



PROJECT MANUAL

RED RIVER BANK – VETERANS BOULEVARD BRANCH

1914 Veterans Boulevard

Metairie, Louisiana

Project Number 2021.53

Date: May 2023

**ASHE BROUSSARD WEINZETTLE
ARCHITECTS**

301 Jackson Street, Suite 205

Alexandria, Louisiana 71301

SET NUMBER _____



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AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

THE OWNER:

(Name, legal status and address)

THE ARCHITECT:

(Name, legal status and address)

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ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document

G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and

delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

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

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will

specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

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

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

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

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;

- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will

promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act

or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and

approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract 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 Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1** damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2** damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

SUPPLEMENTARY CONDITIONS

J-1 SCOPE

- A. The Supplementary Conditions are part of the Contract Documents. The Supplementary Conditions supplement and modify the The General Conditions of the Contract for Construction, hereinafter called "General Conditions". Where differences occur between Supplementary Conditions, Instructions to Bidders, and General Conditions, the Supplementary Conditions take precedence only when differences or modifications are specifically stated.
- B. The "General Conditions of the Contract for Construction", AIA Document A201, 2017 Edition, Articles 1 thru 14 inclusive, is a part of this Contract, and enclosed within.
- C. The "Standard Form of Agreement Between Owner and the Contractor", A103, 2017 Edition is a part of this Contract. This agreement shall be the basis for contract between Owner and Contractor on this Project.

J-2 PRICE, FEES, PERMITS, NOTICES

- A. The cost of the work shall cover the furnishing of all materials, tools, labor, scaffolding, transportation and equipment necessary to do the work in full conformity with the plans, specifications and any addenda, if any, have been issued.
- B. The Contractor will pay for permits, fees, licenses and taxes, compliance with laws, ordinances, rules and regulations as required by the General Conditions.

J-3 RECORDING OF DOCUMENTS

- A. The Contract and Bond shall be recorded in the Office of the Clerk of Court in the Parish in which the project is located at the Contractor's expense before the work is begun or within thirty (30) days from the date of the Contract, whichever is earlier, unless the Owner directs that is shall not be recorded.
- B. Upon acceptance by the Owner of substantial completion and provisions as amended by LA R.S. 38:2241.1 (as to public works) and LA R.S. 9:4902.1 (as to private works) Contractor shall cause Certificate to be recorded in the Mortgage Records of the Parish in which the work has been done.
- C. Final payment shall not become due until legal time period has elapsed and no liens have been recorded affecting the Project, and all affidavits, consents and releases required by the General Conditions are obtained and furnished to the Owner.

J-3 INSURANCE - MODIFICATIONS TO GENERAL CONDITIONS

Paragraph 11.1, Contractor's Liability Insurance and 11.4, Property Insurance, shall be modified as follows:

- A. **General:** The Contractor shall not commence work under this Contract until he has obtained all the insurance required under this paragraph and such insurance has been approved by the Owner, nor shall the Contractor allow any Subcontractor to commence work on his Subcontract until the insurance required of the Subcontractor has been so obtained and approved.
- B. **Compensation Insurance:** The Contractor shall pay for and shall maintain during life of this Contract, Workmen's Compensation Insurance as required by applicable State or Territorial Law for all of his employees to be engaged in work at the site of the Project under this contract and, in case of such work sublet, the Contractor shall require the Subcontractor similarly to provide Workmen's Compensation Insurance for all of the latter's employees to be engaged in such work unless such employees are covered by protection afforded the Contractor's Workmen Compensation Insurance. In case any class of employees engaged is hazardous work on the Project under this Contract is not protected under the Workmen's Compensation Statute, the Contractor shall provide and shall cause each Subcontractor to

provide adequate Employer's Liability Insurance for the protection of such of his employees as are not otherwise protected.

- C. Contractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance: The Contractor shall pay for and maintain during the life of this Contract such public liability and property damage insurance, including the operation of motor vehicles, with limits as hereinafter provided which will cover the Contractor of any subcontractor, and by anyone directly or indirectly employed by either of them, for claims for damages for personal injury, including accidental death, as well as for claims for property damages, insurance shall be as follows:
1. Public Liability Insurance - An amount of not less than \$1,000,000.00 each occurrence for bodily injuries, including accidental death, to any one person, and subject to same limit for each person an account of one accident.
 2. Property Damage Insurance - An amount not less than \$1,000,000.00 each occurrence to cover all sums which the Contractor of Subcontractor shall be obligated to pay by reason of liability imposed upon him by law for damages because of injury to or destruction of property.
- D. Subcontractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance: The Contractor shall either require each of his Subcontractors to pay for and maintain during the life of his Subcontract, Subcontractor's Public Liability and Property Damage Insurance of the type specified in subparagraphs 1 and 2 above in the same limits of \$1,000,000.00 each occurrence, or insure the activities of his Subcontractors in his policy.
- E. Builder's Risk Insurance: The Contractor shall pay for and maintain Fire, Extended Coverage, including vandalism and malicious mischief, on the completed value form on a 100 percent basis on the insurable portion of the project for the benefit of Owner, Contractor and Subcontractors as their interests may appear. Contractor and his Surety shall be obligated to full performance of the Contract.
- F. Further, the Contractor shall procure, at his expense, prior to commencement of any work (including test driving of piling) an "Owner's Protective Liability Policy" in the name of the Owner, covering all work coming within scope of the Contract including pile driving, to protect the Owner against claims for damages because of bodily injury, sickness or disease, or death of any person or for damages because of injury to or destruction of tangible property, including loss or use resulting there from, caused by and arising out of the performance of all such work including pile driving operations, such policy to be in an amount not less than One Million Dollars (\$1,000,000.00) each occurrence and One Million Dollars (\$1,000,000.00) aggregate, with Exclusions X (Explosion), C (Collapse), and U (Underground Property Damage), not applicable. Such policy is to be procured in an insurance company acceptable to the Owner prior to the commencement of any work and to remain in effect until all work is completed and accepted by the Owner.
- G. Proof of Carriage of Insurance: Paragraph 11.1.3 of General Conditions shall remain in full force and effect.
1. Furnish copy of Certificate to Architect.
- H. Partial Occupancy: Paragraph 11.4.1.5 of General Conditions shall remain in full force and effect.

