAC POWER VENTILATORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Ceiling exhaust fans.

1.2 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Product Data: Provide data on fans and accessories, including fan curves with specified operating point plotted, power, rpm, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- C Manufacturer's Instructions: Indicate installation instructions.
- D Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.
- E Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Refer to Division 01, for additional provisions.
 - 2. Extra Fan Belts: One set for each individual fan.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A Greenheck Fan Corporation
- B Loren Cook Company
- C PennBarry, Division of Air System Components
- D Twin City Fan & Blower
- E Substitutions: Refer to Division 01.

2.2 POWER VENTILATORS - GENERAL

- A Static and Dynamically Balanced: Comply with AMCA 204.
- B Performance Ratings: Comply with AMCA 210, bearing certified rating seal.
- C Sound Ratings: Comply with AMCA 301, tested to AMCA 300, bearing certified sound ratings seal.
- D Fabrication: Comply with AMCA 99.
- E UL Compliance: UL 705, listed, labeled, designed, manufactured, and tested.
- F Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- G Enclosed Safety Switches: Comply with NEMA EN 10250.

2.3 CEILING EXHAUST FANS

- A Disconnect Switch: Cord and plug-in housing for thermal overload protected motor and wall mounted switch.
- B Grille: Aluminum with baked white enamel finish.
- C Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is reached with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.
- D Performance Ratings: As indicated on drawings.

PART 3 EXECUTION

3.1 INSTALLATION

- A Install in accordance with manufacturer's instructions.
- B Hung Cabinet Fans:
 - 1. Install fans with resilient mountings and flexible electrical leads, see Division 23.

2. Install flexible connections between fan and ductwork; see Division 23. Ensure metal bands of connectors are parallel with minimum 1 inch flex between ductwork and fan while running.
- C Provide sheaves required for final air balance.
- D Provide backdraft dampers on outlet from cabinet and ceiling exhausters fans and as indicated.

END OF SECTION 23 34 23

SECTION 23 36 00 - AIR TERMINAL UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Fan-powered units.
- B Hose kits and valves.

1.2 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Product Data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings that indicate airflow, static pressure, and NC designation. Include electrical characteristics and connection requirements.
- C Shop Drawings: Indicate configuration, general assembly, and materials used in fabrication, and electrical characteristics and connection requirements.
 - 1. Include schedules listing discharge and radiated sound power level for each of the second through sixth-octave bands at inlet static pressures of 1 to 4 in-wc.
- D Certificates: Certify that coils are tested and rated in accordance with AHRI 410.
- E Manufacturer's Installation Instructions: Indicate support and hanging details, installation instructions, recommendations, and service clearances required.
- F Project Record Documents: Record actual locations of units and controls components and locations of access doors required for access of valving.
- G Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- H Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Refer to Division 01 for additional provisions.

1.3 QUALITY ASSURANCE

- A Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of experience.
- B Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.4 WARRANTY

- A Refer to Division 01 for additional warranty requirements.
- B Provide five year manufacturer warranty for air terminal units.

PART 2 PRODUCTS

2.1 SINGLE-DUCT, VARIABLE-VOLUME UNITS

- A Manufacturers:
 - 1. Johnson Controls, Inc
 - 2. Price Industries
 - 3. Trane Technologies, PLC
 - 4. Substitutions: See Division 01
- B General:
 - 1. Factory-assembled, AHRI 880 (I-P) rated and bearing the AHRI seal, air volume control terminal with damper assembly, flow sensor, externally mounted volume controller, duct collars, and all required features.
 - 2. Control box bearing identification, including but not necessarily limited to nominal cfm, maximum and minimum factory-set airflow limits, coil type and coil (right or left hand) connection, where applicable.
- C Unit Casing:
 - 1. Minimum 22 gauge, 0.0299 inch galvanized steel.
 - 2. Air Inlet Collar: Provide round, suitable for standard flexible duct sizes.

3. Unit Discharge: Rectangular, with slip-and-drive connections.
4. Acceptable Liners:
 - a. 3/4 inch thick polyurethane foam adhesive complying with UL 181 erosion requirements in accordance with ASHRAE Std 62.1, and having a maximum smoke developed index of 50 for both insulation and adhesive, when tested in accordance with ASTM E84.
 - b. Liner not to contain pentabrominated diphenyl ether (CAS #32534-81-9) or octabrominated diphenyl ether.
- D Sound Attenuator:
 1. Provide if required to meet scheduled acoustical performance requirements.
 2. Construction to consist of a continuous extension of the casing and liner as required to achieve required attenuation.
 3. At 2000 fpm inlet velocity, the minimum operating pressure with attenuator added not to exceed 0.14 in-wc.
- E Damper Assembly:
 1. Heavy-gauge, galvanized steel, or extruded aluminum construction with solid steel, nickel-plated shaft pivoting on HDPE, self-lubricating bearings.
 2. Provide integral position indicator or alternative method for indicating damper position over full range of 90 degrees.
 3. Incorporate low leak damper blades for tight airflow shutoff.
 - a. Air Leakage Past Closed Damper: Maximum two percent of unit maximum airflow at 3 in-wc inlet static pressure, tested in accordance with ASHRAE Std 130.
- F Hot Water Heating Coil:
 1. Coil Casing: Minimum 22 gauge, 0.0299 inch galvanized steel, factory-installed on terminal discharge with rectangular outlet, duct connection type.
 2. Coil Fins: Aluminum or aluminum plated fins, mechanically-bonded to seamless copper tubes.
 3. Coil leak tested to minimum 350 psig.
 4. Base performance data on tests run in accordance with AHRI 410 and units to bear AHRI 410 label.
- G Electrical Requirements:
 1. Single-point power connection.
 2. Equipment wiring to comply with requirements of NFPA 70.
- H Control Transformers: Factory supplied and mounted for electric and electronic control applications.
- I Controls:
 1. Terminal Unit Controls: Provide and sequence as indicated on drawings.
 - a. Provide accessories for field interfaced controller including airflow sensor, ball valve, damper actuator, duct-mounted temperature sensor, field-mounted relays, and thermostat.

2.2 FAN-POWERED SERIES UNITS

- A Manufacturers:
 1. Johnson Controls, Inc
 2. Price Industries
 3. Trane Technologies, PLC
 4. Substitutions: See Division 01
- B General:
 1. Factory-assembled and wired, AHRI 880 (I-P) rated, horizontal fan-powered terminal unit with blower, blower motor, mixing plenum, and primary air damper contained in a single unit housing.
- C Unit Casing:
 1. Minimum 22 gauge, 0.0299 inch galvanized steel.
 2. Primary Air Inlet Collar: Suitable for standard flexible duct sizes.
 3. Unit Discharge: Rectangular, suitable for flanged duct connection.
 4. Acceptable Liners:

- a. 3/4 inch thick polyurethane foam adhesive complying with UL 181 erosion requirements in accordance with ASHRAE Std 62.1, and having a maximum smoke developed index of 50 for both insulation and adhesive, when tested in accordance with ASTM E84.
- D Sound Attenuator:
 - 1. Provide if required to meet scheduled acoustical performance requirements.
 - 2. Construction to consist of a continuous extension of the casing and liner as required to achieve required attenuation.
- E Primary Air Damper Assembly:
 - 1. Heavy-gauge, galvanized steel, or extruded aluminum construction with solid shaft rotating in bearings.
 - 2. Provide indicator on damper shaft or alternative method for indicating damper position over full range of 90 degrees.
 - 3. Incorporate low leak (2 percent) damper blades for tight airflow shutoff.
 - 4. Fan(s): Forward curved, centrifugal type.
 - 5. Fan Motor:
 - a. PSC: Thermally protected, single-speed, multi-voltage (120, 208/240, 277), 60 cycle, single phase, energy-efficient design, permanently lubricated, using permanent split capacitor type for starting and specifically designed for use with a SCR (Silicon Controlled Rectifier) fan speed controller with three-speed motors as an acceptable alternative.
 - b. Fan motor shaft directly connected to fan and isolated from unit casing to prevent transmission of vibration.
- F Hot Water Heating Coil:
 - 1. Coil Casing: Minimum 22 gauge, 0.0299 inch galvanized steel, factory-installed on terminal unit with flanged discharge for attachment to downstream ductwork.
 - 2. Heavy-gauge aluminum fins, mechanically bonded to tubes.
 - 3. Copper Tubes: 0.016 inch minimum wall thickness with male solder header connections.
 - 4. Coil leak tested to minimum 305 psig.
 - 5. Base performance data on tests run in accordance with AHRI 410.
- G Electrical Requirements:
 - 1. Single-point power connection.
 - 2. Equipment wiring to comply with requirements of NFPA 70.
- H Controls:
 - 1. Terminal Unit Controls: Provide and sequence as indicated on drawings.
 - a. Provide accessories for field interfaced controller including airflow sensor, ball valve, damper actuator, duct-mounted temperature sensor, field-mounted relays, thermostat, and fan controlling thermostat.

2.3 HOSE KITS AND VALVES

- A Hoses:
 - 1. Provide hoses for all units for connection to main water supply and return headers.
 - 2. Length: 2 feet.
 - 3. Material: Braided stainless steel rated to minimum 400 psi at 265 degrees F.
- B Automatic Balancing Valves:
 - 1. Brass body for shutoff and hydronic balancing.
- C Ball Valves:
 - 1. Brass body for shutoff and hydronic balancing.
 - 2. Provide pressure/temperature ports.
 - 3. Provide balancing valves.
- D Y Strainers:
 - 1. Bronze body.
 - 2. "Y" type configuration with brass cap.
 - 3. Maximum Operating Pressure: Minimum 450 psi.
 - 4. Screen: Stainless steel.

PART 3 EXECUTION

3.1 INSTALLATION

- A Install in accordance with manufacturer's instructions.
- B Install the inlets of air terminal units and air flow sensors a minimum of four duct diameters from elbows, transitions, and duct takeoffs.
- C Provide ceiling access doors or locate units above easily removable ceiling components.
- D Support units individually from structure with wire rope complying with ASTM A492 and ASTM A603 in accordance with SMACNA (SRM). See Section 23 0548.
- E Do not support from ductwork.
- F Connect to ductwork in accordance with Section 23 31 00.
- G Verify that electric power is available and of the correct characteristics.

3.2 ADJUSTING

- A Reset volume with damper operator attached to assembly allowing flow range modulation from 100 percent of design flow to zero percent full flow. Set units with heating coils for minimum 50 percent full flow.

3.3 FIELD QUALITY CONTROL

- A See Division 01 for additional requirements.
- B Provide manufacturer's field representative to test, inspect, instruct, and observe field-assembled components and equipment installation, including connections and to assist in field testing. Report results in writing.
 - 1. Leak Test:
 - a. After installation, fill water coils and test for leaks.
 - b. Repair leaks and retest until no leaks exist.
 - 2. Operational Test:
 - a. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - b. Test and adjust controls and safeties.
 - c. Replace damaged and malfunctioning controls and other equipment.

3.4 CLEANING

- A See Division 01 for additional requirements.
- B Vacuum clean coils and inside of units.
- C Install new filters.

3.5 CLOSEOUT ACTIVITIES

- A See Division 01 for closeout submittals.
- B See Division 01 for additional requirements.

END OF SECTION 23 36 00

SECTION 23 37 00 - AIR OUTLETS AND INLETS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Diffusers:
- B Rectangular ceiling diffusers.
- C Slot ceiling diffusers.
- D Registers/grilles:
 - 1. Ceiling-mounted, exhaust and return register/grilles.
 - 2. Ceiling-mounted, supply register/grilles.
 - 3. Wall-mounted, supply register/grilles.
 - 4. Wall-mounted, linear register/grilles.
- E Duct-mounted supply and return registers/louvers.

1.2 SUBMITTALS

- A Refer to Division 01 for submittal procedures.
- B Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.
- C Project Record Documents: Record actual locations of air outlets and inlets.

1.3 QUALITY ASSURANCE

- A Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.
- B Test and rate louver performance in accordance with AMCA 500-L.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A Krueger-HVAC
- B Price Industries
- C Ruskin Company
- D Titus, a brand of Air Distribution Technologies
- E Substitutions: Refer to Division 01.

2.2 RECTANGULAR CEILING DIFFUSERS

- A Type: Provide square formed backpan stamped and core removable ceiling diffusers constructed to maintain 360 degree discharge air pattern.
- B Connections: As indicated on drawings.
- C Frame: Provide surface mount, snap-in, inverted T-bar, and spline type. In plaster ceilings, provide plaster frame and ceiling frame.
- D Fabrication: Steel with baked enamel finish.
- E Color: As indicated.
- F Accessories: Provide radial opposed blade, butterfly, and combination splitter volume control damper; removable core, sectorizing baffle, wire guard, and gaskets for surface mounted diffusers with damper adjustable from diffuser face.

2.3 CEILING SLOT DIFFUSERS

- A Type: Continuous 1/2 inch wide slot, 1 slots wide, with adjustable vanes for left, right, or vertical discharge.
- B Fabrication: Aluminum extrusions with factory baked enamel finish.
- C Color: As indicated.
- D Frame: 1-1/4 inch margin with concealed mounting and gasket, mitered end border.
- E Plenum: Integral, galvanized steel, insulated.

2.4 DUCT-MOUNTED SUPPLY AND RETURN REGISTERS/LOUVERS

- A Type: Duct-mounted, rectangular register for round-spiral duct with adjustable pivot-ended blades, end caps, built-in volume damper, and dual cover flanges to lay flush on duct surface regardless of diameter. Performance to match manufacturer's catalog data.
- B Material: 22 gauge, 0.0299 inch.
 - 1. Provide crossing spiral fitting-body of matching duct diameter.
- C Color: As indicated on drawings.

2.5 CEILING SUPPLY REGISTERS/GRILLES

- A Type: Streamlined and individually adjustable curved blades to discharge air along face of grille, one-way deflection.
- B Frame: 1 inch margin with concealed mounting and gasket.
- C Construction: Made of aluminum extrusions with factory enamel finish.
- D Color: As indicated.
- E Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.6 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

- A Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with blades set at 45 degrees, vertical face.
- B Frame: 1 inch margin with concealed mounting.
- C Fabrication: Steel with 20 gauge, 0.0359 inch minimum frames and 22 gauge, 0.0299 inch minimum blades, steel and aluminum with 20 gauge, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.
- D Color: As indicated.
- E Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans.

2.7 WALL SUPPLY REGISTERS/GRILLES

- A Type: Streamlined and individually adjustable blades, 3/4 inch minimum depth, 3/4 inch maximum spacing with spring or other device to set blades, vertical face, double deflection.
- B Frame: 1 inch margin with concealed mounting and gasket.
- C Fabrication: Steel with 20 gauge, 0.0359 inch minimum frames and 22 gauge, 0.0299 inch minimum blades, steel and aluminum with 20 gauge, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.
- D Color: As indicated.
- E Damper: Integral, gang-operated opposed blade type with removable key operator, operable from face.

2.8 LINEAR WALL REGISTERS/GRILLES

- A Type: Streamlined blades with 0 degree deflection, 1/8 by 3/4 inch on 1/4 inch centers.
- B Frame: 1 inch margin with concealed mounting and gasket.
- C Fabrication: Aluminum extrusions, with factory baked enamel finish.
- D Color: As indicated.
- E Damper: Integral gang-operated opposed blade damper with removable key operator, operable from face.

PART 3 EXECUTION**3.1 INSTALLATION**

- A Install in accordance with manufacturer's instructions.
- B Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
- C Install diffusers to ductwork with air tight connection.

- D Provide balancing dampers on duct take-off to diffusers and grilles and registers, despite whether dampers are specified as part of diffuser, or grille and register assembly.
- E Paint ductwork visible behind air outlets and inlets matte black, see Section 09 91 23.

3.2 CLOSEOUT ACTIVITIES

- A Demonstrate operational system to Owner's representative.
- B Instruct Owner's representative to maintain system and use occupant controls or interfaces, as required.

3.3 PROTECTION

- A Protect installed products until completion of project.
- B Replace, repair, or touch-up damaged products before Substantial Completion.