END OF SECTION



AIA® Document A101® – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the day of in the year
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

and the Contractor:
(Name, legal status, address and other information)

for the following Project:
(Name, location and detailed description)

The Architect:
(Name, legal status, address and other information)

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101®–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

Init.

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TABLE OF ARTICLES

1	THE CONTRACT DOCUMENTS
2	THE WORK OF THIS CONTRACT
3	DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
4	CONTRACT SUM
5	PAYMENTS
6	DISPUTE RESOLUTION
7	TERMINATION OR SUSPENSION
8	MISCELLANEOUS PROVISIONS
9	ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:

(Check one of the following boxes.)

- ☐ The date of this Agreement.
- ☐ A date set forth in a notice to proceed issued by the Owner.
- ☐ Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check one of the following boxes and complete the necessary information.)

[] Not later than () calendar days from the date of commencement of the Work.

[] By the following date:

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work

Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be (\$), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item

Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item

Price

Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item

Price

§ 4.4 Unit prices, if any:

(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item

Units and Limitations

Price per Unit (\$0.00)

§ 4.5 Liquidated damages, if any:

(Insert terms and conditions for liquidated damages, if any.)

§ 4.6 Other:

(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the day of the month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than () days after the Architect receives the Application for Payment. *(Federal, state or local laws may require payment within a certain period of time.)*

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- .5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

§ 5.1.7.1.1 The following items are not subject to retainage:

(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:

(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:

(Insert any other conditions for release of retainage upon Substantial Completion.)

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Insert rate of interest agreed upon, if any.)

%

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

- ☐ Arbitration pursuant to Section 15.4 of AIA Document A201–2017
- ☐ Litigation in a court of competent jurisdiction
- ☐ Other *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner’s convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:

(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner’s convenience.)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner’s representative:

(Name, address, email address, and other information)

§ 8.3 The Contractor’s representative:

(Name, address, email address, and other information)

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

- .5 Drawings

Number	Title	Date
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- .6 Specifications

Section	Title	Date	Pages
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- .7 Addenda, if any:

Number	Date	Pages
--------	------	-------

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

- .8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

[] The Sustainability Plan:

Title	Date	Pages
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[] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
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- .9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

This Agreement entered into as of the day and year first written above.

OWNER (Signature)

(Printed name and title)

CONTRACTOR (Signature)

(Printed name and title)



AIA® Document A312® – 2010

Performance Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

CONSTRUCTION CONTRACT

Date:

Amount: \$ 0.00

Description:

(Name and location)

BOND

Date:

(Not earlier than Construction Contract Date)

Amount: \$

Modifications to this Bond: ☐ None ☐ See Section 16

CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

Signature: _____

Name and

Title:

(Any additional signatures appear on the last page of this Performance Bond.)

SURETY

Company: (Corporate Seal)

Signature: _____

Name and

Title:

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:**OWNER'S REPRESENTATIVE:**

(Architect, Engineer or other party:)

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

- .1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
- .2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
- .3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

- .1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
- .2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

- .1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
- .2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and
- .3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 **Balance of the Contract Price.** The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 **Construction Contract.** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 **Contractor Default.** Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 **Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 **Contract Documents.** All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

Company: _____
(Corporate Seal)

Signature: _____
Name and Title: _____
Address: _____

SURETY

Company: _____
(Corporate Seal)

Signature: _____
Name and Title: _____
Address: _____



AIA® Document A312® – 2010

Payment Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

CONSTRUCTION CONTRACT

Date:

Amount: \$ 0.00

Description:

(Name and location)

BOND

Date:

(Not earlier than Construction Contract Date)

Amount: \$

Modifications to this Bond: ☐ None ☐ See Section 18

CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

SURETY

Company: (Corporate Seal)

Signature: _____

Name and

Title:

(Any additional signatures appear on the last page of this Payment Bond.)

Signature: _____

Name and

Title:

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:**OWNER'S REPRESENTATIVE:**

(Architect, Engineer or other party:)

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

- .1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
- .2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- .1 the name of the Claimant;
- .2 the name of the person for whom the labor was done, or materials or equipment furnished;
- .3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- .4 a brief description of the labor, materials or equipment furnished;
- .5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- .6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- .7 the total amount of previous payments received by the Claimant; and
- .8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

Company: _____ (Corporate Seal)

Signature: _____
Name and Title: _____
Address: _____

SURETY

Company: _____ (Corporate Seal)

Signature: _____
Name and Title: _____
Address: _____

**DIVISION 01
GENERAL REQUIREMENTS**

CONTENTS

01 11 00	Summary of the Work
01 14 00	Contractor's Use of Premises
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01 30 00	Administrative Requirements
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SECTION 01 11 00

SUMMARY OF THE WORK

PART 1 GENERAL

1.1 SCOPE

- A. This Project Manual and accompanying Drawings provide for labor, materials, plant, supplies, equipment, facilities and appurtenances necessary for preparation of and work necessary for construction and completion of the project titled, Renovations to: RED RIVER BANK – VETERANS BRANCH, Metairie, Louisiana, complete and in accordance with all requirements of the Contract Documents.

1.2 PROJECT DESCRIPTION

- A. Project consists of completing a new branch bank of approximately 2,490 square feet. Additionally, the project will include demolition of existing paved areas and the construction of new drives, parking, walkways and storm drainage.
- B. Erect and maintain all required temporary walls, lights, barricades and warning signs, as may be necessary to protect the public and workmen.
- C. Contractor shall become familiar with and at all times shall observe and comply with all Federal, State and Local laws and/or ordinances and regulations in any manner affecting the conduct of the work.

END OF SECTION

SECTION 01 14 00

CONTRACTOR'S USE OF THE PREMISES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work included: This section applies to situation in which the Contractor or his representatives including, but not necessarily limited to, suppliers, subcontractors, employees and field engineers, enter upon the Owner's property.
- B. Related work: Documents affecting work of this Section include, but are not limited to, General Conditions, Supplementary Conditions and Sections of Division 1 of this Specification.

1.02 QUALITY ASSURANCE

- A. Promptly upon award of the Contract, notify all pertinent personnel regarding requirements of this Section.

1.03 SCOPE

- A. Reference Site Plan for extent of site available for Contractor's use for storage of materials, parking and construction area. It is the intent of this project to work only in those areas and in no way disturb the remaining portions of the site. Materials may be stored in paved areas. Do not allow storage on adjacent properties or public right of ways.
- B. Contractor to prepare with Architect a procedure for his use of the premises for storage, personnel, etc., prior to start of work.
- C. No after-hours access to the site is permitted unless specifically approved by the Architect. No work shall be done by Subcontractors without the direct supervision of General Contractor's Job Superintendent.
- D. Restrict and control all parking and entry into the site to only that necessary to accomplish the work.
- E. Parking of Contractor's employees automobiles is to be the responsibility of Contractor and shall follow all regulations and ordinances controlling such. At no time shall any vehicles restrict or prevent public use of street or entry or present a nuisance to the general public.
- F. At each day's end Contractor to secure all portions of the work and all entry into the building so as to maintain property security requirements. Contractor and Architect to arrange such security requirements prior to start of work under the direction of Owner.
- G. Contractor shall not use existing building for storage of materials.

END OF SECTION

SECTION 01 15 20

APPLICATION FOR PAYMENT

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Comply with procedures described in this Section when applying for progress payment and final payment under the Contract.
- B. Related Work:
 - 1. Documents affecting work of this Section included, but are not necessarily limited to General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. The Contract Sum and the schedule for payments are described in the Form of Agreement.
 - 3. Payments upon Substantial Completion and Completion of the Work are described in the General Conditions and in Section 01 77 00 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Prior to start of construction, secure the Architect's approval of the schedule of values required to be submitted under Paragraph 9.2 of the General Conditions.
- B. During progress of the work, modify the schedule of values as approved by the Architect to reflect changes in the Contract Sum due to Change Orders or other modifications of the Contract.
- C. Base requests for payment on the approved schedule of values.

1.3 SUBMITTALS

- A. Formal Submittal: Unless otherwise directed by the Architect:
 - 1. Make formal submittal of request for payment by filling in the agreed data, on AIA Document G702-1992, "Application and Certificate for Payment", and G703-1992 Continuation Sheet.
 - 2. Sign the Application and Certificate for Payment. Please note that the application does not need to be notarized.
 - 3. Submit the original of the Application and Certificate for Payment, plus three (3) identical copies, to the Architect.
 - 4. Contractor can only invoice for materials stored on the site. Contractor may not invoice for materials stored in a bonded warehouse or elsewhere.
 - 5. Contractor must include copies of supportive invoices and other documentation for any stored materials included in the application.
 - 6. The Architect will review the formal submittal and, when approved, will sign the Application and Certificate for Payment, and will distribute:
 - a. One original copy to Owner;
 - b. One copy to Contractor;
 - c. One copy to Architect's file; and
 - 7. Owner will, upon approval, disburse payment directly to the Contractor.

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Coordination.
- B. Field engineering.

1.2 COORDINATION

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

1.3 FIELD ENGINEERING

- A. Employ a Land Surveyor registered in the State of Louisiana for assistance in laying out the work and establishing key reference points.
- B. Contractor to locate and protect survey control and reference points.
- C. Control datum for survey is indicated on Civil Drawings.
- D. Verify set-backs and easements; confirm drawing dimensions and elevations.
- E. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- F. Submit certificate signed by the Land Surveyor that the elevations and locations of the Work are in conformance with the Contract Documents.
- G. Maintain complete and accurate log of control and survey work as work progresses.
- H. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- I. Promptly report to Architect loss or destruction of reference point or relocation required because of changes in grades or other reasons.

- J. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

PART 2 **PRODUCTS**
Not Used

PART 3 **EXECUTION**
Not Used

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Make submittals required by the Contract Documents, and revise and resubmit as necessary to establish compliance with the specified requirements.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. Individuals requirements for submittals also may be described in pertinent Sections of these Specifications.
- C. Work not included:
 - 1. Unrequired submittals will not be reviewed by the Architect.
 - 2. The Contractor may require his Subcontractors to provide drawings, setting diagrams and similar information to help coordinate the Work, but such data shall remain between the Contractor and his Subcontractors and will not be reviewed by the Architect.