END OF SECTION 23 37 00

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SECTION 26 05 05 - SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Electrical demolition.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify field measurements and circuiting arrangements are as indicated.
- B Verify that abandoned wiring and equipment serve only abandoned facilities.
- C Demolition drawings are based on casual field observation and existing record documents.
- D Report discrepancies to Architect before disturbing existing installation.
- E Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

- A Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B Coordinate utility service outages with utility company.
- C 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.
- D 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. Minimize outage duration.
 - 1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.
 - 2. Make temporary connections to maintain service in areas adjacent to work area.
- E Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Notify Owner before partially or completely disabling system.
 - 2. Notify local fire service.
 - 3. Make notifications at least 24 hours in advance.
 - 4. Make temporary connections to maintain service in areas adjacent to work area.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A Perform work for removal and disposal of equipment and materials containing toxic substances regulated under the Federal Toxic Substances Control Act (TSCA) in accordance with applicable federal, state, and local regulations. Applicable equipment and materials include, but are not limited to:
 - 1. PCB-containing electrical equipment, including transformers, capacitors, and switches.
 - 2. PCB- and DEHP-containing lighting ballasts.
 - 3. Mercury-containing lamps and tubes, including fluorescent lamps, high intensity discharge (HID), arc lamps, ultra-violet, high pressure sodium, mercury vapor, ignitron tubes, neon, and incandescent.
- B Remove, relocate, and extend existing installations to accommodate new construction.
- C Remove abandoned wiring to source of supply.
- D Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

- E Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
- F Disconnect and remove abandoned panelboards and distribution equipment.
- G Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- H Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- I Repair adjacent construction and finishes damaged during demolition and extension work.
- J Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- K Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.4 CLEANING AND REPAIR

- A See Section 01 74 19 - Construction Waste Management and Disposal for additional requirements.
- B Clean and repair existing materials and equipment that remain or that are to be reused.
- C Panelboards: 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. Examine and research for obsolescence.
- D Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts and broken electrical parts.

END OF SECTION 26 05 05

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Single conductor building wire.
- B Underground feeder and branch-circuit cable.
- C Metal-clad cable.
- D Wiring connectors.
- E Electrical tape.
- F Heat shrink tubing.
- G Oxide inhibiting compound.
- H Wire pulling lubricant.
- I Cable ties.
- J Firestop sleeves.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.3 SUBMITTALS

- A Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- B Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.4 QUALITY ASSURANCE

- A Comply with requirements of NFPA 70.
- B Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.6 FIELD CONDITIONS

- A Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.1 CONDUCTOR AND CABLE APPLICATIONS

- A Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C Nonmetallic-sheathed cable is not permitted.
- D Underground feeder and branch-circuit cable is not permitted.
- E Service entrance cable is not permitted.
- F Armored cable is not permitted.
- G Metal-clad cable is not permitted.

2.2 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A Provide products that comply with requirements of NFPA 70.
- B Provide products listed, classified, and labeled as suitable for the purpose intended.
- C Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D Comply with NEMA WC 70.
- E Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G Conductor Material:
 - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 3. Tinned Copper Conductors: Comply with ASTM B33.
- H Minimum Conductor Size:
 - 1. Branch Circuits: 12 AWG.
 - a. Exceptions:
 - 1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
 - 2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
 - 3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
 - 2. Control Circuits: 14 AWG.
- I Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- J Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 - 2. Color Coding Method: Integrally colored insulation.
 - 3. Color Code:
 - a. 480Y/277 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral/Grounded: Gray.
 - b. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - c. Equipment Ground, All Systems: Green.
 - d. Isolated Ground, All Systems: Green with yellow stripe.

- e. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.
- f. For control circuits, comply with manufacturer's recommended color code.

2.3 SINGLE CONDUCTOR BUILDING WIRE

- A Description: Single conductor insulated wire.
- B Conductor Stranding:
 - 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid.
 - b. Size 8 AWG and Larger: Stranded.
- C Insulation Voltage Rating: 600 V.
- D Insulation:
 - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.

2.4 WIRING CONNECTORS

- A Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B Connectors for Grounding and Bonding: Comply with Section 26 05 26.
- C Wiring Connectors for Splices and Taps:
 - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- D Wiring Connectors for Terminations:
 - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 - 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
 - 3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
 - 4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
 - 5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
- E Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- F Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
- G Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
- H Mechanical Connectors: Provide bolted type or set-screw type.
- I Compression Connectors: Provide circumferential type or hex type crimp configuration.
- J Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

2.5 ACCESSORIES

- A Electrical Tape:
 - 1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
 - 2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.

3. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
4. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
5. Varnished Cambric Electrical Tape: Cotton cambric fabric tape, with or without adhesive, oil-primed and coated with high-grade insulating varnish; minimum thickness of 7 mil; suitable for continuous temperature environment up to 221 degrees F.
6. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.
- B Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
- C Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
- D Wire Pulling Lubricant:
 1. Listed and labeled as complying with UL 267.
 2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
 3. Suitable for use at installation temperature.
- E Cable Ties: Material and tensile strength rating suitable for application.
- F Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for cables and roofing system to be installed; designed to accommodate existing penetrations where applicable.
- G Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
- H Fire-Protective Coating for Electrical Conductors and Cables: Field-applied, intumescent or ablative coating designed to prevent ignition and propagation of fire along thermoplastic-insulated conductors and cables.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify that interior of building has been protected from weather.
- B Verify that work likely to damage wire and cable has been completed.
- C Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D Verify that field measurements are as indicated.
- E Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A Circuiting Requirements:
 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 2. When circuit destination is indicated without specific routing, determine exact routing required.
 3. Arrange circuiting to minimize splices.
 4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
 5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 6. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
 7. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is not permitted.
 - a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
 - b. Increase size of conductors as required to account for ampacity derating.
 - c. Size raceways, boxes, etc. to accommodate conductors.

8. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
9. Provide oversized neutral/grounded conductors where indicated and as specified below.
 - a. Provide 200 percent rated neutral for feeders fed from K-rated transformers.
 - b. Provide 200 percent rated neutral for feeders serving panelboards with 200 percent rated neutral bus.
- B Install products in accordance with manufacturer's instructions.
- C Perform work in accordance with NECA 1 (general workmanship).
- D Installation in Raceway:
 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 2. Pull all conductors and cables together into raceway at same time.
 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- E Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- F Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
 1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
 2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.
- G Install conductors with a minimum of 12 inches of slack at each outlet.
- H Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.
- I Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- J Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- K Make wiring connections using specified wiring connectors.
 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 3. Do not remove conductor strands to facilitate insertion into connector.
 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminants. Do not use wire brush on plated connector surfaces.
 5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- L Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
 1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
 - b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.

2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
 - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
 3. Wet Locations: Use heat shrink tubing.
- M Insulate ends of spare conductors using vinyl insulating electrical tape.
- N Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
- O Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- P Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.3 FIELD QUALITY CONTROL

- A See Section 01 40 00 - Quality Requirements, for additional requirements.
- B Inspect and test in accordance with NETA ATS, except Section 4.
- C Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
 1. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.
- D Correct deficiencies and replace damaged or defective conductors and cables.
- E Provide a NETA testing form signed by the testing company or Contractor performing the tests and inspections showing test and inspection results and certification that testing was performed under the required standards. Do not energize conductors without approved tests.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Grounding and bonding requirements.
- B Conductors for grounding and bonding.
- C Connectors for grounding and bonding.
- D Ground bars.
- E Ground rod electrodes.
- F Ground access wells.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination:
 - 1. Verify exact locations of underground metal water service pipe entrances to building.
 - 2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B Sequencing:
 - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.3 SUBMITTALS

- A Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- B Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- C Field quality control test reports.
- D Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.4 QUALITY ASSURANCE

- A Comply with requirements of NFPA 70.
- B Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 GROUNDING AND BONDING REQUIREMENTS

- A Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

- D Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- E Grounding System Resistance:
 - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
 - 2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
 - 3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.
- F Grounding Electrode System:
 - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
 - a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
 - 2. Metal Underground Water Pipe(s):
 - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
 - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
 - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
 - 3. Metal In-Ground Support Structure:
 - a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
 - 4. Concrete-Encased Electrode:
 - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
 - 5. Ground Rod Electrode(s):
 - a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
 - b. Space electrodes not less than 10 feet from each other and any other ground electrode.
 - c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
 - d. Provide ground access well for first connected electrode.
 - 6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
 - 7. Ground Bar: Provide ground bar, separate from service equipment enclosure (Intersystem Bonding Terminal or IBT), for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
 - a. Ground Bar Size: Minimum 1/4 by 2 by 12 inches unless otherwise indicated or required.
 - b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
 - c. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.

8. Ground Riser: Provide common grounding electrode conductor not less than 3/0 AWG for tap connections to multiple separately derived systems as permitted in NFPA 70. This would include locations where structural steel or other grounding electrodes are not readily available at the equipment locations.
- G Service-Supplied System Grounding:
 1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
 2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.
- H Separately Derived System Grounding:
 1. Separately derived systems include, but are not limited to:
 - a. Transformers (except autotransformers such as buck-boost transformers).
 - b. Uninterruptible power supplies (UPS), when configured as separately derived systems.
 - c. Generators, when neutral is switched in the transfer switch.
 2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
 3. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
 4. Where common grounding electrode conductor ground riser is used for tap connections to multiple separately derived systems, provide bonding jumper to connect the metal building frame and metal water piping in the area served by the derived system to the common grounding electrode conductor.
 5. Outdoor Source: Where the source of the separately derived system is located outside the building or structure supplied, provide connection to grounding electrode at source in accordance with NFPA 70.
 6. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.
 7. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.
- I Bonding and Equipment Grounding:
 1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
 2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
 3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
 7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:

- a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
 - b. Metal gas piping.
- 8. Provide bonding for interior metal air ducts.
- 9. Provide bonding for metal building frame.
- 10. Provide bonding for metal siding not effectively bonded through attachment to metal building frame.
- J Communications Systems Grounding and Bonding:
 - 1. Provide intersystem bonding termination (IBT) at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
 - 2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
 - a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
 - b. Raceway Size: 3/4 inch trade size unless otherwise indicated or required.
 - c. Ground Bar Size: Minimum 1/4 by 2 by 12 inches unless otherwise indicated or required.
 - d. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.
- K Cable Tray Systems: Also comply with Section 26 05 36.
- L Pole-Mounted Luminaires: Also comply with Section 26 56 00.

2.2 GROUNDING AND BONDING COMPONENTS

- A General Requirements:
 - 1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:
 - 1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C Connectors for Grounding and Bonding:
 - 1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 - 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 - 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
 - a. Exceptions:
 - 1) Use exothermic welded connections for connections to metal building frame.
 - 4. Manufacturers - Mechanical and Compression Connectors:
 - a. Burndy LLC: www.burndy.com/#sle.
 - b. nVent ERICO: www.nvent.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
- D Ground Bars:
 - 1. Description: Copper rectangular ground bars with mounting brackets and insulators.
 - 2. Size: As indicated or where not indicated minimum 12"x4"x1/4" thick.
 - 3. Holes for Connections: As indicated or as required for connections to be made.
 - 4. Manufacturers:
 - a. Harger Lightning & Grounding: www.harger.com/#sle.
 - b. nVent ERICO: www.nvent.com/#sle.
- E Ground Rod Electrodes:
 - 1. Comply with NEMA GR 1.
 - 2. Material: Copper-bonded (copper-clad) steel.
 - 3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

4. Where rod lengths of greater than 10 feet are indicated or otherwise required, sectionalized ground rods may be used.
 5. Manufacturers:
 - a. allG Fabrication: www.allgfab.com/#sle.
 - b. Galvan Industries, Inc: www.galvanelectrical.com/#sle.
 - c. Harger Lightning & Grounding: www.harger.com/#sle.
- F Ground Access Wells:
1. Description: Open bottom round or rectangular well with access cover for testing and inspection; suitable for the expected load at the installed location.
 2. Size: As required to provide adequate access for testing and inspection, but not less than minimum size requirements specified.
 - a. Round Wells: Not less than 8 inches in diameter.
 - b. Rectangular Wells: Not less than 12 by 12 inches.
 3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 10 inches.
 4. Cover: Factory-identified by permanent means with word "GROUND".
 5. Manufacturers:
 - a. allG Fabrication: www.allgfab.com/#sle.
 - b. Harger Lightning & Grounding: www.harger.com/#sle.
 - c. nVent ERICO: www.nvent.com/#sle.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify that work likely to damage grounding and bonding system components has been completed.
- B Verify that field measurements are as indicated.
- C Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A Install products in accordance with manufacturer's instructions.
- B Perform work in accordance with NECA 1 (general workmanship).
- C Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
 1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.
 2. Indoor Installations: Unless otherwise indicated, install with 4 inches of top of rod exposed.
- D Make grounding and bonding connections using specified connectors.
 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E Identify grounding and bonding system components in accordance with Section 26 05 53.

3.3 FIELD QUALITY CONTROL

- A See Section 01 40 00 - Quality Requirements, for additional requirements.
- B Inspect and test in accordance with NETA ATS except Section 4.

- C Perform inspections and tests listed in NETA ATS, Section 7.13.
- D Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- E Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.
- F Submit detailed reports detailing inspection and testing results and corrective actions taken. Do not energize the electrical service without approval.

END OF SECTION 26 05 26

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with actual equipment and components to be installed.
 - 2. Coordinate work to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at installed locations.
 - 4. Coordinate arrangement of supports with ductwork, piping, equipment and other potential conflicts.
 - 5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has cured; see Section 03 30 00.

1.3 SUBMITTALS

- A Product Data: Provide manufacturer's standard catalog pages and data sheets for channel/strut framing systems, nonpenetrating rooftop supports, and post-installed concrete/masonry anchors.
- B Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

1.4 QUALITY ASSURANCE

- A Maintain at project site one copy of each referenced document that prescribes execution requirements.
- B Installer Qualifications for Powder-Actuated Fasteners: Certified by fastener system manufacturer with current operator's license.
- C Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 SUPPORT AND ATTACHMENT COMPONENTS

- A General Requirements:
 - 1. Comply with the following. Where requirements differ, comply with most stringent.
 - a. NFPA 70.
 - b. Requirements of authorities having jurisdiction.
 - 2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
 - 3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
 - 4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for load to be supported with minimum safety factor of 25%. Include consideration for vibration, equipment operation, and shock loads where applicable.

5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
6. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
7. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
 - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B Conduit and Cable Supports: Straps and clamps suitable for conduit or cable to be supported.
 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
- D Metal Channel/Strut Framing Systems:
 1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
 2. Comply with MFMA-4.
 3. Channel Material:
 - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
 4. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
 5. Minimum Channel Dimensions: 1-5/8 inch wide by 13/16 inch high.
- E Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
 1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2-inch diameter.
 - b. Busway Supports: 1/2-inch diameter.
 - c. Single Conduit up to 1-inch (27 mm) Trade Size: 1/4-inch diameter.
 - d. Single Conduit Larger than 1-inch (27 mm) Trade Size: 3/8-inch diameter.
 - e. Trapeze Support for Multiple Conduits: 3/8-inch diameter.
 - f. Outlet Boxes: 1/4-inch diameter.
 - g. Luminaires: 1/4-inch diameter.
- F Anchors and Fasteners:
 1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.
 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 4. Hollow Masonry: Use toggle bolts.
 5. Hollow Stud Walls: Use toggle bolts.
 6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
 7. Sheet Metal: Use sheet metal screws.
 8. Wood: Use wood screws.
 9. Plastic and lead anchors are not permitted.
 10. Powder-actuated fasteners are not permitted.
 11. Hammer-driven anchors and fasteners are not permitted.
 - a. Nails are permitted for attachment of nonmetallic boxes to wood frame construction.
 - b. Staples are permitted for attachment of nonmetallic-sheathed cable to wood frame construction.
 12. Preset Concrete Inserts: Continuous metal channel/strut and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Manufacturer: Same as manufacturer of metal channel/strut framing system.
 - b. Comply with MFMA-4.
 - c. Channel Material: Use galvanized steel.

- d. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch minimum base metal thickness.
- 13. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify that field measurements are as indicated.
- B Verify that mounting surfaces are ready to receive support and attachment components.
- C Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A Install products in accordance with manufacturer's instructions.
- B Install hangers and supports in accordance with NECA 1.
- C Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- D Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- E Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- F Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- G Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- H Equipment Support and Attachment:
 - 1. Use metal, fabricated supports or supports assembled from metal channel/strut to support equipment as required.
 - 2. Use metal channel/strut secured to studs to support equipment surface mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel/strut to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- I Conduit Support and Attachment: See Section 26 05 33.13 for additional requirements.
- J Box Support and Attachment: See Section 26 05 33.16 for additional requirements.
- K Interior Luminaire Support and Attachment: See Section 26 51 00 for additional requirements.
- L Exterior Luminaire Support and Attachment: See Section 26 56 00 for additional requirements.
- M Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- N Secure fasteners in accordance with manufacturer's recommended torque settings.
- O Remove temporary supports.