1.2 QUALITY ASSURANCE

- A. Coordination of submittals:
 - 1. Prior to each submittal, carefully review and coordinate all aspects of each items being submitted.
 - 2. Verify that each item and the submittal for it conform in all respects with the specified requirements.
 - 3. By affixing the Contractor's signature to each submittal, certify that this coordinate has been performed.
- B. Substitutions:
 - 1. Refer to INSTRUCTIONS TO BIDDERS, ARTICLE 4, Section 4.3 for description of procedure to be followed for any Substitutions.
 - 2. Substitutions must be approved prior to bid according to the requirements of Paragraph 4.3, Instructions to Bidders.
 - 3. Use "Substitution Request Form" provided in this section.
- C. "Or Equal"
 - 1. Where the Phrase "or equal" or "or equal as approved by Architect", occurs in the Contract Documents, do not assume that the materials, equipment, or methods will be approved as equal unless the item has been specifically so approved for this Work by the Architect, prior to bidding.
 - 2. The decision of the Architect shall be final and shall be set forth in an addendum.

1.3 SUBMITTALS

- A. Make submittals of Shop Drawings, Samples, substitution requests and other items in accordance with the provision of this Section, or as requested by Architect.

PART 2 PRODUCTS

2.1 SHOP DRAWINGS

- A. Scale and measurements: Make Shop Drawings accurately to a scale sufficiently large to show all pertinent aspects of the item and its method of connection to the Work.
- B. Types of prints required:
 - 1. Submit Shop Drawings in the form of clear readable prints. Submit a minimum of one (1) full copy of all shop drawings. At contractor's option submittal may be in PDF form and submitted electronically.
- C. Review comments of the Architect and his Consultants will be shown on the prints in red ink when it is returned to the Contractor. The Contractor may make and distribute such copies as are required for his purposes.
- D. Electronic File Transfer: The contractor may secure ACAD Files from the Architect by completing and submitting the Electronic File Transfer and Release Form included in this Project Manual Section.

2.2 MANUFACTURERS' LITERATURE

- A. Where contents of submitted literature from manufacturer includes data not pertinent to the submittal, clearly shown which portions of the contents is being submitted for review.
- B. Submit the number of copies which are required to be returned, plus one copy which will be retained by the Architect.

2.3 SAMPLES

- A. Provide Sample or Samples identical to the precise article proposed to be provided. Identify as described under "Identification of Submittals" below.
- B. Number of Samples required:
 - 1. Unless otherwise specified, submit Samples in the quantity which is required to be returned, plus one which will be retained by the Architect.
 - 2. By pre-arrangement in specific cases, a single Sample may be submitted for review and, when approved, be installed in the Work at a location agreed upon by the Architect.

2.4 COLORS AND PATTERNS

- A. Unless the precise color and pattern is specifically called out in the Contract Documents, and whenever a choice of color or pattern is available in the specified products, submit accurate color and pattern charts to the Architect for selection.
- B. Architect shall prepare selections for approval by the User Agency and Facility Planning and Control.

PART 3 EXECUTION

3.1 IDENTIFICATION OF SUBMITTALS

- A. Consecutively number all submittals.
 - 1. When material is resubmitted for any reason, transmit under a new letter of transmittal and with a new transmittal number.
 - 2. On resubmittals, cite the original submittal number of reference.

- B. Accompany each submittal with a letter of transmittal showing all information required for positive identification and checking. General Contractor shall review, stamp, date and sign all shop drawing submittals.
- C. On at least the first page of each submittal, and elsewhere as required for positive identification, show the submittal number in which the item was included.
- D. Maintain an accurate submittal log for the duration of the Work, showing current status of all submittals at all times. Make the submittal log available to the Architect for his review upon request.

3.2 GROUPING OF SUBMITTALS

- A. Unless otherwise specified, make submittals in groups containing all associated items to assure that information is available for checking each item when it is received.
 - 1. Partial submittals may be rejected as not complying with the provisions of the Contract.
 - 2. The Contractor may be held liable for delays so occasioned.

3.3 TIMING OF SUBMITTALS

- A. Make submittals far enough in advance of scheduled dates for installation to provide time required for reviews, for securing necessary approvals, for possible revisions and resubmittals, and for placing orders and securing delivery.
- B. In scheduling, allow at least fifteen (15) working days for review by the Architect following receipt of the submittal.

3.4 ARCHITECT'S REVIEW

- A. Review by the Architect does not relieve the Contractor from responsibility for errors which may exist in the submitted data.
- B. Revisions:
 - 1. Make revisions required by the Architect.
 - 2. If the Contractor considers any required revision to be a change, the Architect shall be notified as provided for in Paragraph 7.3 of the General Conditions.
 - 3. Make only those revisions directed or approved by the Architect.

SUBSTITUTION REQUEST FORM

Project: Red River Bank – Veterans Branch
1914 Veterans Boulevard
Metairie, Louisiana 70005
(Architect's Project Number: 2021.53)

Mail /Email: Ashe Broussard Weinzettle Architects
301 Jackson St., Suite 205
Alexandria, LA 71301
Telephone: (318) 473-0252
Fax: (318) 442-6007

Attn: Kevin Broussard
Email: kevinbroussard@abwarchitects.com

SECTION	PARAGRAPH	SPECIFIED ITEM: _____
_____	_____	PROPOSED SUBSTITUTE: _____

Attach complete description, designation, catalog or model number, Spec Data sheet, and other technical data, including laboratory tests if applicable.

Fill In Blanks Below:

1. Will substitution affect dimensions indicated on drawings? _____

2. Will substitution affect wiring, piping, ductwork, etc., indicated on drawings? _____

3. What affect will substitution have on other trades? _____

4. Differences between proposed substitution and specified item? _____

5. If necessary, will the undersigned pay for Architect's cost, required to revise working drawings, caused by substitution? _____
6. Manufacturer's warranties of specified items and proposed items are:
[] Same [] Different (explain) _____

Submitted By:
Firm: _____

Address: _____

Signature

Date: _____
Telephone: _____
Fax: _____

Electronic File Request and Release Form

Project: Red River Bank – Veterans Branch
1914 Veterans Boulevard
Metairie, Louisiana 70005
(Architect's Project Number: 2021.53)

Mail/Email: Ashe Broussard Weinzettle Architects
301 Jackson Street, Suite 205
Alexandria, LA 71301
Tel: (318) 473-0252
Fax: (318) 442-6007

Attn: Kevin Broussard
Email: kevinbroussard@abwarchitects.com

At your request, we will provide electronic files for your convenience and use in the preparation of shop drawings related to the above referenced project, the RECIPIENT agrees to the following terms and conditions:

Ashe Broussard Weinzettle Architects will provide to the RECIPIENT certain drawings, specifications, or other documents prepared by Ashe Broussard Weinzettle Architects or its sub consultants in electronic format and/or on electronic media. These documents are hereinafter collectively referred to as "ELECTRONIC FILES". Our ELECTRONIC FILES are compatible with: Autodesk Autocad 2010 and legacy formats. We make no representation as to the compatibility of these files with the RECIPIENT'S hardware or your software beyond the specified release of the referenced specifications.

Data contained on these ELECTRONIC FILES are part of our instruments of service and shall not be used by the RECIPIENT or anyone else receiving these data through or from the RECIPIENT for any purpose other than those outlined for the referenced project. Any other use or reuse by the RECIPIENT or by others will be at the RECIPIENT'S sole risk and without liability or legal exposure to Ashe Broussard Weinzettle Architects or its sub consultants. The RECIPIENT agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against Ashe Broussard Weinzettle Architects, our partners, employees, agents, or sub consultants that may arise out of, or in connection with, the RECIPIENT'S use of the ELECTRONIC FILES.

Furthermore, the RECIPIENT shall, to the fullest extent permitted by law, indemnify and hold us harmless against all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, arising out of or resulting from the RECIPIENT'S use of these ELECTRONIC FILES.

These ELECTRONIC FILES are not construction documents or record documents of as-built conditions. Differences may exist between these ELECTRONIC FILES, site conditions and signed or sealed hard-copy construction documents. We make no representation regarding the accuracy or completeness of the ELECTRONIC FILES the RECIPIENT receives. In the event that a conflict arises between the signed or sealed hard-copy construction documents prepared by us and the ELECTRONIC FILES, the signed or sealed hard-copy construction documents shall govern. The RECIPIENT is responsible for determining if any conflict exists. By the use of these ELECTRONIC FILES, the RECIPIENT is not relieved of their duty to fully comply with the contract documents, including, and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate work with that of other contractors for the project.

Because information presented on the ELECTRONIC FILES can be modified, unintentionally or otherwise, we reserve the right to remove all indication of ownership and/or involvement from each electronic display.

We will furnish you electronic files of the following drawings:

We make no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall we be liable for any loss of profit or any consequential damages as a result of your use, reuse or misuse of these electronic files.

Please execute this Agreement in the space provided below to indicate your acceptance of the terms and conditions of the release in this Agreement. Upon receipt of the executed Agreement, we will transfer the ELECTRONIC FILES to the appropriate address or email.

READ AND ACCEPTED BY:

Signature of Authorized Representative: _____

Date: _____

Printed Name: _____

Company: _____

Title: _____

END OF SECTION

SECTION 01 35 43

ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 DESCRIPTION

- A. For the purpose of this specification, environmental pollution is defined as the presence of chemical, physical or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and recreational purposes. The control of environmental pollution requires consideration of, but is not limited to air, water and land, and involves noise, solid waste management and management of radioactive and other hazardous materials.

1.2 APPLICABLE REGULATION

- A. In order to prevent, and to provide for abatement and control any environmental pollution arising from the construction activities of the Contractor and his/her Subcontractors in the performance of this contract, they shall comply with the current applicable federal, state and local laws and regulations concerning environmental pollution control and abatement.

1.3 PROTECTION OF LAND RESOURCES

- A. It is intended that the land resources within the project boundaries and outside of limits of permanent work performed under this Contract be preserved in their present condition or be restored to a condition after completion of construction that will appear to be natural and not detract from the appearance of the Project. Insofar as possible, the contractor shall confine his/her construction activities to areas defined by the plans or specifications, to areas to be cleared by other operations, or to quarry, borrow or waste areas indicated on the plans. At the onset of borrow excavation, topsoil shall be saved for use in restoring the borrow area. Waste and borrow areas shall be leveled or trimmed to regular lines and shaped to provide a neat appearance. In all instances the restored area shall be well-drained, so as to prevent the accumulation of stagnant water. Except in areas marked on the plans to be cleared, the Contractor shall not deface, injure or destroy trees or shrubs, nor remove or cut them without special authority.
- B. Restoration of Landscape Damage: Any trees or other landscape feature scarred or damaged by the Contractor's equipment or operations, shall be restored as nearly as possible to its original condition at the Contractor's expense. The Contracting Officer will decide what method of restoration shall be used and whether damaged trees shall be treated and healed or removed and replaced.
- C. Post-Construction Cleanup or Obliteration: The Contractor shall obliterate all signs of temporary construction facilities such as haul roads, work areas, structure, foundations of temporary structure, stockpiles of excess or waste materials, or any other vestiges of construction as directed by the Contracting Officer. It is anticipated that excavation, filling and plowing of roadways will be required to restore the area to near natural conditions which will permit the growth of vegetation thereon. The disturbed areas shall be graded and filled as necessary, and shall be spread to a depth of approximately four inches over the entire area and the entire Area seeded. Restoration to original contours is required unless otherwise directed by the Contracting Officer.