3.3 FIELD QUALITY CONTROL

- A See Section 01 40 00 - Quality Requirements for additional requirements.
- B Inspect support and attachment components for damage and defects.
- C Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION 26 05 29

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SECTION 26 05 33.13 - CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Galvanized steel rigid metal conduit (RMC).
- B Galvanized steel intermediate metal conduit (IMC).
- C Flexible metal conduit (FMC).
- D Galvanized steel electrical metallic tubing (EMT).
- E Rigid polyvinyl chloride (PVC) conduit.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination:
 - 1. Coordinate minimum sizes of conduits with actual type and quantity of conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment, and other potential conflicts.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.
 - 4. Coordinate work to provide roof penetrations that preserve integrity of roofing system and do not void roof warranty.
 - 5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B Sequencing:
 - 1. Do not begin installation of conductors and cables until installation of conduit between termination points is complete.

1.3 SUBMITTALS

- A Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

1.4 QUALITY ASSURANCE

- A Documents at Project Site: Maintain at project site one copy of manufacturer's instructions and shop drawings.
- B Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 CONDUIT APPLICATIONS

- A Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, manufacturer's instructions, and product listing.
- B Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.
- C Underground:
 - 1. Under Slab on Grade: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or rigid PVC conduit.
- D Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT).

- E Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT).
- F Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT).
- G Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC).
- H Flexible Connections to Vibrating Equipment:
 - 1. Dry Locations: Use flexible metal conduit (FMC).
 - 2. Maximum Length: 4 feet unless otherwise indicated.

2.2 CONDUIT - GENERAL REQUIREMENTS

- A Comply with NFPA 70.
- B Electrical Service Conduits: See Section 26 21 00 for additional requirements.
- C Fittings for Grounding and Bonding: See Section 26 05 26 for additional requirements.
- D Provide conduit, fittings, supports, and accessories required for complete raceway system.
- E Provide products listed, classified, and labeled as suitable for purpose intended.
- F Minimum Conduit Size, Unless Otherwise Indicated:
 - 1. Branch Circuits: 3/4-inch trade size.
 - 2. Branch Circuit Homeruns: 3/4-inch trade size.
 - 3. Control Circuits: 1/2-inch trade size.
 - 4. Flexible Connections to Luminaires: 3/8-inch trade size.
- G Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.3 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B Fittings:
 - 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
 - 2. Material: Use steel or malleable iron.
 - a. Do not use die cast zinc fittings.
 - 3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.4 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)

- A Manufacturers:
 - 1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
 - 2. Nucor Tubular Products: www.nucortubular.com/#sle.
 - 3. Rymco USA: www.rymcousa.com/#sle.
 - 4. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
 - 5. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.
- B Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- C Fittings:
 - 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.
 - 2. Material: Use steel or malleable iron.
 - a. Do not use die cast zinc fittings.
 - 3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.5 FLEXIBLE METAL CONDUIT (FMC)

- A Description: NFPA 70, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.
- B Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - a. Do not use die cast zinc fittings.

2.6 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

- A Manufacturers:
 - 1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
 - 2. Nucor Tubular Products: www.nucortubular/#sle.
 - 3. Rymco USA: www.rymcousa.com/#sle.
 - 4. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
 - 5. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.
- B Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - a. Do not use die cast zinc fittings.
 - 3. Connectors and Couplings: Use compression/gland type.
 - a. Do not use indenter type connectors and couplings.

2.7 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- B Fittings:
 - 1. Manufacturer: Same as manufacturer of conduit to be connected.
 - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.8 ACCESSORIES

- A Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.
- B Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- C Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf.
- D Foam Conduit Sealant:
 - 1. Removable, two-part, closed-cell foam, specifically designed for sealing conduit openings against water, moisture, gases, and dust.
 - 2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
 - 3. Rated to hold minimum of 10 ft water head pressure.
- E Conduit Mechanical Seals:
 - 1. Listed as complying with UL 514B.
 - 2. Specifically designed for sealing conduit openings against water, moisture, gases, and dust.
 - 3. Suitable for sealing around conductors/cables to be installed.
- F Sealing Systems for Concrete Penetrations:
 - 1. Sleeves: Provide water stop ring or cement coating that bonds to concrete to prevent water infiltration.
 - 2. Rate for minimum of 40 psig; suitable for sealing around conduits to be installed.

- G Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for conduits and roofing system to be installed; designed to accommodate existing penetrations where applicable.
- H Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.
- I Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify that field measurements are as indicated.
- B Verify that mounting surfaces are ready to receive conduits.
- C Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A Install products in accordance with manufacturer's instructions.
- B Install conduit in accordance with NECA 1.
- C Galvanized Steel Rigid Metal Conduit (RMC): Install in accordance with NECA 101.
- D Intermediate Metal Conduit (IMC): Install in accordance with NECA 101.
- E Rigid Polyvinyl Chloride (PVC) Conduit: Install in accordance with NECA 111.
- F Conduit Routing:
 - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 - 2. When conduit destination is indicated without specific routing, determine exact routing required.
 - 3. Conceal conduits unless specifically indicated to be exposed.
 - 4. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Electrical rooms.
 - b. Mechanical equipment rooms.
 - c. Within joists in areas with no ceiling.
 - 5. Unless otherwise approved, do not route exposed conduits:
 - a. Across floors.
 - b. Across roofs.
 - c. Across top of parapet walls.
 - d. Across building exterior surfaces.
 - 6. Conduits installed underground or embedded in concrete may be routed in shortest possible manner unless otherwise indicated. Route other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
 - 7. Arrange conduit to maintain adequate headroom, clearances, and access.
 - 8. Arrange conduit to provide no more than equivalent of four 90-degree bends between pull points.
 - 9. Arrange conduit to provide no more than 150 feet between pull points.
 - 10. Route conduits above water and drain piping where possible.
 - 11. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
 - 12. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
 - 13. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
 - a. Heaters.
 - b. Hot water piping.
 - c. Flues.
 - d. Steam Piping.
 - 14. Group parallel conduits in same area on common rack.

G Conduit Support:

1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 26 05 29.
2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
4. Use conduit strap to support single surface-mounted conduit.
 - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
5. Use metal channel/strut with accessory conduit clamps to support multiple parallel surface-mounted conduits.
6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
7. Use trapeze hangers assembled from threaded rods and metal channel/strut with accessory conduit clamps to support multiple parallel suspended conduits.
8. Use nonpenetrating rooftop supports to support conduits routed across rooftops, where approved.
9. Use of spring steel conduit clips for support of conduits is permitted only as follows:
10. Use of wire for support of conduits is not permitted.

H Connections and Terminations:

1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
5. Where spare conduits stub up through concrete floors and are not terminated in box or enclosure, provide threaded couplings equipped with threaded plugs set flush with finished floor.
6. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
7. Secure joints and connections to provide mechanical strength and electrical continuity.

I Penetrations:

1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Provide suitable sealing system where conduits penetrate exterior wall below grade.
6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
8. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 07 84 00.

J Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:

1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
3. Where conduits are subject to earth movement by settlement or frost.

K Conduit Sealing:

1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
 - a. Where conduits enter building from outside.
 - b. Where service conduits enter building from underground distribution system.
 - c. Where conduits enter building from underground.
 - d. Where conduits may transport moisture to contact live parts.
2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
 - a. Where conduits pass from outdoors into conditioned interior spaces.
 - b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

L Provide pull string in each empty conduit and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.

M Provide grounding and bonding; see Section 26 05 26.

N Identify conduits; see Section 26 05 53.

3.3 FIELD QUALITY CONTROL

A See Section 01 40 00 - Quality Requirements for additional requirements.

B Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C Correct deficiencies and replace damaged or defective conduits.

3.4 PROTECTION

A Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION 26 05 33.13

SECTION 26 05 33.16 - BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
- C Boxes and enclosures for integrated power, data, and audio/video.
- D Floor boxes.
- E Underground boxes/enclosures.
- F Accessories.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
 - 4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
 - 5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
 - 6. Coordinate the work with other trades to preserve insulation integrity.
 - 7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
 - 8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.3 SUBMITTALS

- A Product Data: Provide manufacturer's standard catalog pages and data sheets for outlet and device boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.
 - 1. Underground Boxes/Enclosures: Include reports for load testing in accordance with SCTE 77 certified by a professional engineer or an independent testing agency upon request.
- B Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- C Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Keys for Lockable Enclosures: Two of each different key.

1.4 QUALITY ASSURANCE

- A Comply with requirements of NFPA 70.
- B Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 BOXES

A General Requirements:

1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
3. Provide products listed, classified, and labeled as suitable for the purpose intended.
4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:

1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit or exposed intermediate metal conduit (IMC) is used.
4. Use suitable concrete type boxes where flush-mounted in concrete.
5. Use suitable masonry type boxes where flush-mounted in masonry walls.
6. Use raised covers suitable for the type of wall construction and device configuration where required.
7. Use shallow boxes where required by the type of wall construction.
8. Do not use "through-wall" boxes designed for access from both sides of wall.
9. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
10. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
11. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
12. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
13. Minimum Box Size, Unless Otherwise Indicated:
 - a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
 - b. Communications Systems Outlets: 4 inch square by 2-1/8 inch (100 by 54 mm) trade size.
 - c. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
14. Wall Plates: Comply with Section 26 27 26.

C Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:

1. Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA EN 10250 Environment Type, Unless Otherwise Indicated:
 - a. Indoor Clean, Dry Locations: Type 1, painted steel.
 - b. Outdoor Locations: Type 3R, painted steel.
3. Junction and Pull Boxes Larger Than 100 cubic inches:
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
 - b. Boxes 6 square feet and Larger: Provide hinged-cover enclosures.
4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
 - a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
 - b. Back Panels: Painted steel, removable.
 - c. Terminal Blocks: Provide voltage/current ratings and terminal quantity suitable for purpose indicated, with 25 percent spare terminal capacity.

5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
- D Boxes and Enclosures for Integrated Power, Data, and Audio/Video: Size and configuration as indicated or as required with partitions to separate services; field-connected gangable boxes may not be used.
- E Floor Boxes:
 1. Description: Floor boxes compatible with floor box service fittings provided in accordance with Section 26 27 26; with partitions to separate multiple services; furnished with all components, adapters, and trims required for complete installation.
 2. Use cast iron floor boxes within slab on grade.
 3. Use sheet-steel or cast iron floor boxes within slab above grade.
 4. Metallic Floor Boxes: Fully adjustable (with integral means for leveling adjustment prior to and after concrete pour).
 5. Manufacturer: Same as manufacturer of floor box service fittings.
 6. Refer to drawings schedules, legends, notes and details for specific type and configurations of floor boxes.

2.2 ACCESSORIES

- A Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for boxes and facade materials to be installed.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify that field measurements are as indicated.
- B Verify that mounting surfaces are ready to receive boxes.
- C Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A Install products in accordance with manufacturer's instructions.
- B Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D Provide separate boxes for emergency power and normal power systems.
- E Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- F Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- G Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- H Box Locations:
 1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 31 00 as required where approved by the Architect.
 2. Unless dimensioned, box locations indicated are approximate.
 3. Locate boxes as required for devices installed under other sections or by others.
 - a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 27 26.
 - b. Communications Systems Outlets: Comply with Section 27 10 00 where is it included in the project, otherwise comply with this section or legends, details and notes on the drawings.
 4. Locate boxes so that wall plates do not span different building finishes.
 5. Locate boxes so that wall plates do not cross masonry joints.
 6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.

7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
 8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation or use acoustical blankets or other measures in the area of the boxes to mute sound transmission.
 9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
 - a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
 - b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.
 10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 05 33.13.
 11. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
 - a. Concealed above accessible suspended ceilings.
 - b. Within joists in areas with no ceiling.
 - c. Electrical rooms.
 - d. Mechanical equipment rooms.
- I Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
 3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
 4. Use far-side support (support from two framing members) to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.
- J Install boxes plumb and level.
- K Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- L Install boxes as required to preserve insulation integrity.
- M Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.
- N Underground Boxes/Enclosures:
1. Install enclosure on gravel base, minimum 6 inches deep.
 2. Flush-mount enclosures located in concrete or paved areas.
 3. Mount enclosures located in landscaped areas with top at 1 inch above finished grade.
 4. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.
- O Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- P Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- Q Close unused box openings.

- R Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- S Provide grounding and bonding in accordance with Section 26 05 26.
- T Identify boxes in accordance with Section 26 05 53.

3.3 CLEANING

- A Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.4 PROTECTION

- A Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION 26 05 33.16

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SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Electrical identification requirements.
- B Identification nameplates and labels.
- C Wire and cable markers.
- D Voltage markers.
- E Underground warning tape.
- F Warning signs and labels.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination:
 - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B Sequencing:
 - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
 - 2. Do not install identification products until final surface finishes and painting are complete.

1.3 SUBMITTALS

- A Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- B Shop Drawings: Provide schedule of items to be identified indicating proposed designations, materials, legends, and formats.

1.4 QUALITY ASSURANCE

- A Comply with requirements of NFPA 70.

1.5 FIELD CONDITIONS

- A Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.1 IDENTIFICATION REQUIREMENTS

- A Existing Work: Unless specifically excluded, identify existing elements to remain whose designations are changed as part of the new work.
- B Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components. These requirements may be superseded or enhanced by legends, details and notes on plans.
 - a. Enclosed switches, circuit breakers, and motor controllers:
 - 1) Identify power source and circuit number. Include location when not within sight of equipment.
 - 2) Identify load(s) served. Include location when not within sight of equipment.
 - 2. Use voltage marker to identify highest voltage present for each piece of electrical equipment.
 - 3. Use identification nameplate to identify equipment utilizing series ratings, where permitted, in accordance with NFPA 70.
 - 4. Use identification nameplate to identify switchboards and panelboards utilizing a high leg delta system in accordance with NFPA 70.
 - 5. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
 - 6. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".

7. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
 - a. Service equipment.
 - b. Industrial control panels.
 - c. Motor control centers.
 - d. Elevator control panels.
 - e. Industrial machinery.
 - f. Elevator power disconnect.
 8. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
 - a. Minimum Size: 3.5 by 5 inches.
 - b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.
 - c. Service Equipment: Include the following information in accordance with NFPA 70.
 - 1) Equipment name or designation used on the drawings.
 - 2) Nominal system voltage.
 - 3) Available fault current.
 - 4) Date label applied.
- C Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
 3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
 - a. At each source and load connection.
 - b. Within boxes when more than one circuit is present.
 - c. Within equipment enclosures when conductors and cables enter or leave the enclosure.
 4. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.
 5. Use underground warning tape to identify direct buried cables.
- D Identification for Raceways:
1. Use factory-painted conduits to identify specified systems for accessible conduits.
 - a. Color Code:
 - 1) Normal Power System: Galvanized
 - 2) Emergency Power System: Green .
 - 3) Fire Alarm System: Red.
 - 4) Data, Telephone, Paging, TV Systems: Orange
 - 5) Audio Visual: Galvanized
 - 6) HVAC Controls: Blue
 - 7) Intercom, Card Reader, Camera Systems: Yellow
 2. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.
 3. Use underground warning tape to identify underground raceways.
- E Identification for Boxes and Covers:
1. Use color coded boxes to identify systems other than normal power system.
 - a. Color-Coded Boxes: Field-painted per the following color code:
 - 1) Normal 120/208V Power System: Galvanized
 - 2) Normal 277/480V Power System: Black

- 3) Emergency Power System: Green .
 - 4) Fire Alarm System: Bright Red.
 - 5) Data: Brown.
 - 6) Telephone: Orange.
 - 7) Paging: White.
 - 8) TV Systems: Purple.
 - 9) Audio Visual: Blue.
 - 10) Intercom, Card Reader, Camera, Network Backbone Systems: Galvanized
2. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.
 - a. For exposed boxes in public areas, use only identification labels.
 3. Use warning labels to identify electrical hazards for boxes containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".
- F Identification for Devices:
1. Wiring Device and Wallplate Finishes: Comply with Section 26 27 26.
 2. Factory Pre-Marked Wallplates: Comply with Section 26 27 26.
 3. Use identification label to identify fire alarm system devices.
 4. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
 5. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.
 6. Use identification label to identify receptacles protected by upstream GFI, AFCI other type protection, where permitted. The materials used and fastening of the label shall provide a semi-permanent installation.
- G Identification for Luminaires:
1. Use permanent red dot on luminaire frame to identify luminaires connected to emergency power system.

2.2 IDENTIFICATION NAMEPLATES AND LABELS

- A Identification Nameplates:
1. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
 2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
 - a. Exception: Provide minimum thickness of 1/8 inch when any dimension is greater than 4 inches.
 3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
 4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
 5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C Format for Equipment Identification:
1. Minimum Size: 1 inch by 2.5 inches.
 2. Legend:
 - a. System designation where applicable:
 - 1) Emergency Power System: Identify with text "EMERGENCY".