1.4 PROTECTION OF WATER RESOURCES

- A. The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acids or other harmful materials. It is the responsibility of the Contractor to investigate and comply with all applicable federal, state, parish and municipal laws concerning pollution of rivers and streams. all work under this Contract shall be performed in such a manner that pollution/pollutants will not be introduced into streams through or adjacent to the project area.
- B. Erosion Control: Surface drainage from cuts and fills within the construction limits, whether or not completed and from borrow and waste disposal areas, shall, if turbidity producing materials are present, be held in suitable sedimentation ponds or shall be graded to control erosion within acceptable limits. Temporary erosion and sediment control measures such as berms, dikes, drains or sedimentation basins, required to meet the above standards, shall be provided and maintained until permanent drainage and erosion control facilities are completed and operative. The area of bare soil exposed at any time by construction proletrarian should be held to a minimum. Steam crossing by fording with equipment is prohibited. Fills and waste areas shall be constructed by selective placement to eliminate silts or clays on the surface that will erode and contaminate adjacent streams.
- C. Spillages: At all times of the year, special measures shall be taken to prevent chemicals, fuels, oils, grease, bituminous materials, waste washings, herbicides and insecticides, and cement drainage from entering surface or ground waters. In the event of a fuel, oil or chemical spill the Contractor will take immediate containment measures to prevent the spill from entering the base drainage system. All spills will be reported immediately to the Authority having jurisdiction.
- D. Disposal: Disposal of any materials, wastes, effluents, trash, garbage, oil, grease, on the project site is expressly forbidden. If any waste material is dumped in unauthorized areas, the Contractor shall remove the material and restore the area to the condition of the adjacent undisturbed area at the Contractor's own expense. If necessary, contaminated ground shall be excavated, disposed of as directed by the Contracting Officer and replaced with suitable fill material, compacted and finished with topsoil; all at the expense of the Contractor.

1.5 DISPOSAL OF REMOVED MATERIAL

- A. Unless otherwise specified in other sections of these specifications or unless reusable under the terms of this Contract, all removed material shall be disposed of off site. This disposal shall be in accordance with all applicable federal, state, parish and municipal laws.

1.6 PESTICIDES (INSECTICIDES, FUNGICIDES, HERBICIDES)

- A. Application of all pesticides shall be accomplished by a certified pest control operator. Delivery and storage of pesticides will be monitored by certified personnel to insure the adequacy of containers and the safe storage of adjacent undisturbed area at the Contractor's own expense. If necessary, contaminated ground shall be excavated, disposed or as directed by the Contracting Officer, and replaced with suitable fill material, compacted and finished with topsoil; all at the expense of the Contractor.

1.7 BURNING

- A. No open burning shall be permitted.

1.8 HAZARDOUS MATERIALS

- A. The Contractor will comply with all local, state and federal laws pertaining to the protection of the environment and emission of hazardous pollutants in the performance of this Contract. No equipment or components containing polychlorinated biphenyls (PCB) will be allowed.

END OF SECTION

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality assurance and control of installation.
- B. References.
- C. Field samples.
- D. Mock-up.
- E. Manufacturers' field services and reports.

1.2 RELATED SECTIONS

- A. Section 01 33 00 - Submittals: Submission of Manufacturers' Instructions and Certificates.
- B. Section 01 45 29 - Testing Laboratory Services.
- C. Section 01 66 00 – Product Storage and Handling Requirements for material and product quality.

1.3 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply fully with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work by persons qualified to produce workmanship of specified quality.
- F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.4 REFERENCES

- A. Conform to reference standard by date of issue current on date for receiving bids.
- B. Obtain copies of standards when required by Contract Documents.
- C. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.5 TOLERANCES

- A. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with contract documents, request clarification from Architect before proceeding.

- B. Adjust products to appropriate dimensions; position before securing products in place.

1.6 FIELD SAMPLES

- A. Install field samples at the site as required by individual specifications Sections for review.
- B. Acceptable samples represent a quality level for the Work.
- C. Where field sample is specified in individual Sections to be removed, clear area after field sample has been accepted by Architect.

1.7 MOCK-UP

- A. Assemble and erect specified items, with specified attachment and anchorage devices, flashings, seals, and finishes.
- B. Where mock-up is specified in individual Sections to be removed, clear area after mock-up has been accepted by Architect.
- C. Accepted mock-ups shall be comparison standard for remaining work.

1.8 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. When specified in individual specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance of equipment and training of maintenance personnel as applicable, and to initiate instructions when necessary.
- B. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- C. Submit report in duplicate within seven (7) days of observation to Architect for review.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 42 19

REFERENCE STANDARDS

PART 1 GENERAL

1.1 DESCRIPTION

A. Work included:

1. Throughout the Contract Documents, reference is made to codes and standards which establish qualities and types of workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics.
2. Where materials or workmanship are required by these Contract Documents to meet or exceed the specifically named code or standard, it is the Contractor's responsibility to provide materials and workmanship which meet or exceed the specifically named code or standard.
3. It is also the Contractor's responsibility, when so required by the Contract Documents or by written request from the Architect, to deliver to the Architect all required proof that the materials or workmanship, or both, meet or exceed the requirements of the specifically named code or standard. Such proof shall be in the form requested in writing by the Architect, and generally will be required to be copies of a certified report of tests conducted by a testing agency approved for that purpose by the Architect.

B. Related Work:

1. Related work described elsewhere; e.g., specific naming of codes or standards occurs on the Drawings and in other Sections of these Specifications.

1.2 QUALITY ASSURANCE

- A. Familiarity with pertinent codes and standards: In procuring all items used in this work, it is the Contractor's responsibility to verify the detailed requirements of the specifically named codes and standards and to verify that the items procured for this use in this work meet or exceed the specified requirements.

- B. Rejection of non-complying items: The Architect reserves the right to reject items incorporated into the work which fail to meet the specified minimum requirements. The Architect further reserves the right, and without prejudice to other recourse the Architect may take, to accept non-complying items subject to an adjustment in the Contract Amount as approved by the Architect and the Owner.

- C. Applicable standards listed in these Specifications include, but are not necessarily limited to, standards promulgated by the following agencies and organizations:

- | | |
|-------------|---|
| 1. AASHTO - | American Association of State Highway and Transportation Officials, 341 National Press Building, Washington, D.C. 20004 |
| 2. ACI - | American Concrete Institute, Box 19150 Redford Station, Detroit, Michigan 48129 |
| 3. AISC - | American Institute of Steel Construction, Inc., 1221 Avenue of the Americas, New York, New York 10020 |
| 4. ADAAG | Americans with Disabilities Act Accessibility Guidelines |
| 5. ANSI - | American National Standards Institute (successor to USASI and ASA), 1430 Broadway, New York, New York 10018 |
| 6. ASTM - | American Society of Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103 |
| 7. AWS - | American Welding Society, Inc., 2501 N.W. 7th Street, Miami, Florida 33125 |

- 8. AWWA - American Water Works Association, Inc., 6666 West Quincy Avenue, Denver, Colorado 80235
- 9. CRSI - Concrete Reinforcing Steel Institute, 228 North LaSalle Street, Chicago, Illinois 60610
- 10. IBC International Building Code, 2009 Edition
- 11. NEC - National Electrical Code (See NFPA)
- 12. NEMA - National Electrical Manufacturers Association, 155 East 44th Street, New York, New York 10017
- 13. NFPA - National Fire Protection Association, 470 Atlantic Avenue, Boston, Massachusetts 02210
- 14. SDI - Steel Deck Institute, 135 Addison Avenue, Elmhurst, Illinois 60125
- 15. SSPC - Steel Structures Painting Council, 4400 5th Avenue, Pittsburgh, Pennsylvania 15213
- 16. UL - Underwriter's Laboratories, Inc., 207 East Ohio Street, Chicago, Illinois 60611
- 17. USAB - United States Access Board (Americans with Disabilities Act Accessibility Guidelines) 1331 F Street, NW,, Suite 1000, Washington, DC 20004-1111.
- 18. Fed Specs and
Fed Standards - Specifications Sales (3FRI), Building 197, Washington Navy Yard, General Services Administration, Washington, D.C. 20407

END OF SECTION

SECTION 01 45 29

TESTING LABORATORY SERVICES

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Test proposed fill materials
- B. Test fill materials and existing ground for proper compaction
- C. Test concrete for required and proper strength at 7 days and 28 days

1.2 RELATED WORK

- A. Documents affecting work of the Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.3 SELECTION AND PAYMENT FOR TESTING SERVICES

- A. The Owner shall engage and pay for the services of an independent testing laboratory to perform inspection and tests of materials and construction as defined in the General Conditions, except that in the event of a test failure the Contractor shall pay for retesting. The Contractor is to select the testing lab and pay for all concrete design mix testing.

1.4 COOPERATION OF CONTRACTOR - CONTRACTOR RESPONSIBILITIES

- A. The Contractor shall cooperate with the laboratory and:
 - 1. Make available, without cost, samples of all materials to be tested in accordance with applicable standard specifications.
 - 2. Furnish such nominal labor and sheltered working space as is necessary to obtain samples at the project.
 - 3. Advise the laboratory of the identity of materials' sources and instruct the suppliers to allow tests or inspections by the laboratory.
 - 4. Notify the laboratory sufficiently in advance of operations to allow for completion of initial tests and assignment of inspection personnel.
 - 5. Notify the laboratory sufficiently in advance of cancellation of required testing operations. The Contractor shall be responsible to the laboratory for changes due to failure to notify if requirements for testing are canceled.

1.5 QUALITY ASSURANCE

- A. Tests shall be performed in accordance with ASTM Standard Specifications as applicable for tests to be performed.
- B. Laboratory authorized to operate in State in which Project is located.
- C. Testing equipment shall be calibrated at reasonable intervals with devices of an accuracy traceable to either NBS Standards or accepted values of natural physical constraints.

1.6 LABORATORY RESPONSIBILITIES

- A. Test Reports

The laboratory shall promptly submit written reports of each test and inspection made to the Owner, Architect, Engineers, Contractor, and to such other parties the Owner may specify.

B. Extent of Laboratory Tests and Inspections

The Architect will recommend to the Owner the type and number of tests to be performed on the project. The Contractor shall be advised of the number and type of tests to be performed by the testing laboratory.

C. Test soil samples proposed for fill materials to conform to Contract Documents.

D. Test soil compaction.

E. Test concrete paving and cast-in-place concrete.

F. Provide qualified personnel at site after due notice; cooperate with Architect and Contractor in performance of services.

G. Ascertain compliance of materials with requirements of Contract Documents.

H. Promptly notify Architect, Landscape Architect and Contractor of observed irregularities or non-conformance of Work or products.

I. Perform additional inspections and tests required by Architect, Landscape Architect or Contractor.

1.7 LIMITS ON TESTING LABORATORY AUTHORITY

A. Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Laboratory may not approve or accept any portion of the Work.

C. Laboratory may not assume any duties of Contractor.

D. Laboratory has no authority to stop Work.

E. All copies of testing laboratory invoices shall be verified by the Designer prior to being submitted to the Owner for payment.