- 2) Fire Alarm System: Identify with text "FIRE ALARM".
 - b. Equipment designation or other approved description.
 - c. Other information as indicated.
- 3. Text: All capitalized unless otherwise indicated.
- 4. Minimum Text Height:
 - a. System Designation: 1/2 inch.
 - b. Equipment Designation: 1/4 inch.
 - c. Other Information: 1/8 inch.
 - d. Exception: Provide minimum text height of 1 inch for equipment located more than 10 feet above floor or working platform.
- 5. Color:
 - a. Normal Power System: White text on black background.
 - b. Emergency Power System: White text on red background.
 - c. Fire Alarm System: White text on red background.
- D Format for Receptacle Identification:
 - 1. Minimum Size: 1/4 inch by 1.5 inches.
 - 2. Legend: Power source and circuit number or other designation indicated.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height: 3/16 inch.
 - 5. Color: Black text on clear background.
- E Format for Control Device Identification:
 - 1. Minimum Size: 3/8 inch by 1.5 inches.
 - 2. Legend: Load controlled or other designation indicated.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height: 3/16 inch.
 - 5. Color: Black text on clear background.

2.3 WIRE AND CABLE MARKERS

- A Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- B Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- C Legend: Power source and circuit number or other designation indicated.
- D Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- E Minimum Text Height: 1/8 inch.
- F Color: Black text on white background unless otherwise indicated.

2.4 VOLTAGE MARKERS

- A Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
- B Minimum Size:
 - 1. Markers for Equipment: 1 1/8 by 4 1/2 inches.
 - 2. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
 - 3. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
 - 4. Markers for Junction Boxes: 1/2 by 2 1/4 inches.
- C Legend:
 - 1. Markers for Voltage Identification: Highest voltage present.
 - 2. Markers for System Identification:
 - a. Emergency Power System: Text "EMERGENCY".
 - b. Other Systems: Type of service.
- D Color: Black text on orange background unless otherwise indicated.

2.5 UNDERGROUND WARNING TAPE

- A Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

- B Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.
- C Legend: Type of service, continuously repeated over full length of tape.
- D Color:

2.6 WARNING SIGNS AND LABELS

- A Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B Warning Signs:
 - 1. Materials:
 - a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
 - b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
 - 2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
 - 3. Minimum Size: 7 by 10 inches unless otherwise indicated.
- C Warning Labels:
 - 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 - 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 - 3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.1 PREPARATION

- A Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.2 INSTALLATION

- A Install products in accordance with manufacturer's instructions.
- B Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 - 1. Surface-Mounted Equipment: Enclosure front.
 - 2. Flush-Mounted Equipment: Inside of equipment door.
 - 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 - 4. Elevated Equipment: Legible from the floor or working platform.
 - 5. Interior Components: Legible from the point of access.
 - 6. Conduits: Legible from the floor.
 - 7. Boxes: Outside face of cover.
 - 8. Conductors and Cables: Legible from the point of access.
 - 9. Devices: Outside face of cover.
- C Install identification products centered, level, and parallel with lines of item being identified.
- D Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.
- G Secure rigid signs using stainless steel screws.
- H Mark all handwritten text, where permitted, to be neat and legible.

3.3 FIELD QUALITY CONTROL

- A See Section 01 40 00 - Quality Requirements, for additional requirements.

- B Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION 26 05 53

SECTION 26 09 23 - LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Occupancy sensors.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination:

1. Coordinate placement of lighting control devices with millwork, furniture, equipment and other potential conflicts.
2. Coordinate placement of wall switch occupancy sensors with installed door swings.
3. Coordinate placement of occupancy sensors with millwork, furniture, equipment and other potential obstructions to motion detection coverage.
4. Coordinate lighting control device product selections with luminaire characteristics; see Section 26 51 00 and lighting fixture schedule.
5. Notify Architect of conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.3 SUBMITTALS

- A Product Data: Include ratings, operating modes or sequence of functions, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.

1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.

- B Shop Drawings:

1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
2. Digital Load Controllers: Provide dimensioned plan views indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing factory and field connections. Include manufacturer product characteristics and application instructions for wired and wireless applications, including start-up and commissioning.

- C Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

- D Operation and Maintenance Data: Include detailed information on device programming and setup.

1.4 QUALITY ASSURANCE

- A Comply with NFPA 70.

- B Maintain at project site one copy of each referenced document that prescribes execution requirements.

- C Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

- D Product Evaluation and Listing Organization Qualifications: Organization engaged in evaluation of products and services, including those recognized by OSHA as Nationally Recognized Testing Laboratories (NRTL), and acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND PROTECTION

- A Store products in clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.6 FIELD CONDITIONS

- A Maintain field conditions within manufacturer's required service conditions during and after installation.

1.7 WARRANTY

- A See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B Provide five year manufacturer warranty for occupancy sensors.
- C Provide five year manufacturer warranty for digital load controllers.

PART 2 PRODUCTS**2.1 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS**

- A Provide products listed, classified, and labeled as suitable for purpose intended.
- B Unless specifically indicated as excluded, provide components necessary for complete operating system including, but not limited to, conduit, wiring, connectors, hardware, and accessories.

2.2 OCCUPANCY SENSORS

- A Manufacturers:
 - 1. Acuity Brands, Inc: www.acuitybrands.com/#sle.
 - 2. Legrand North America, Inc: www.legrand.us/#sle.
 - 3. Lutron Electronics Company, Inc: www.lutron.com/#sle.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
 - 5. Source Limitations: Furnish products produced by single manufacturer and obtained from single supplier.
- B General Requirements:
 - 1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
 - 2. Sensor Technology:
 - a. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using combination of both passive infrared and ultrasonic technologies.
 - 3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
 - 4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during adjustable turn-off delay time interval.
 - 5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.
 - 6. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
 - 7. Adaptive Technology: Field selectable; capable of self-adjusting sensitivity and time delay according to conditions.
 - 8. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
 - 9. Load Rating for Line Voltage Occupancy Sensors: As required to control load indicated on drawings.
 - 10. Isolated Relay for Low Voltage Occupancy Sensors: SPDT dry contacts, ratings as required for interface with system indicated.
- C Wall Switch Occupancy Sensors:
 - 1. General Requirements:
 - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
 - b. Unless otherwise indicated or required to control load indicated on drawings, provide line voltage units with self-contained relay.

- c. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during delayed-off time interval.
 - d. Finish: Match finishes specified for wiring devices in Section 26 27 26, unless otherwise indicated.
 - 2. Passive Infrared/Ultrasonic Dual Technology Wall Switch Occupancy Sensors: Capable of detecting motion within area of 900 square feet.
- D Wall Dimmer Occupancy Sensors:
 - 1. General Requirements:
 - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with field of view of 180 degrees, integrated dimming control capability, and no leakage current to load in off mode.
 - b. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
 - c. Manual-Off Override Control Capability: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during delayed-off time interval.
 - d. Dimmer: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, and listed as complying with UL 1472; type and rating suitable for load controlled.
 - e. Finish: Match finishes specified for wiring devices in Section 26 27 26, unless otherwise indicated.
- E Ceiling Mounted Occupancy Sensors:
 - 1. General Requirements:
 - a. Description: Low profile occupancy sensors designed for ceiling installation.
 - b. Unless otherwise indicated or required to control load indicated on drawings, provide low voltage units, for use with separate compatible accessory power packs.
 - c. Provide field selectable setting for disabling LED motion detector visual indicator.
 - d. Occupancy sensor to be field selectable as either manual-on/automatic-off or automatic on/off.
 - e. Finish: White unless otherwise indicated.
 - 2. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:
 - a. Standard Range Sensors: Capable of detecting motion within area of 450 square feet at mounting height of 9 feet, with field of view of 360 degrees.
 - b. Extended Range Sensors: Capable of detecting motion within area of 1,200 square feet at mounting height of 9 feet, with field of view of 360 degrees.
- F Power Packs for Low-Voltage Occupancy Sensors:
 - 1. Description: Plenum rated, self-contained low-voltage class 2 transformer and relay compatible with specified low-voltage occupancy sensors for switching of line-voltage loads.
 - 2. Provide quantity and configuration of power and slave packs with associated wiring and accessories as required to control load indicated on drawings.
 - 3. Input Supply Voltage: Dual rated for 120/277 V ac.
 - 4. Load Rating: As required to control load indicated on drawings.

END OF SECTION 26 09 23

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SECTION 26 27 26 - WIRING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Wall switches.
- B Wall dimmers.
- C Receptacles.
- D Wall plates and covers.
- E Floor box service fittings.
- F Poke-through assemblies.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others. This includes floor boxes.
 - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 - 3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
 - 4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 - 5. Coordinate the core drilling of holes for poke-through assemblies with the work covered under other sections.
 - 6. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
- B Sequencing:
 - 1. Do not install wiring devices until final surface finishes and painting are complete.

1.3 SUBMITTALS

- A Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
- B Provide product data clearly marked up to showing each type of device used in the project and all features required. Present only project data relevant to the project and not entire catalog sections.
 - 1. Surge Protection Receptacles: Include surge current rating, voltage protection rating (VPR) for each protection mode, and diagnostics information.
- C Certificates for Surge Protection Receptacles: Manufacturer's documentation of listing for compliance with UL 1449.
- D Field Quality Control Test Reports.
- E Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- F Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Screwdrivers for Tamper-Resistant Screws: Two for each type of screw.
 - 3. Extra Keys for Locking Switches: Two of each type.
 - 4. Extra Wall Plates: three of each style, size, and finish.

1.4 QUALITY ASSURANCE

- A Comply with requirements of NFPA 70.
- B Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D Products: Listed, classified, and labeled as suitable for the purpose intended.

- E Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND PROTECTION

- A Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.1 WIRING DEVICES - GENERAL REQUIREMENTS

- A Provide wiring devices suitable for intended use with ratings adequate for load served.
- B Except where explicitly permitted, substitution of combination switch-and-receptacle devices for separate switches and receptacles is not permitted.
- C Wiring Device Applications:
1. Receptacles Installed Outdoors or in Damp or Wet Locations: Use weather-resistant GFCI receptacles with weatherproof covers.
 2. Provide GFCI protection for:
 - a. Receptacles installed within 6 feet of sinks.
 - b. Receptacles installed in kitchens.
 - c. Receptacles serving electric drinking fountains.
 - d. Electrical equipment service receptacles as mandated in the NEC.
 3. Single Receptacles Installed on Individual Branch Circuits: Provide receptacle ampere rating equal to branch circuit rating.
 4. Flush Floor Service Fittings in Tile Floors: Use tile rings.
 5. Flush Floor Service Fittings in Carpeted Floors: Use carpet flanges.
- D Wiring Device Finishes:
1. Provide wiring device finishes as described below, unless otherwise indicated. These selection are subject to change during the submittal review process.
 2. Wiring Devices, Unless Otherwise Indicated: Gray with stainless steel wall plate.
 3. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate.
 4. Wiring Devices Installed in Wet or Damp Locations: Gray with weatherproof cover.
 5. Isolated Ground Convenience Receptacles: Orange.
 6. Surge Protection Receptacles: Blue.
 7. Wiring Devices Connected to Emergency Power: Red with stainless steel wall plate factory engraved with text "Emergency".
 8. Above-Floor Service Fittings: Gray wiring devices with satin aluminum housing.
 9. Flush Floor Box Service Fittings: Black wiring devices with black nonmetallic cover and ring/flange.
 10. Flush Poke-Through Service Fittings: Gray wiring devices with black nonmetallic cover and aluminum flange.

2.2 WALL SWITCHES

- A Manufacturers:
1. Hubbell Incorporated: www.hubbell.com/#sle.
 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
- B Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- C Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

- D Lighted Wall Switches: Industrial specification grade, 20 A, 120/277 V with illuminated standard toggle type switch actuator and maintained contacts; illuminated with load off; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.3 WALL DIMMERS

- A Wall Dimmers - General Requirements: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1472; types and ratings suitable for load controlled as indicated on the drawings.
- B Control: Slide control type with separate on/off switch.
- C Power Rating, Unless Otherwise Indicated or Required to Control the Load Indicated on the Drawings:
- D Provide accessory wall switches to match dimmer appearance when installed adjacent to each other.

2.4 RECEPTACLES

- A Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell.com/#sle.
 - 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 3. Lutron Electronics Company, Inc; Designer Style: www.lutron.com/#sle.
 - 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 - 5. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.
- B Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 - 2. NEMA configurations specified are according to NEMA WD 6.
- C Convenience Receptacles:
 - 1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
 - 2. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
 - 3. Tamper Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings or specifically required by NEC. Each tamper resistant receptacles shall be permanently identified as such on the body of the devices.
 - 4. Tamper Resistant and Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations; single or duplex as indicated on the drawings or specifically required by the NEC.
- D GFCI Receptacles:
 - 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 - a. Provide test and reset buttons of same color as device.
 - 2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.

3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.
 4. Tamper Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.
 5. Tamper Resistant and Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.
- E USB Charging Devices:
1. USB Charging Devices - General Requirements: Listed as complying with UL 1310.
 - a. Charging Capacity - Two-Port Devices: 2.1 A, minimum.
 2. USB Charging/Tamper Resistant Receptacle Combination Devices: Two-port (Type A) USB charging device and receptacle, commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; rectangular decorator style.
- F Surge Protection Receptacles:
1. Surge Protection Receptacles - General Requirements: Listed and labeled as complying with UL 1449, Type 2 or 3.
 - a. Energy Dissipation: Not less than 240 J per mode.
 - b. Protected Modes: L-N, L-G, N-G.
 - c. UL 1449 Voltage Protection Rating (VPR): Not more than 700 V for L-N, L-G modes and 1200 V for N-G mode.
 - d. Diagnostics:
 - 1) Visual Notification: Provide indicator light to report functional status of surge protection.
 2. Standard Surge Protection Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
- G Locking Receptacles: Industrial specification grade, configuration as indicated on the drawings.
1. Standard Locking Convenience Receptacles: Single, 20A, 125V, NEMA L5-20R.

2.5 WALL PLATES AND COVERS

- A Manufacturers:
1. Hubbell Incorporated: www.hubbell-wiring.com/#sle.
 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 3. Lutron Electronics Company, Inc: www.lutron.com/#sle.
 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 5. Substitutions: See Section 01 60 00 - Product Requirements.
 6. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.
- B Wall Plates: Comply with UL 514D.
1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 2. Size: Standard.
 3. Screws: Metal with slotted heads finished to match wall plate finish.
- C Nylon Wall Plates: Smooth finish, high-impact thermoplastic.
- D Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- E Galvanized Steel Wall Plates: Rounded corners and edges, with corrosion resistant screws.
- F Weatherproof Receptacle Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.
- G Weatherproof Receptacle Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

- H Weatherproof Switch Covers for Wet or Damp Locations: Gasketed, metallic, with externally operable actuating means and corrosion-resistant screws; listed as suitable for use in wet locations.

2.6 FLOOR BOX SERVICE FITTINGS

A Manufacturers:

1. Hubbell Incorporated: www.hubbell.com/#sle.
2. Thomas & Betts Corporation: www.tnb.com/#sle.
3. Wiremold, a brand of Legrand North America, Inc: www.legrand.us/#sle.

- B Description: Service fittings compatible with floor boxes provided under Section 26 05 33.16 with components, adapters, and trims required for complete installation. Or conversely, compatible with fittings specified on floor box schedules or legends and descriptions shown on the drawing which will supercede these requirements. These requirements may be superceded by floor box schedules or legends and descriptions shown on the drawings.

C Flush Floor Service Fittings:

1. Single Service Flush Convenience Receptacles:
 - a. Cover: Round.
 - b. Configuration: One standard convenience duplex receptacle(s) with duplex flap opening(s).
2. Single Service Flush Communications Outlets:
 - a. Cover: Rectangular.
 - b. Configuration: Provide activation covers for a minimum of four ports..
 - c. Voice and Data Jacks: Provided by others.
3. Single Service Flush Furniture Feed:
 - a. Cover: Round.
 - b. Configuration: One 2-1/8 inch by 3/4 inch combination threaded opening(s).
4. Dual Service Flush Combination Outlets (The following shall be superceded by floor box schedules or legends shown on the drawings):
 - a. Cover: Round.
 - b. Configuration:
 - 1) Power: One standard convenience duplex receptacle(s) with duplex flap opening(s).
 - 2) Communications: Provide activations for minimum four ports.
 - 3) Voice and Data Jacks: Provided by others.
5. Dual Service Flush Furniture Feed(The following shall be superceded by floor box schedules or legends and descriptions shown on the drawings):
 - a. Cover: Round.
 - b. Configuration:
 - 1) Power: One 2-1/8 inch by 3/4 inch combination threaded opening(s).
 - 2) Communications: One 2-1/8 inch by 1 inch combination threaded opening(s).
6. Accessories:
 - a. Tile Rings: Finish to match covers; configuration as required to accommodate specified covers.
 - b. Carpet Flanges: Finish to match covers; configuration as required to accommodate specified covers.

2.7 POKE-THROUGH ASSEMBLIES

A Manufacturers:

1. Hubbell Incorporated: www.hubbell.com/#sle.
2. Thomas & Betts Corporation: www.tnb.com/#sle.
3. Wiremold, a brand of Legrand North America, Inc: www.legrand.us/#sle.

- B Description: Assembly comprising floor service fitting, poke-through component, fire stops and smoke barriers, and junction box for conduit termination; fire rating listed to match fire rating of floor and suitable for floor thickness where installed.

C Flush Floor Service Fittings:

1. Single Service Flush Convenience Receptacles:
 - a. Configuration: One standard convenience duplex receptacle(s) with duplex flap opening(s).
2. Single Service Flush Communications Outlets:
 - a. Configuration: Provide activation covers for four data ports..
 - b. Voice and Data Jacks: Provided by others.
3. Single Service Flush Furniture Feed:
 - a. Configuration: One 2 inch by 1-1/4 inch combination threaded opening(s).
4. Dual Service Flush Combination Outlets:
 - a. Cover: Hinged door(s).
 - b. Configuration:
 - 1) Power: One standard convenience duplex receptacle(s).
 - 2) Communications: Activation covers for four data ports..
 - 3) Voice and Data Jacks: Provided by others.
5. Dual Service Flush Furniture Feed:
 - a. Configuration:
 - 1) Power: One 3/4 inch threaded opening(s).
 - 2) Communications: Two 1/2 inch threaded opening(s).
6. Accessories:
 - a. Closure Plugs: Size and fire rating as required to seal unused core hole and maintain fire rating of floor.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify that field measurements are as indicated.
- B Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D Verify that final surface finishes are complete, including painting.
- E Verify that floor boxes are adjusted properly.
- F Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- G Verify that core drilled holes for poke-through assemblies are in proper locations.
- H Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

- A Provide extension rings to bring outlet boxes flush with finished surface.
- B Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

- A Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of wiring devices provided under this section.
 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switches: 48 inches above finished floor.
 - b. Wall Dimmers: 48 inches above finished floor.
 - c. Fan Speed Controllers: 48 inches above finished floor.
 - d. Receptacles: 18 inches above finished floor or 6 inches above counter or bottom of cover 2 inches above backsplash.
 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.

- 4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
- 5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- C Install wiring devices in accordance with manufacturer's instructions.
- D Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
- F Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H Provide GFCI receptacles with integral GFCI protection at each location indicated. Generally do not use feed-through wiring to protect downstream devices.
- I Where specified or where specifically approved by the engineer of record, GFCI receptacles may be connected to provide feed-through protection to downstream devices. Label such devices to indicate they are protected by upstream GFCI protection. Labels shall be semi-permanent.
- J Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.
- K Install wiring devices plumb and level with mounting yoke held rigidly in place.
- L Install wall switches with OFF position down.
- M Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- N Do not share neutral conductor on branch circuits utilizing wall dimmers.
- O Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- P Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- Q Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- R Identify wiring devices in accordance with Section 26 05 53.
- S Install poke-through closure plugs in each unused core holes to maintain fire rating of floor.

3.4 FIELD QUALITY CONTROL

- A See Section 01 40 00 - Quality Requirements, for additional requirements.
- B Inspect each wiring device for damage and defects.
- C Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
- D Test each receptacle to verify operation and proper polarity.
- E Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- F Inspect each surge protection receptacle to verify surge protection is active.
- G Correct wiring deficiencies and replace damaged or defective wiring devices.

3.5 ADJUSTING

- A Adjust devices and wall plates to be flush and level.
- B Adjust presets for wall dimmers according to manufacturer's instructions as directed by Architect.

3.6 CLEANING

- A Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION 26 27 26

SECTION 26 28 13 - FUSES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Fuses.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination:

1. Coordinate fuse clips furnished in equipment provided under other sections for compatibility with indicated fuses.
 - a. Fusible Enclosed Switches: See Section 26 28 16.16.
2. Coordinate fuse requirements according to manufacturer's recommendations and nameplate data for actual equipment to be installed.
3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.3 SUBMITTALS

- A Product Data: Provide manufacturer's standard data sheets including voltage and current ratings, interrupting ratings, time-current curves, and current limitation curves.
 1. Spare Fuse Cabinet: Include dimensions.
- B Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 2. Extra Fuses: One set(s) of three for each type and size installed.
 3. Fuse Pullers: One set(s) compatible with each type and size installed.

1.4 QUALITY ASSURANCE

- A Comply with requirements of NFPA 70.
- B Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A Bussmann, a division of Eaton Corporation: www.cooperindustries.com/#sle.
- B Littelfuse, Inc: www.littelfuse.com/#sle.
- C Mersen: ep-us.mersen.com/#sle.
- D Substitutions: See Section 01 60 00 - Product Requirements.

2.2 APPLICATIONS

- A Service Entrance:
 1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
 2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.
- B Feeders:
 1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
 2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.
- C General Purpose Branch Circuits: Class RK1, time-delay.
- D Individual Motor Branch Circuits: Class RK1, time-delay.
- E In-Line Protection for Pole-Mounted Luminaires: Class CC, time-delay.
- F Primary Protection for Control Transformers: Class CC, time-delay.

2.3 FUSES

- A Provide products listed, classified, and labeled as suitable for the purpose intended.

- B Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.
- C Provide fuses of the same type, rating, and manufacturer within the same switch.
- D Comply with UL 248-1.
- E Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.
- F Voltage Rating: Suitable for circuit voltage.
- G Class R Fuses: Comply with UL 248-12.
- H Class L Fuses: Comply with UL 248-10.
- I Class CC Fuses: Comply with UL 248-4.
- J Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.
- K Provide the following accessories where indicated or where required to complete installation:
 - 1. Fuseholders: Compatible with indicated fuses.
 - 2. Fuse Reducers: For adapting indicated fuses to permit installation in switch designed for fuses with larger ampere ratings.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.
- B Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A Do not install fuses until circuits are ready to be energized.
- B Install fuses with label oriented such that manufacturer, type, and size are easily read.

END OF SECTION 26 28 13

SECTION 26 28 16.13 - ENCLOSED CIRCUIT BREAKERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Enclosed circuit breakers.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination:

1. Coordinate work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted enclosed circuit breakers where indicated.
4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.3 SUBMITTALS

- A Product Data: Provide manufacturer's standard catalog pages and data sheets for circuit breakers, enclosures, and other installed components and accessories.
 1. Include characteristic trip curves for each type and rating of circuit breaker upon request.
- B Shop Drawings: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
 1. Include dimensioned plan and elevation views of enclosed circuit breakers and adjacent equipment with all required clearances indicated.
 2. Include wiring diagrams showing all factory and field connections.
 3. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
 4. Include documentation of listed series ratings upon request.
- C Provide a circuit breaker schedule that shows the load, equipment or devices for which the circuit breaker is used.
- D Field Quality Control Test Reports.
- E Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- F Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.4 QUALITY ASSURANCE

- A Comply with requirements of NFPA 70.
- B Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

- B Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed circuit breaker internal components, enclosure, and finish.

1.6 FIELD CONDITIONS

- A Maintain ambient temperature between 23 degrees F and 104 degrees F during and after installation of enclosed circuit breakers.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A ABB: www.electrification.us.abb.com/#sle.
- B Eaton Corporation: www.eaton.com/#sle.
- C Schneider Electric: www.se.com/#sle.
- D Siemens Industry, Inc: www.new.siemens.com/#sle.
- E Substitutions: See Section 01 60 00 - Product Requirements.
- F Source Limitations: Provide enclosed circuit breakers and associated components produced by same manufacturer as other electrical distribution equipment used for project and obtained from single supplier.

2.2 ENCLOSED CIRCUIT BREAKERS

- A Description: Units consisting of molded case circuit breakers individually mounted in enclosures.
- B Provide products listed, classified, and labeled as suitable for the purpose intended.
- C Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature: Between 23 degrees F and 104 degrees F.
- D Short Circuit Current Rating:
 - 1. Provide enclosed circuit breakers with listed short circuit current rating not less than the available fault current at the installed location indicated on the drawings.
 - 2. Listed series ratings are only acceptable where specifically indicated.
- E Enclosed Circuit Breakers Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- F Conductor Terminations: Suitable for use with the conductors to be installed.
- G Provide thermal magnetic circuit breakers unless otherwise indicated.
- H Provide electronic trip circuit breakers for circuit breaker frame sizes 400 amperes and above.
- I Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.
- J Provide solidly bonded equipment ground bus in each enclosed circuit breaker, with a suitable lug for terminating each equipment grounding conductor.
- K Enclosures: Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - 2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.
 - 3. Provide surface-mounted enclosures unless otherwise indicated.
- L Provide externally operable handle with means for locking in the OFF position.
- M Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.
 - 1. Where electronic circuit breakers equipped with integral ground fault protection are used, provide separate neutral current sensor where applicable.
 - 2. Where accessory ground fault sensing and relaying equipment is used, equip companion circuit breakers with ground-fault shunt trips.

- a. Use zero sequence ground fault detection method unless otherwise indicated.
 - b. Provide test panel and field-adjustable ground fault pick-up and delay settings.
- N Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

2.3 MOLDED CASE CIRCUIT BREAKERS

- A Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
- B Interrupting Capacity:
 - 1. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - a. 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
 - b. 14,000 rms symmetrical amperes at 480 VAC.
 - 2. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
- C Conductor Terminations:
 - 1. Provide mechanical lugs unless otherwise indicated.
 - 2. Lug Material: Copper, suitable for terminating copper conductors only.
- D Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
- E Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
 - 1. Provide the following field-adjustable trip response settings:
 - a. Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.
 - b. Long time delay.
 - c. Short time pickup and delay.
 - d. Instantaneous pickup.
 - e. Ground fault pickup and delay where ground fault protection is indicated or required.
- F Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
- G Provide the following circuit breaker types where indicated:
 - 1. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
 - 2. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.
 - 3. Current Limiting Circuit Breakers: Without using fusible elements, designed to limit the let-through energy to a value less than the energy of a one-half cycle wave of the symmetrical prospective current when operating within its current limiting range.
- H Provide listed switching duty rated circuit breakers with SWD marking for all branch circuits serving fluorescent lighting.
- I Provide listed high intensity discharge lighting rated circuit breakers with HID marking for all branch circuits serving HID lighting.
- J Provide the following features and accessories where indicated or where required to complete installation:
 - 1. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
 - 2. Auxiliary Switch: SPDT switch suitable for connection to system indicated for indicating when circuit breaker has tripped or been turned off.
 - 3. Undervoltage Release: For tripping circuit breaker upon predetermined drop in coil voltage with field-adjustable time delay to prevent nuisance tripping.
 - 4. Alarm Switch: SPDT switch suitable for connection to system indicated for indicating when circuit breaker has tripped.

PART 3 EXECUTION**3.1 EXAMINATION**

- A Verify that field measurements are as indicated.
- B Verify that the ratings of the enclosed circuit breakers are consistent with the indicated requirements.
- C Verify that mounting surfaces are ready to receive enclosed circuit breakers.
- D Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A Install products in accordance with manufacturer's instructions.
- B Perform work in accordance with NECA 1 (general workmanship).
- C Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D Provide required support and attachment in accordance with Section 26 05 29.
- E Install enclosed circuit breakers plumb.
- F Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed circuit breakers such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G Provide grounding and bonding in accordance with Section 26 05 26.
- H Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.
- I Set field-adjustable circuit breaker tripping function settings as directed.
- J Set field-adjustable ground fault protection pickup and time delay settings as directed.
- K Identify enclosed circuit breakers in accordance with Section 26 05 53.

3.3 FIELD QUALITY CONTROL

- A See Section 01 40 00 - Quality Requirements, for additional requirements.
- B Inspect and test in accordance with manufacturer's instructions and NETA ATS, except Section 4.
- C Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for circuit breakers used for service entrance and for circuit breakers larger than 600 amperes. Tests listed as optional are not required.
- D Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
- E Test GFCI circuit breakers to verify proper operation.
- F Test shunt trips to verify proper operation.
- G Correct deficiencies and replace damaged or defective enclosed circuit breakers.

3.4 ADJUSTING

- A Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.5 CLEANING

- A Clean dirt and debris from circuit breaker enclosures and components according to manufacturer's instructions.
- B Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 26 28 16.13

SECTION 26 28 16.16 - ENCLOSED SWITCHES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Enclosed safety switches.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination:

1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.3 SUBMITTALS

- A Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.
- B Shop Drawings: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
 1. Include dimensioned plan and elevation views of enclosed switches and adjacent equipment with all required clearances indicated.
 2. Include wiring diagrams showing all factory and field connections.
 3. Identify mounting conditions required for equipment seismic qualification.
- C Provide a disconnect schedule indicating the load, equipment or devices for which the disconnect is to be used.
- D Field Quality Control Test Reports.
- E Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- F Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.
- G Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 2. See Section 26 28 13 for requirements for spare fuses and spare fuse cabinets.

1.4 QUALITY ASSURANCE

- A Comply with requirements of NFPA 70.
- B Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

1.6 FIELD CONDITIONS

- A Maintain ambient temperature between -22 degrees F and 104 degrees F during and after installation of enclosed switches.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A ABB: www.electrification.us.abb.com/#sle.
- B Eaton Corporation: www.eaton.com/#sle.
- C Schneider Electric: www.se.com/#sle.
- D Siemens Industry, Inc: www.new.siemens.com/#sle.
- E Substitutions: See Section 01 60 00 - Product Requirements.
- F Source Limitations: Provide enclosed switches and associated components produced by same manufacturer as other electrical distribution equipment used for project and obtained from single supplier.

2.2 ENCLOSED SAFETY SWITCHES

- A Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.
- B Provide products listed, classified, and labeled as suitable for the purpose intended.
- C Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature: Between -22 degrees F and 104 degrees F.
- D Horsepower Rating: Suitable for connected load.
- E Voltage Rating: Suitable for circuit voltage.
- F Short Circuit Current Rating:
 - 1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
 - 2. Minimum Ratings:
 - a. Switches Protected by Class H Fuses: 10,000 rms symmetrical amperes.
 - b. Heavy Duty Single Throw Switches Protected by Class R, Class J, Class L, or Class T Fuses: 200,000 rms symmetrical amperes.
 - c. Double Throw Switches Protected by Class R, Class J, or Class T Fuses: 100,000 rms symmetrical amperes.
- G Enclosed Safety Switches Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- H Provide with switch blade contact position that is visible when the cover is open.
- I Fuse Clips for Fusible Switches: As required to accept fuses indicated.
 - 1. Where NEMA Class R fuses are installed, provide rejection feature to prevent installation of fuses other than Class R.
- J Conductor Terminations: Suitable for use with the conductors to be installed.
- K Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.
- L Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- M Enclosures: Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - c. Kitchen dishwashing rooms or areas: Type 4X Stainless steel..

2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.
- N Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- O Heavy Duty Switches:
 1. Comply with NEMA BS 31047.
 2. Conductor Terminations:
 - a. Provide mechanical lugs unless otherwise indicated.
 - b. Lug Material: Copper, suitable for terminating copper conductors only.
 3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.
- P Provide the following features and accessories where indicated or where required to complete installation:
 1. Hubs: As required for environment type; sized to accept conduits to be installed.
 2. Integral fuse pullers.
 3. Auxiliary Switch: SPDT switch suitable for connection to system indicated, with auxiliary contact operation before switch blades open and after switch blades close.
 4. Viewing Window: Positioned over switch blades for visual confirmation of contact position with door closed.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify that field measurements are as indicated.
- B Verify that the ratings of the enclosed switches are consistent with the indicated requirements.
- C Verify that mounting surfaces are ready to receive enclosed safety switches.
- D Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A Install products in accordance with manufacturer's instructions.
- B Perform work in accordance with NECA 1 (general workmanship).
- C Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D Provide required support and attachment in accordance with Section 26 05 29.
- E Install enclosed switches plumb.
- F Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G Provide grounding and bonding in accordance with Section 26 05 26.
- H Provide fuses complying with Section 26 28 13 for fusible switches as indicated or as required by equipment manufacturer's recommendations.
- I Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.
- J Identify enclosed switches in accordance with Section 26 05 53.

3.3 FIELD QUALITY CONTROL

- A See Section 01 40 00 - Quality Requirements, for additional requirements.
- B Inspect and test in accordance with NETA ATS, except Section 4.
- C Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.
- D Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

3.4 ADJUSTING

- A Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.5 CLEANING

- A Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.
- B Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 26 28 16.16

SECTION 26 51 00 - INTERIOR LIGHTING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Interior luminaires.
- B Emergency lighting units.
- C Exit signs.
- D Ballasts and drivers.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination:
 - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
 - 4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.3 SUBMITTALS

- A Shop Drawings:
 - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
 - 2. Provide photometric calculations where luminaires are proposed for substitution upon request.
- B Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
- C Avoid providing superfluous data sheets in the submittal that do not affect choices or data specifically required for the project. Each sheet shall be marked up to show specific criteria that applies to the fixture being provided where multiple options are presented on the sheet. Submittals shall be organized as follows:
 - 1. Section 1 - A bill of material showing each light fixture, light fixture catalog number and light fixture catalog number.
 - 2. Section 2 - Data sheets showing the required marked up or highlighted options selected or options requiring approval such as colors and other outstanding approval issues. General data should not be included in this section.
 - 3. Section 3 - Backup data can be provided by the supplier/contractor for each light fixture.
 - 4. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
 - 5. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IES LM-63 standard format upon request.

1.4 WARRANTY

- A See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B Provide 5-year manufacturer warranty for LED luminaires, including drivers.

PART 2 PRODUCTS**2.1 LUMINAIRE TYPES**

- A Furnish products as indicated in luminaire schedule included on the drawings.

2.2 LUMINAIRES

- A Manufacturers: Refer to projects listed on the light fixtures schedules on the drawings.
- B Provide products that comply with requirements of NFPA 70.
- C Provide products that are listed and labeled as complying with UL 1598, where applicable.
- D Provide products listed, classified, and labeled as suitable for the purpose intended.
- E Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, drivers, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- F Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- G Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- H Recessed Luminaires:
1. Ceiling Compatibility: Comply with NEMA LE 4.
 2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
 3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters or light fixtures with internal adjustable aiming design.
- I LED Luminaires:
1. Components: UL 8750 recognized or listed as applicable.
 2. Tested in accordance with IES LM-79 and IES LM-80.
 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
- J LED Tape Lighting Systems: Provide all power supplies, drivers, cables, connectors, channels, covers, mounting accessories, and interfaces as necessary to complete installation.
1. LED Tape - General Requirements:
 - a. Listed.
 - b. Designed for field cutting in accordance with listing.
 - c. Wet Location Applications: IEC 60529, IP 68 (waterproof) rated.
- K Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

2.3 EMERGENCY LIGHTING UNITS

- A Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
- B Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
- C Battery:
1. Sealed maintenance-free lead calcium unless otherwise indicated.
 2. Size battery to supply all connected lamps, including emergency remote heads where indicated.
- D Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
- E Provide low-voltage disconnect to prevent battery damage from deep discharge.
- F Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.

G Accessories:

1. Provide compatible accessory mounting brackets where indicated or required to complete installation.
2. Where indicated, provide emergency remote heads that are compatible with the emergency lighting unit they are connected to and suitable for the installed location.

2.4 EXIT SIGNS**A Description:** Exit signs complying with NFPA 101 and applicable state and local codes, and listed and labeled as complying with UL 924.

1. Number of Faces: Single- or double-face as indicated or as required for installed location.
2. Directional Arrows: As indicated or as required for installed location.

B Powered Exit Signs: Internally illuminated with LEDs unless otherwise indicated.

1. Self-Powered Exit Signs:
 - a. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
 - b. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
 - c. Provide low-voltage disconnect to prevent battery damage from deep discharge.
 - d. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.

2.5 BALLASTS AND DRIVERS**A Ballasts/Drivers - General Requirements:**

1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
3. Electronic Ballasts/Drivers: Inrush currents not exceeding peak currents specified in NEMA 410.

B Dimmable LED Drivers:

1. Dimming Range: Continuous dimming from 100 percent to one percent relative light output unless dimming capability to lower level is indicated, without flicker.
2. Control Compatibility: Fully compatible with the dimming controls to be installed.
 - a. Wall Dimmers: See Section 26 27 26.
 - b. Daylighting Controls: See Section 26 09 23.

2.6 ACCESSORIES**A Stems for Suspended Luminaires:** Steel tubing, minimum 1/2" size, factory finished to match luminaire or field-painted as directed.**B Threaded Rods for Suspended Luminaires:** Zinc-plated steel, minimum 1/4" size, field-painted as directed.**C Provide accessory plaster frames for luminaires recessed in plaster ceilings.****D Architectural Trims for LED Lighting:**

1. Description: Trims designed for integration into architectural elements, with channels to accommodate LED tape lighting system.
2. Material: Extruded aluminum, ASTM B221 ASTM B221M 6063 alloy, T5 temper.
3. Profile: As indicated on drawings.
4. Finish: As indicated on drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify that field measurements are as indicated.
- B Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C Verify that suitable support frames are installed where required.
- D Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

- A Provide extension rings to bring outlet boxes flush with finished surface.
- B Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

- A Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.
- B Install products in accordance with manufacturer's instructions.
- C Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- D Provide required support and attachment in accordance with Section 26 05 29.
- E Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F Suspended Ceiling Mounted Luminaires:
 - 1. Do not use ceiling tiles to bear weight of luminaires.
 - 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
 - 3. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
 - 4. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gauge, connected from opposing corners of each recessed luminaire to building structure.
 - 5. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
- G Recessed Luminaires:
 - 1. Install trims tight to mounting surface with no visible light leakage.
 - 2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
 - 3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
- H Suspended Luminaires:
 - 1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
 - 2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
 - 3. Install canopies tight to mounting surface.
 - 4. Unless otherwise indicated, support pendants from swivel hangers.
- I Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- J Install accessories furnished with each luminaire.
- K Bond products and metal accessories to branch circuit equipment grounding conductor.
- L Emergency Lighting Units:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
 - 2. Install lock-on device on branch circuit breaker serving units where they are separately or independently circuited.
- M Exit Signs:

1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
 2. Install lock-on device on branch circuit breaker serving units where they are separately circuited from local lighting circuits.
- N Install lamps in each luminaire.

3.4 FIELD QUALITY CONTROL

- A See Section 01 40 00 - Quality Requirements, for additional requirements.
- B Inspect each product for damage and defects.
- C Operate each luminaire after installation and connection to verify proper operation.
- D Test self-powered exit signs, emergency lighting units, and integral light fixture installed emergency lighting units to verify proper operation upon loss of normal power supply.
- E Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.5 ADJUSTING

- A Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.
- C Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.6 CLOSEOUT ACTIVITIES

- A See Section 01 78 00 - Closeout Submittals, for closeout submittals.

3.7 PROTECTION

- A Protect installed luminaires from subsequent construction operations.

END OF SECTION 26 51 00

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SECTION 26 56 00 - EXTERIOR LIGHTING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Exterior luminaires.

1.2 RELATED REQUIREMENTS

- A Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C Section 26 05 33.16 - Boxes for Electrical Systems.

1.3 SUBMITTALS

- A Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.

1.4 QUALITY ASSURANCE

- A Comply with requirements of NFPA 70.
- B Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
- B Keep products in original manufacturer's packaging and protect from damage until ready for installation.
- C Receive, handle, and store wood poles in accordance with ANSI O5.1.

1.6 WARRANTY

- A See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B Provide 5-year manufacturer warranty for all LED luminaires, including drivers.

PART 2 PRODUCTS

2.1 LUMINAIRE TYPES

- A Furnish products as indicated in luminaire schedule included on the drawings.
- B Substitutions: See Section 01 60 00 - Product Requirements.

2.2 LUMINAIRES

- A Provide products that comply with requirements of NFPA 70.
- B Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C Provide products listed, classified, and labeled as suitable for the purpose intended.
- D Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- F Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify that field measurements are as indicated.
- B Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C Verify that suitable support frames are installed where required.
- D Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

- A Provide extension rings to bring outlet boxes flush with finished surface.
- B Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

- A Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.
- B Install products in accordance with manufacturer's instructions.
- C Install luminaires in accordance with NECA/IESNA 501.
- D Provide required support and attachment in accordance with Section 26 05 29.
- E Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- G Install accessories furnished with each luminaire.
- H Bond products and metal accessories to branch circuit equipment grounding conductor.
- I Install lamps in each luminaire.

3.4 FIELD QUALITY CONTROL

- A See Section 01 40 00 - Quality Requirements, for additional requirements.
- B Inspect each product for damage and defects.
- C Operate each luminaire after installation and connection to verify proper operation.
- D Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.5 CLEANING

- A Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.6 CLOSEOUT ACTIVITIES

- A See Section 01 78 00 - Closeout Submittals, for closeout submittals.

3.7 PROTECTION

- A Protect installed luminaires from subsequent construction operations.

END OF SECTION 26 56 00

SECTION 28 46 00 - FIRE DETECTION AND ALARM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Fire alarm system and associated components, including control units, related equipment, initiating devices, and notification appliances.

1.2 ADMINISTRATIVE REQUIREMENTS

- A Coordination:

1. The complete responsibility for the fire alarm system as described in this specification and the associated drawings is by Division 28 fire alarm manufacturer and contractor. This includes wiring and pathways for the system. Supervise all work done by subcontractors that may be engaged in the work.
2. The fire alarm shall be considered a delegated design. Provide shop drawings and product data reviewed, signed and sealed by a professional engineer licensed in the jurisdiction in which the project is located. Where required by the jurisdiction, submit the shop drawings to the appropriate governing authority for review and approval.
3. Calculate requirements for selecting the spacing and sensitivity of smoke and heat detectors and spacing and intensities for strobe devices and sound pressure levels for audible appliances to meet NFPA 72 and other applicable code and standards.
4. Coordinate arrangement of equipment with dimensions and clearance requirements of actual equipment.
5. Coordinate placement of devices and notification appliances with potential conflicts or view obstructions.
6. Coordinate work to provide power for equipment at required locations (e.g., smoke dampers, type of actuators, line or local control transformer, zoning, grouping and circuit activations).
7. Coordinate fire suppression system device requirements, monitoring, control, and associated interconnections.
8. Coordinate requirements for control of smoke dampers including fire alarm devices required, damper operation, and fire alarm responses. Refer to Division 23 control system specifications for related requirements and control details, notes on the related to fire alarm system interface, devices and programming.
9. Coordinate requirements for branch circuit protection, identification, and shunt trip if applicable.
10. Coordinate kitchen equipment requirements for fire alarm system interconnections based on selected equipment.
11. Coordinate reflected ceiling plans to avoid conflicting placements; maintain minimum diffuser and detector clearances as indicated.
12. Coordinate submittals to confirm equipment and associated components are capable of indicated settings, and manufacturer documentation identifies required compatible product listings.
13. Municipal Alarm Connections: Coordinate requirements for connection with municipality representative.
14. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
15. Radio Transmitter: Coordinate roof location and installation with Architect.
16. Door Hardware: See Section 08 71 00 and coordinate, including access control panel locations.
17. Elevators or Escalators: See Division 14.
18. Lighting Controls: See Division 26.
19. Non-Power-Limited Cables: See Section 26 05 19.

- B Preinstallation Meetings:

1. Conduct meeting with facility representative to review devices, notification appliances, and equipment locations.

2. Conduct meeting with facility representative and other related equipment manufacturers to discuss fire alarm system interface requirements.
 3. Conduct meeting to review anticipated installation of code-required smoke control requirements, product solutions, and SOO.
 4. Convene one week before starting work for review of documented SOO for system applications.
- C Sequencing:
1. Verify exact termination locations required for boxes, enclosures, and equipment.
 2. Do not install devices or notification appliances until final surface finishes, painting, and cleaning are complete, unless otherwise required by AHJ.
 3. Do not begin installation of conductors and cables until installation of conduit and pathways between termination points is complete.
 4. Sequence work to protect cabling (e.g., overspray painting, physical stress, and insulation damage or covering markings).
 5. Verify naming convention for equipment identification, including room names and numbers, prior to creation of final drawings, reports, and labels.

1.3 SUBMITTALS

- A Evidence of designer qualifications.
- B Comply with NFPA 72 chapter "Documentation," including noting names of installers, owners, and system classification information.
- C Design Documents: Submit all information required for plan review and permitting by AHJ, including floor plans, riser diagrams, and description of operation.
1. Copy (if any) of list of data required by AHJ.
 2. NFPA 72 "Record of Completion", filled out to extent known at time.
 3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A, and complete listing of software required.
 4. Manufacturer's detailed product data sheet for each component, including wiring diagrams, and circuit length limitations. Catalog pages and product descriptions include ratings, dimensions, finishes, service conditions, and included features.
 5. Certification by manufacturer of FACU that system design complies with Contract Documents.
 6. Certification by Contractor that system design complies with Contract Documents.
- D Shop Drawings: Submit installation documentation required for plan review and permitting by AHJ, including floor plans showing locations of fire alarm system components, enlarged drawn to identified scale plan view, and riser diagrams.
1. System zone boundaries and interfaces to fire safety systems.
 2. Show locations of components, circuits, and raceways; mark components with identifiers used in control unit programming.
 3. Include elevations and details of proposed equipment arrangements.
 4. Include system interconnection schematic riser diagram showing proposed and approved cable size and type; coordinated with floor plans and describing circuit class, survivability, and application specific information required by NFPA 72.
 5. Include typical wiring diagrams for devices, notification appliances, remote indicators, annunciators, remote test stations, and EoL and power supervisory devices.
 6. Include requirements and control diagrams for interfacing with other systems.
 7. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; standby and spare capacity calculations; notification appliance circuit loop resistance and voltage drop calculations, including spare capacity.
 8. List of devices and notification appliances on each SLC, with spare capacity indicated.
 9. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
 10. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
 11. Detailed drawing of graphic annunciators, displays, and interfaces.

12. Certification by either FACU manufacturer or manufacturer of related equipment.
 13. Certification by FACU manufacturer that system design complies with Contract Documents.
 14. Certification by Contractor that system design complies with Contract Documents.
- E Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- F Evidence of installer qualifications.
- G Evidence of maintenance contractor qualifications, if different from installer.
- H Inspection and Test Reports:
1. Submit inspection and test plan prior to closeout demonstration.
 2. Submit documentation of satisfactory inspections and tests.
 3. Submit NFPA 72 "Inspection and Test," filled out.
- I Operating and Maintenance Data: See Section 01 7800 for additional requirements; revise and resubmit until acceptable; have one set available during closeout demonstration:
1. Complete set of specified design documents, as approved by AHJ.
 2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
 3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
 4. List of recommended spare parts, tools, and instruments for testing.
 5. Replacement parts list with current prices, and source of supply.
 6. Detailed troubleshooting guide and large scale input/output matrix.
 7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
 8. Detailed but easy to read explanation of procedures require recording of system trouble events by qualified personnel, such as when routine testing is being conducted for fire drills and when entering into contracts for building renovations.
- J Project Record Documents: See Section 01 7800 for additional requirements, have one set available during closeout demonstration:
1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
 2. "As installed" wiring and schematic diagrams, with final terminal identifications.
 3. "As programmed" operating sequences, including control events by device, and updated input/output chart.
- K Closeout Documents:
1. Certification by manufacturer that system has been installed in compliance with manufacturer's installation requirements, is complete, and is in satisfactory operating condition.
 2. NFPA 72 "Record of Completion," filled out completely and signed by installer and authorized representative of AHJ.
- L Maintenance Materials, Tools, and Software: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 60 00 - Product Requirements for additional provisions.
 2. Furnish spare parts of same manufacturer and model as those installed; deliver in original packaging, labeled in same manner as in operating and maintenance data and place in spare parts cabinet.
 3. In addition to items in quantities indicated in PART 2, furnish the following:
 - a. Tools, software, and documentation necessary to modify fire alarm system using Owner's personnel; minimum modification capability to include addition and deletion of devices, notification appliances, circuits, and zones, and changes to system description, and operation.
 - b. One copy of software not resident in read-only-memory.
 - c. Extra Fuses: Two for each installed fuse; store inside applicable control cabinet.
 - d. Extra Cabinet Keys: Six spare for each cabinet lock provided; label key number and corresponding cabinet identifier; collect and provide to Owner facility manager.

1.4 QUALITY ASSURANCE

- A Designer Qualifications: NICET Level III (three) or Level IV (four) certified fire alarm technician or registered fire protection engineer, employed by FACU manufacturer, Contractor, or installer.
- B Installer Qualifications: Firm with minimum three years documented experience installing fire alarm systems of specified type and providing contract maintenance service as regular part of their business.
 - 1. Authorized representative of FACU manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
 - 2. Installer Personnel: At least two years of experience installing fire alarm systems.
 - 3. Supervisor: Level III (three) or Level IV (four) certified fire alarm technician; furnish name and address.
- C Manufacturer Qualifications: Company specialized in manufacturing products specified in this section with at least three years of documented experience.
- D Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.
- E Product Evaluation and Listing Organization Qualifications: Organization engaged in evaluation of products and services, including those recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL), and acceptable to AHJ.

1.5 DELIVERY, STORAGE, AND HANDLING

- A See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
- B Receive, inspect, handle, and store products in accordance with manufacturer's instructions and NECA 305.
- C Handle carefully to avoid damage to internal components, enclosure, and finish.
- D Store products in manufacturer's unopened packaging, keep dry and protect from damage until ready for installation.

1.6 FIELD CONDITIONS

- A Maintain field conditions within manufacturer's required service conditions during and after installation.
- B Do not exceed maximum ambient temperature requirements for batteries at any time, which reduces battery service life. Replace batteries exposed to temperatures in excess of manufacturer's requirements.
- C Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

1.7 WARRANTY

- A See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B Fire Alarm Control Units and Accessory Equipment: Provide minimum 3-year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS**2.1 FIRE ALARM SYSTEM**

- A General Requirements:
 - 1. Provide modifications and extensions to existing fire alarm system complying with NFPA 70, NFPA 72, NFPA 90A, and consisting of required equipment, conduit, cabinets, outlet boxes, wiring, connectors, hardware, supports, accessories, components, software, and system programming as necessary for complete operating system that provides functional intent indicated.
 - 2. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:

- a. 36 CFR 1191 and ADA Standards.
 - b. Requirements of State Fire Marshal.
 - c. Requirements of AHJ.
 - d. Applicable local codes.
 - e. Contract Documents.
 - f. NFPA 72; "should" is mandatory; where conflicts between requirements require deviation, identify deviations clearly on design documents.
3. Fire Alarm System Products:
- a. Listed, classified, and labeled as suitable for purpose intended.
 - b. Installation Environments: Provide products suitable for their respective indoor and outdoor applications.
4. Fire Alarm System Design Information:
- a. Building Code: Comply with applicable building code.
 - 1) Principle Occupancy: As indicated on Architect code summary drawings.
 - 2) Principle Use: As indicated on Architect code summary drawings.
 - 3) Occupant Evacuation Method: Total building.
 - 4) Equipment Room Rating: None required.
 - 5) Fire Suppression System: Fully sprinkled.
 - (a) Types:
 - (b) Elevator Hoistway: Provide detection, actuation, and dedicated annunciation for sprinklered hoistways in accordance with NFPA 72.
 - b. NFPA 72 Fire Alarm System Classification: Protected premises.
 - c. Smoke and Heat Detector Coverage: Partial or selective coverage in accordance with NFPA 72.
 - d. Signal Priorities:
 - 1) See fire alarm system matrix indicated on drawings.
5. Provide fire alarm circuits in accordance with NFPA 70.
- a. Comply with methods of interconnecting FACUs in accordance with NFPA 72 and NFPA 70.
 - b. Power Sources:
 - 1) Comply with requirements for power supplies of emergency systems in accordance with NFPA 70.
 - 2) Primary: Dedicated branch circuits from facility power distribution system.
 - 3) Secondary: Storage batteries with capacity to operate system for period specified by NFPA 72.
 - c. Wiring and Wiring Methods:
 - 1) General Requirements:
 - (a) Comply with requirements for wiring and wiring methods in accordance with NFPA 70.
 - (b) All fire alarm circuits shall be installed in minimum 1/2" conduit. Conduit shall be red, either painted or integrally colored. The requirements for plenum rated cable listed below are for special conditions or permissions that may be granted but does not change the requirement for wiring to be in conduit.
 - (c) Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum-rated, listed and labeled as suitable for use in return air plenums.
 - (d) Special Occupancies: Comply with NFPA 70.
 - (e) Comply with NFPA 70 for wire and cable plenum, riser, general-purpose, limited-use, undercarpet, and underground applications.
 - 2) Fire Alarm Circuits:
 - (a) Comply with NFPA 70 for conditions and types required for multiconductor cable systems.
 - (b) Non-Power-Limited Fire Alarm (NPLFA) Circuits:

- (1) Provide dedicated NPLFA non-GFCI branch circuits for fire alarm equipment and marked by red identification in accordance with NFPA 70.
 - (c) Power-Limited Fire Alarm (PLFA) Circuits:
 - (1) Provide identification for PLFA circuits in accordance with NFPA 70.
- 6. Provide pathway class designations and pathway survivability, as defined in NFPA 72.
 - a. Provide monitoring of conductors and other signaling channels for integrity and circuit performance.
 - b. Pathway Class Designations:
 - 1) Unless otherwise indicated or required, pathways to meet the following requirements:
 - (a) SLCs: Class B (star, tee-tap, multi-tap, with no return).
 - (b) IDCs: Class B (daisy-chain with EoL resistor device installed at end of circuit).
 - (c) NACs: Class B (daisy-chain with EoL resistor device installed at end of circuit).
 - (d) Network Communications: Class B.
 - (e) Other Wiring:
 - (1) Other life safety control features not covered above (e.g., door holder circuits, elevator recall circuits, fire smoke dampers, and air handling system interfaces), wired as Class D (failsafe, intended operation is performed in event of pathway failure).
 - (2) Where Class D wiring is not possible due to limitation of equipment, wiring limited to 3-feet between addressable control module and equipment and be installed in metallic conduit.
 - c. Pathway Survivability:
 - 1) Unless otherwise indicated or required, pathways to meet requirements for Pathway Survivability Level 1 (nonrated cable installed in metal raceway, building protected by automatic sprinkler system).
 - d. Shared Pathway Designations: Unless otherwise indicated or required, shared pathways to meet requirements for Pathway Survivability Level 3 (two-hour rated cable with performance approved by AHJ, building protected by automatic sprinkler system).
- 7. Secondary Power Source - Battery Storage Capacity:
 - a. Provide standby (nonalarm) operation sufficient for 24 hours for non-voice evacuation systems and 60 hours for voice evacuations systems..
 - b. Provide additional alarm operation for 5 minutes for non-voice evacuation systems and 15 minutes for voice evacuation systems or ECS Systems.
 - c. Calculate combined of standby load plus alarm load for overall battery storage capacity requirements, per power supply.
 - d. Provide 25 percent additional overall battery capacity correction factor.
- B Fire Alarm System Interfaces and Control Functions:
 - 1. UL 864 listed unless otherwise indicated.
 - 2. Descriptions below are intended to provide means for interface. See project SOOs, narrative, and input/output matrix for execution requirements.
 - 3. Provide initiating devices, interfaces, and control functions for emergency control function interfaces in accordance with NFPA 72.
 - 4. Provide monitoring of interconnected systems. Coordinate notification appliance alternate markings as indicated on drawings.
 - 5. Fire Suppression Systems:
 - a. Provide minimum of four monitoring point inputs per system unless otherwise indicated.
 - b. Kitchen Hood Suppression Systems: Provide minimum of one monitoring point input per system.
 - c. Fire Sprinkler Systems:
 - 1) Waterflow Switches: Provide minimum of one monitoring point input per switch.

- 2) Control Valve Supervisory (Tamper) Switches: Provide minimum of one monitoring point input per switch.
 - 3) Preaction Control Panels: Provide minimum of four monitoring point inputs per system.
 - 4) Monitoring devices for all PIV's, sprinkler vaults and other site monitoring requirements shall be provided where such structures or valves are indicated on the Civil site plans or other site plans provided for the project.
6. HVAC Systems:
- a. Air Handling Units (AHUs) and Roof Top Units (RTUs):
 - 1) Provide duct smoke detector on supply side of air stream for units over 2,000 cfm.
 - 2) Provide duct smoke detector on return side of air stream for units over 15,000 cfm.
 - 3) Provide remote test station for each duct smoke detector unless explicitly indicated as not required.
 - 4) Provide output signal to shut down units with at least one duct smoke detector via addressable relay module.
 - 5) Where fire/smoke dampers are located downstream of unit, provide monitoring point input to determine that unit is not operational and subsequently provide output signal to close such dampers via addressable relay module and power isolation relay. Provide additional duct detectors for the associated smoke dampers where required for operation.
 - 6) Fully coordinate with the mechanical and mechanical controls contractors to provide all levels of fire alarm interface, devices and programming for HVAC system operations. Review control diagrams, specifications, notes and details for these requirements.
 - b. Remote Test Stations: Provide remote alarm and test station for each duct smoke detector unless explicitly indicated as not required. Unless otherwise indicated, use remote test stations only in clean, dry, indoor, nonhazardous locations. Coordinate locations stations
7. Fire/Smoke Dampers:
- a. Provide output signal to close fire/smoke damper via addressable relay module and power isolation relay.
 - b. Fire/smoke damper activated by one of the following methods. Confirm with AHJ and in coordination with the mechanical contractor. .
 - 1) By addressable duct smoke detector.(Primary method. Provide in duct within five feet of damper. Program and wire for damper operation. The following other methods are acceptable where they meet NFPA and Mechanical code requirements and have been approved the authorities having jurisdiction).
 - 2) By conventional duct smoke detector furnished with fire/smoke damper (along with remote test station); provide addressable monitor module.
 - 3) By corridor smoke detection, where fire/smoke dampers serve only corridors provided with smoke detection throughout and all dampers serving such corridor are activated.
 - 4) By smoke detector installed within 5 feet of fire/smoke damper air diffuser (in lieu of duct smoke detection), where fire/smoke dampers serve spaces other than corridors or corridors not provided with smoke detection; smoke detectors installed solely for activation of fire/smoke damper programmed as supervisory signal (not alarm) unless otherwise required by AHJ.
 - 5) By room/area smoke detection (in lieu of duct smoke detection), where area/room is provided with smoke detection throughout and all dampers serving such room/area are activated.

2.2 FIRE ALARM CONTROL UNITS AND RELATED EQUIPMENT

A Manufacturers:

1. Existing

B Fire Alarm Control Unit (FACU): Addressable.

1. SLCs and IDCs: Configurable for Class B or Class A with additional modules.
2. NACs: Integral and programmable with synchronization modules or cards as required.
3. Power Supply: 120 VAC, 60 Hz, supplying necessary power for FACU.
4. User-Interface: Touchscreen display for system interfacing and service mode settings, include password and user credentials; configurable for custom actions and incorporates historical event log.
5. Support self-testing detector capability.
6. Remote Annunciator Support: Up to three but no less than indicated for project..
7. Provide NAC expansion as required.
8. Enclosure Finish Color: Red.
- C Notification Appliance Circuit Expansion:
 1. Where notification appliance circuit requirements exceed capacity of FACU, provide accessories and cabinets as required for expansion.
- D Addressable Interface Modules:
 1. General Requirements:
 - a. Provide addressable modules suitable for connection to FACU SLCs.
 - b. Unless otherwise indicated, use addressable modules only in clean, dry, indoor, nonhazardous locations.
 2. Addressable Monitor Modules: Unless devices are explicitly permitted connected together on one zone; provide separate addressable monitor module for each conventional dry-contact input device in order to be individually identifiable by addressable FACU.
 3. Addressable Control Modules: Provide as indicated or as required for selective control of notification appliances.
 4. Addressable Relay Modules:
 - a. Provide as indicated or as required to perform necessary functions via dry-contact interface.
 - b. Where load exceeds module contact rating, provide accessory power isolation relays suitable for load as required.
 5. Addressable SLC Isolating Modules:
 - a. Provide as indicated or as required to automatically isolate short circuits on connected sections of SLC loops and allow other sections to continue to function normally.
 - b. Provide automatic reset upon correction of short circuit.

2.3 FIRE ALARM SYSTEM INITIATING DEVICES

- A Manufacturers:
 1. Source Limitations: Furnish initiating devices produced by same manufacturer as FACUs where possible.
- B General Requirements:
 1. Addressable Systems:
 - a. Addressable Devices: Individually identifiable by addressable FACU; suitable for connection to FACU SLCs.
 - b. Conventional/Nonaddressable Devices: Provide addressable interface modules as indicated or as required for connection to addressable FACU. Unless devices are explicitly permitted to be connected together as one zone, provide separate addressable monitoring point for each device in order to be individually identifiable by addressable FACU.
 2. Provide devices and associated accessories suitable for intended application and location to be installed. Unless otherwise indicated, use addressable devices and addressable interface modules only in clean, dry, indoor, nonhazardous locations.
 3. Surface-Mounted Devices: Provide manufacturer's accessory surface mount backboxes or suitable outlet/device box.
 4. Devices for Outdoor and Damp/Wet Locations: Weatherproof, suitable for outdoor use; provide manufacturer's accessory backboxes or enclosures in accordance with product listing.

5. Devices for Hazardous/Classified Locations: Listed and labeled as suitable for classification of installed location.
 - C Manual Fire Alarm Boxes/Pull Stations:
 1. Description: Noncoded manual signaling boxes listed and labeled as complying with UL 38.
 2. Alarm Initiation: Configured for general alarm initiation unless otherwise indicated; presignal stations (where indicated) require use of key to initiate general alarm.
 3. Operation: Dual-action unless otherwise indicated or required.
 - a. Dual-Action Operation: First requires pushing, pulling, or lifting, then pulling of lever.
 4. Color: Red, in accordance with NFPA 72.
 5. Station Reset: Requires use of key or tool.
 - D Spot-Type Detectors:
 1. Utilize plug-in mounting to separate base with tamper-resistant feature; provide bases as indicated or as required.
 2. Addressable Detectors:
 - a. Provide LED indication of normal operation and regular communication with FACU and alarm condition.
 - b. Provide reporting of analog sensor values to FACU.
 3. Smoke Detectors:
 - a. Listed and labeled as complying with UL 268.
 - b. Provide sensor type (e.g., photoelectric, ionization) as indicated.
 4. Thermal/Heat Detectors:
 - a. Listed and labeled as complying with UL 521.
 - b. Provide sensor type (e.g., fixed temperature, rate-of-rise) and rating as indicated.
 - E Duct Smoke Detectors:
 1. Listed and labeled as complying with UL 268A.
 2. Ratings: Compatible with air velocity, temperature, and humidity requirements for installed duct.
 3. Housing: Select as required for application.
 4. Sampling Tubes: Select as required for installation in duct to be monitored.
 - F Accessories:
 1. Remote Test Stations: Allows for detector key switch test and reset; provides visual indication of alarm condition.
 2. Remote Indicators: Provides visual indication of alarm condition.
 3. Provide Detector Bases As required:
 - a. Color: White, unless otherwise indicated.
 - b. Relay bases.
 - c. Isolator bases.
 - d. Sounder bases.
 4. Provide power supervision relays as required.
- 2.4 FIRE ALARM SYSTEM NOTIFICATION APPLIANCES
- A Manufacturers:
 1. Source Limitations: Furnish notification appliances produced by same manufacturer as FACUs where possible.
 - B General Requirements:
 1. Provide signaling notification appliances listed for fire-protective service and intended operating mode, public or private; suitable for connection to FACU notification appliance circuits.
 2. Provide notification appliances and associated accessories suitable for intended application and location to be installed. Use notification appliances only according to listed mounting (e.g. ceiling, wall).
 3. Surface-Mounted Notification Appliances: Provide manufacturer's accessory surface mount backboxes or suitable outlet/device box.
 4. Exterior Notification:

- a. In addition to required occupant notification, provide notification appliances on exterior of building.
 - b. Outdoor and Damp/Wet Locations: Weatherproof, suitable for outdoor use; provide manufacturer's accessory backboxes or enclosures in accordance with product listing.
 - c. Visible Notification: Provide strobe beacon with red lens; interface to dedicated NAC or addressable control module, 24 VDC, supervised.
 5. Notification Appliance Derating: Include device derating adjustments in accordance with listing where applicable, including the following.
 - a. Where accessory protective guards or enclosures are utilized.
 - b. Where required by field conditions (e.g., ambient temperature and sound).
 6. Notification Appliance Color:
 - a. Wall-Mounted: White.
 - b. Ceiling-Mounted: White.
 - c. See drawings for mounting configuration indicated by symbols on floor plans, system interconnection diagrams, and details.
 - C Visible Notification Appliances:
 1. Public Mode Operation: Listed and labeled as complying with UL 1971.
 2. Strobes: Clear or nominal white lens with flash rate of 1 Hz unless otherwise indicated or required; xenon or LED light source with maximum pulse duration of 0.02 seconds; candela rating as indicated.
 - a. Where field-selectable candela strobes are specified, substitution of fixed candela strobes is not permitted.
 - D Audible Notification Appliances:
 1. Listed and labeled as complying with UL 464.
 2. Rated Sound Pressure Level: As required to achieve design sound pressure levels, but not less than 75 dBA at 10 feet for public mode operation or 45 dBA at 10 feet for private mode operation in accordance with UL 464.
 3. Horns: Selectable tone, including at minimum NFPA 72 temporal 3 pattern and continuous; minimum of two selectable volume levels.
 - E Combination Notification Appliances: Comply with respective requirements for each signaling method.
 - F Accessories:
 1. Notification Appliance Bases: White, unless otherwise indicated.
- 2.5 WIRE AND CABLE
- A General Requirements:
 1. Comply with NFPA 70 listing and marking requirements for cables.
 2. Substitution of fire alarm listed cables for communication wiring, in accordance with NFPA 70, is not permitted.
 3. Provide cables as indicated or as required for connections between system components.
 - a. Data Cables for IP Network Connections: Unshielded twisted pair (UTP) complying manufacturer's minimum requirements.
 - B Power-Limited Fire Alarm Cables (PLFA):
 1. Comply with applications of listed cables in accordance with Chapter 7 of NFPA 70.
 - C Non-Power-Limited Fire Alarm Cables (NPLFA):
 1. Comply with NPLFA circuit conductor properties in accordance with NFPA 72.
 2. Comply with listing requirements in Chapter 7 of NFPA 70.
- 2.6 ACCESSORIES
- A Provide components as indicated or as required for connection of fire alarm system to devices and other systems indicated.
 - B Provide EoL resistors as required for wiring supervision.
 - C Surge Protection:
 1. Line Voltage Surge Protection:

- a. Provide for each line voltage circuit serving fire alarm system control units and related equipment (e.g., FACU, field booster panels, nodes, and transponders).
- b. Listed and labeled as complying with UL 1449.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify that system capacities listed in manufacturer instructions align with designed system.
- B Verify that mounting surfaces are ready to accept components and equipment, with suitable support frames and anchors installed where required.
- C Verify ratings, configurations, and characteristics of system components.
- D Verify rough-ins for field connections.
- E Verify that work likely to damage fire alarm system has been completed.
- F Verify that interior of building has been protected from weather.
- G Perform preinstallation tests and inspections per manufacturer's instructions and in accordance with NECA 305.
- H Verify that system bonding is in accordance with Section 26 05 26.
- I Do not energize system until deficiencies have been corrected.
- J Verify that branch circuit wiring installation is completed, tested, and ready for connection to fire alarm system. Overcurrent protection ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.

3.2 PREPARATION

- A Prior to installation, confirm environment of installation area is clean, and with ambient temperature, humidity, and ventilation requirements are per manufacturer's written instructions.
 1. Clean and vacuum in accordance with manufacturer's written instructions. Confirm equipment ventilation holes are absent of obstructions and free for air flow.
 2. Clean pathways thoroughly to remove foreign materials before installing conductors and cables.
 3. Clean dirt, debris, plaster, and other foreign materials from equipment enclosures, cabinets, and outlet boxes.
 4. Clean surfaces to receive adhesive products according to manufacturer's instructions.
- B Follow tool requirements for installation, including torquing adjustments, as listed in manufacturer documentation.
- C Remove detector dust covers prior to system energization.

3.3 INSTALLATION

- A Install field-devices, components, FACU and related equipment, and accessories in accordance with the following:
 1. Manufacturer's instructions, applicable codes, and Contract Documents.
- B Field Locations:
 1. Obtain Owner's approval of locations of devices and notification appliances that do not match fire alarm system documentation before installation.
 2. Arrange equipment to provide minimum operational clearances and required maintenance access in accordance with manufacturer's instructions and NFPA 70.
 3. Conceal wiring, conduit, outlet boxes, and supports where installed in finished areas; maintain code-required access.
- C Raceways and Supports:
 1. Coordinate locations of outlet boxes as required for installation. Only install boxes and equipment at locations based on application standards indicated in NFPA 72.
 - a. See Section 26 05 33.16.
 2. Secure and support raceways at intervals complying with NFPA 70. Provide supports where vertical rise exceeds permissible limits.
 - a. See Section 26 05 29.
 3. Install firestopping to preserve fire resistance rating of partitions and other elements.

- a. Minimum height for pathways to pass through floor or wall, if cable fastening is required, and routing in elevator hoistways in accordance with NFPA 70.
 - b. See Section 07 84 00.
- D Wiring and Connections:
 1. Maintain separation of Class 1, Class 2, Class 3 remote-control, signaling, fire alarm circuits, and power-limited circuits in accordance with cable insulation class and NFPA 70.
 2. Maintain circuit pathway and class designations in accordance with NFPA 72 for configuration, separation, and survivability.
 3. Comply with permitted and not permitted installations for wires, cables, cable routing assemblies, communications circuits, and fire alarm circuits in accordance with NFPA 70.
 4. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by AHJ. Provide independent support from building structure and suspended ceiling systems. Do not provide support from raceways, piping, ductwork, or other systems.
 5. Provide grounding and bonding in accordance with Section 26 05 26.
 6. Comply with manufacturer's minimum cable sizes or ratings.
 7. Do not exceed manufacturer's recommended maximum power, signal, or network cable lengths between components.
 8. Provide network wiring in accordance with NFPA 70.
 9. Neatly train and bundle conductors inside boxes, wireways, and cabinets.
 10. See manufacturer's instructions for batteries.
- E Fire Alarm System Components:
 1. Install field-installed devices, components, relays, notification appliances, accessories, and when applicable EoL resistors.
 - a. Install wiring to supervisory devices and associated EoL resistors as required for supervision of hardwired connections
 2. Install Wall-Mounted Equipment: Assemble component hardware within (e.g., card bays, sub-bays, expansion bays, signal cards, other card frames, networking, signal transmission, application modules, tamper monitoring devices, interconnecting modules, and auxiliary power supplies), including space for required spare capacity, and configure settings.
 3. Install Interconnect Wiring: Connect system cabinets, install processor and cards, cabling, connectors, terminations, and bonding.
- F Branch Power:
 1. After installation confirmations, follow manufacturer instructions to connect branch circuit power cables to premises fire alarm system components; comply with NFPA 70.
 2. Where accessories require auxiliary power, provide control power source and monitoring as indicated or as required to complete installation.
 3. Install auxiliary power supplies, including indicated monitoring, and connections necessary for remote equipment.
- G System Identification:
 1. Identify devices, notification appliances, components, cables, and equipment in accordance with approved submittals. See Section 26 05 53.
 2. Confirm fire alarm system programming meets requirements of SOO and sub-system SOOs.
 3. Mark location of disconnecting means for NPFLA circuits.
 4. Coordinate to provide red branch power circuit protective devices or identify them accordingly as required by NFPA 72 and NFPA 70.
 5. Mark date of batteries installed on inside cover of panels and formal maintenance logs.
- H Troubleshooting and Installer Checks:
 1. Field test connectivity periodically during installation process to avoid unexpected troubleshooting.
 2. Check system operation for notification, FACU functions, circuit supervision, alarm initiating devices, supervisory initiating devices, dress panels/doors/covers, and programming before performing field tests.
- I Fire Alarm System Tests:
 1. Perform required tests of NFPA 72. Record measured values during operational checks.
 2. Confirm functional testing of fire alarm system is as indicated in Contract Documents.

3.4 FIELD QUALITY CONTROL

- A See Section 01 40 00 - Quality Requirements for additional requirements.
- B Provide services of manufacturer's authorized representation to observe installation and assist in inspection, testing, and adjusting. Include manufacturer's detailed testing procedures and field reports and with submittals.
- C Provide equipment, two-way radios for testing personnel use, tools, and supplies required to accomplish inspection and testing.
- D Provide smoke bombs and smoke sprays to test smoke detector operation.
- E Notify Owner and Architect at least two weeks prior to scheduled inspections and tests.
- F Inspect and test in accordance with manufacturer's instructions.
- G Inspect wiring and components for damage and defects.
- H Batteries and Power Supplies: Perform inspections and tests listed in manufacturer installation instructions.
- I Perform additional requirements related to testing and inspection during system startup.
- J Test for interface with other systems.
- K Test shunt trips to verify operation.
- L Correct defective work, adjust for operation, and retest until entire system complies with Contract Documents.
- M Submit detailed reports indicated inspection and testing results, corrective actions taken, and as-found and final adjusted settings.
- N Diagnostic Period: After successful completion of inspections and tests, operate system to normal mode for at least 14 days without system or equipment malfunctions.

3.5 ADJUSTING

- A Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B Adjust initiating device and notification appliance settings to achieve desired operation as indicated in submittals.
- C Measure power supply primary and secondary voltages, log values for records, and make appropriate adjustments.
- D Adjust alignment of equipment covers and doors. Provide keys and spare keys to Owner.
- E Reprint and reinstall damaged or misinstalled labels; maintain neat and square to installed location good workmanship - see NECA 1; maintain consistent placements for identification on products of similar type.
- F Adjust devices or notification appliances and associated bases to be flush and level.
- G Program system parameters according to requirements of Owner.

3.6 CLEANING

- A See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
- B See Section 01 74 19 - Construction Waste Management and Disposal for field-generated construction waste requirements.
- C Check tightness of electrical connections. Replace damaged components and provide closure plates for vacant positions. Provide circuit directory updates for related power branch circuits.
- D Clean and repair existing materials and equipment that remain or are indicated for reuse.
- E Clean dirt, debris, plaster, and other foreign materials from outlet boxes and fire alarm system equipment and components.
- F Clean fire alarm system equipment and components according to manufacturer's instructions and NECA 305.
- G Clean surfaces and interiors of boxes and device cover plates in accordance with manufacturer's instructions to remove dirt, fingerprints, debris, plaster, and other foreign materials.
- H Repair scratched or marred exposed surfaces to match original factory finish.
- I Comply with federal (EPA), state, and local regulations for battery handling and disposal. Do not spill battery fluids down plumbing drains. Only use containers safe for transportation marked 'nonspillable.'

3.7 INSPECTION AND TESTING FOR COMPLETION

- A Notify Owner 7 days prior to beginning completion inspections and tests.
- B Notify AHJ and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- C Provide services of installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
- D Prepare for testing by ensuring that work is complete and correct; perform preliminary tests as required.
- E Provide tools, software, and supplies required to accomplish inspection, testing, and document results. Provide smoke bombs and smoke sprays for testing smoke detectors.
- F Perform inspection and testing in accordance with NFPA 72 and requirements of AHJ; document each inspection and test.
- G Correct defective work, adjust for operation, and retest until entire system complies with Contract Documents.
- H Diagnostic Period: After successful completion of inspections and tests, operate system in normal mode for at least 14 days without system or equipment malfunctions.
 - 1. Record system operations and malfunctions.
 - 2. If malfunction occurs, start diagnostic period over after correction of malfunction.
 - 3. Owner will provide attendant operator personnel during diagnostic period; schedule training to allow Owner personnel to perform normal duties.
 - 4. At end of successful diagnostic period, fill out and submit NFPA 72 "Inspection and Testing Form" and Record of Completion Form.

3.8 CLOSEOUT ACTIVITIES

- A See Section 01 78 00 - Closeout Submittals for additional submittals.
- B See Section 01 79 00 - Demonstration and Training for additional requirements.
- C Occupancy will not occur prior to Substantial Completion.
- D Substantial Completion of project cannot be achieved until inspection and testing is successful and the following:
 - 1. Specified diagnostic period without malfunction has been completed.
 - 2. Approved operating and maintenance data has been delivered.
 - 3. Spare parts, extra materials, and tools have been delivered.
 - 4. All aspects of operation have been demonstrated to Owner.
 - 5. Final acceptance of fire alarm system has been given by AHJ.

3.9 PROTECTION

- A Protect installed fire alarm system from subsequent construction operations.

END OF SECTION 28 46 00

SECTION 32 13 13 - CONCRETE PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Paving assemblies.
- B Form materials.
- C Reinforcement.
- D Concrete materials.

1.2 RELATED REQUIREMENTS

- A Section 03 10 00 - Concrete Forming and Accessories.
- B Section 03 20 00 - Concrete Reinforcing.
- C Section 03 30 00 - Cast-in-Place Concrete.
- D Section 31 22 00 - Grading: Preparation of site for paving and base and preparation of subsoil at pavement perimeter for planting.
- E Section 32 17 26 - Tactile Warning Surfacing: Plastic tactile and detectable warning tiles for pedestrian walking surfaces.

1.3 SUBMITTALS

- A Design Data: Indicate pavement thickness, designed concrete strength, reinforcement, and typical details.

PART 2 PRODUCTS

2.1 FORM MATERIALS

2.2 REINFORCEMENT

- A Reinforcing Steel and Welded Wire Reinforcement: Types specified in Section 03 20 00.

2.3 CONCRETE MATERIALS

- A Obtain cementitious materials from same source throughout.
- B Fly Ash: ASTM C618, Class C or F.
- C Air-Entraining Admixtures: ASTM C260/C260M.

2.4 ACCESSORIES

2.5 CONCRETE MIX DESIGN

2.6 MIXING

PART 3 EXECUTION

3.1 SUBBASE

3.2 PREPARATION

- A Moisten base to minimize absorption of water from fresh concrete.

3.3 FORMING

- A Place and secure forms to correct location, dimension, profile, and gradient.
- B Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.4 REINFORCEMENT

- A Place reinforcement as indicated.
- B Interrupt reinforcement at contraction joints.

3.5 COLD AND HOT WEATHER CONCRETING

- A Follow recommendations of ACI PRC-305 when concreting during hot weather.
- B Follow recommendations of ACI PRC-306 when concreting during cold weather.
- C Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

3.6 PLACING CONCRETE

- A Ensure reinforcement, inserts, embedded parts, formed joints and ____ are not disturbed during concrete placement.

3.7 JOINTS

- A Align joints with adjacent surfaces.
- B Place 3/8 inch wide expansion joints at 20 foot intervals and to separate paving from vertical surfaces and other components and in pattern indicated.
 - 1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface.
- C Provide scored joints.
 - 1. At 3 feet intervals.

3.8 FINISHING

- A Area Paving: Light broom, texture perpendicular to pavement direction.

3.9 FIELD QUALITY CONTROL

- A An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
 - 1. Provide free access to concrete operations at project site and cooperate with appointed firm.
 - 2. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
 - 3. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.
- B Compressive Strength Tests: ASTM C39/C39M; for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.
 - 1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
 - 2. Perform one slump test for each set of test cylinders taken.
- C Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.10 PROTECTION

- A Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B Do not permit pedestrian traffic over pavement for 7 days minimum after finishing.

END OF SECTION 32 13 13

SECTION 32 92 19 - SEEDING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A Preparation of subsoil.
- B Placing topsoil.

1.2 RELATED REQUIREMENTS

- A Section 31 22 00 - Grading.
- B Section 32 93 00 - Plants.

1.3 DEFINITIONS

- A Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.4 SUBMITTALS

- A Test Reports: Indicate nitrogen, phosphorus, potash, soluble salt, organic matter, and pH.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

PART 2 PRODUCTS

2.1 SEED MIXTURE

- A Seed Mixture:
 - 1. Merion Blue Grass: ____ percent.

2.2 ACCESSORIES

- A Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
- B Fertilizer: Recommended for grass, slow release nitrogen, biological materials, and biostimulant materials; of proportion necessary to eliminate deficiencies of topsoil.
- C Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.
- D Erosion Fabric: Jute matting, open weave.

PART 3 EXECUTION

3.1 EXAMINATION

- A Verify that prepared soil base is ready to receive the work of this Section.

3.2 PREPARATION

- A Prepare subgrade in accordance with Section 31 22 00.
- B Place topsoil in accordance with Section 32 91 19.

3.3 FERTILIZING

- A Apply fertilizer in accordance with manufacturer's instructions.
- B Apply after smooth raking of topsoil and prior to roller compaction.
- C Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D Mix thoroughly into upper 2 inches of topsoil.
- E Lightly water to aid the dissipation of fertilizer.

3.4 SEEDING

- A Apply seed at a rate of ____ lbs per 1000 sq ft evenly in two intersecting directions. Rake in lightly.
- B Do not seed areas in excess of that which can be mulched on same day.
- C Do not sow immediately following rain, when ground is too dry, or during windy periods.
- D Immediately following seeding and compacting, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.
- E Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.
- F Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches.

3.5 FIELD QUALITY CONTROL

- A See Section 01 40 00 - Quality Requirements for additional requirements.

3.6 CLEANING

- A See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
- B Clean surrounding areas of construction debris.

3.7 MAINTENANCE

- A See Section 01 70 00 - Execution Requirements, for additional requirements relating to maintenance service.

END OF SECTION 32 92 19

SECTION 32 93 00 - PLANTS

PART 2 PRODUCTS

1.1 PLANTS

- A Plants: Species and size identified in plant schedule, grown in climatic conditions similar to those in locality of the work according to ANSI/AHIA Z60.2.

END OF SECTION 32 93 00