PART 2 PRODUCTS

2.1 MATERIALS

A. Refer to specification sections listed under paragraph 1.2 Related Work.

PART 3 EXECUTION

3.1 COMPACTED FILL

A. After grading and compaction of subgrade surfaces, to receive concrete work, to depth and percentage of maximum density required, perform laboratory tests prior to depth and percentage of maximum density required, perform laboratory tests prior to placement of concrete. Contractor shall submit samples of fill material for testing before fill or backfill work begins. Make densities of proposed fill material and field tests of compacted fill.

- B. **Field Tests of Compacted Fill:** Minimum requirements for fill compaction tests shall be two (2) tests, one (1) for each 1500 sq. ft. for each lift of fill. Tests shall be made on the sub-grade at the same rate prior to commencing fill operations. See Section 32 13 13 of these Specifications.

3.2 ADDITIONAL TESTS

- A. If additional test are thought to be necessary due to non-compliance with the Contract Documents, additional testing as directed by the Architect shall be conducted. If work does not conform to the Contract Documents, cost of such additional tests and cost of correcting work will be paid for by the Contractor. If tests indicate that work complies with the Contract Documents, costs of additional tests will be paid by the Owner.

3.3 MAINTENANCE

- A. Where completed graded or compacted areas are disturbed by subsequent construction operations or rain, scarify surface, re-shape, and compact and re-test for required density. Contractor to pay for re-testing of areas disturbed by construction operations. Owner will pay for re-testing of areas disturbed by rain.

3.4 TESTING AND INSPECTION REPORTS

- A. **Inspection Reports:** Submit written inspection reports so that Owner, Architect, Landscape Architect, Civil Engineer and Contractor shall receive reports within three (3) days of date in inspection.
- B. **Test Reports:** Submit written test reports to Owner, Architect, Landscape Architect, Civil Engineer and Contractor as soon as possible after test are made.
- C. **Problems:** If there appears to be problems at the project site based on sight inspection, notify Architect by telephone immediately.
- D. Neither laboratory inspections, tests, survey reports and/or soil boring reports with engineering recommendations and recommendations of the Architect, Landscape Architect and/or Civil Engineer relative to any of the foregoing relieve the Contractor of his obligation under this contract.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: provide temporary facilities and controls needed for the Work including, but not necessarily limited to:
 - 1. Temporary utilities such as heat, water, electricity and telephone;
 - 2. Field office for the Contractor's personnel;
 - 3. Sanitary facilities;
 - 4. Enclosures such as tarpaulins, barricades and canopies;
 - 5. Project sign.
- B. Related work:
 - 1. Documents affecting work of the Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. Except that equipment furnished by Subcontractors shall comply with requirements of pertinent safety regulations, such equipment normally furnished by the individual trades in execution of their own portions of the work is not part of this Section.
 - 3. Permanent installation and hookup of the various utilities line are described in other Sections.

1.2 PRODUCT HANDLING

- A. Maintain temporary facilities and controls in proper and safe condition throughout progress of the Work.

PART 2 PRODUCTS

2.1 UTILITIES

- A. Water: Contractor shall arrange and pay for a temporary water supply as needed for the duration of construction.
- B. Electricity: Contractor shall arrange and pay for temporary electrical service as needed for the duration of construction.
- C. Heating: Provide and maintain heat necessary for proper conduct of operations needed in the Work.

2.2 FIELD OFFICES AND SHEDS

- A. Contractor's facilities: If the contractor requires a field office, the contractor shall provide his own accommodations and shall remove such at the conclusion of the project.
- B. Sanitary facilities: Contractor shall provide temporary sanitary facilities for contractor employees. Contractor shall maintain facilities in a clean and sanitary condition.

2.3 ENCLOSURES

- A. Provide and maintain for the duration of construction all scaffolds, tarpaulins, canopies, warning signs, steps, platforms, bridges and other temporary construction necessary for proper completion of the Work in compliance with pertinent safety and other regulations.

2.4 PROJECT SIGNS

- A. Except as otherwise specifically approved by the Architect, do not permit signs or advertising on the job site.

2.5 PROTECTION OF EXISTING VEGETATION AND FENCING

- A. All existing trees, vegetation, and fencing shall be protected from damage resulting from construction activity.

2.6 TEMPORARY FIRE PROTECTION

- A. During construction period and until fire protection needs are fulfilled by permanent facilities, provide and maintain types and forms of temporary fire protection needed to protect facilities against fire losses. Store combustible materials in recognized fire-safe locations and containers.

PART 3 EXECUTION

3.1 MAINTENANCE AND REMOVAL

- A. Maintain temporary facilities and controls as long as needed for safe and proper completion of the Work.
- B. Remove such temporary facilities and controls as rapidly as progress of the Work will permit, or as directed by the Architect.

END OF SECTION

SECTION 01 66 00

PRODUCT STORAGE AND HANDLING REQUIREMENTS

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Protect products scheduled for use in the Work by means including, but not necessarily limited to, those described in this Section.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.

1.3 MANUFACTURER'S RECOMMENDATION

- A. Except as otherwise approved by the Architect, determine and comply with manufacturer's recommendations on product handling, storage and protection.

1.4 PACKAGING

- A. Deliver products to the job site in their manufacturer's original container, with labels intact and legible.
 - 1. Maintain packaged materials with seals unbroken and labels intact until time of use.
 - 2. Promptly remove damaged material and unsuitable items from the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the Owner.
- B. The Architect may reject as non-complying such material and products that do not bear identification satisfactory to the Architect as to manufacturer, grade, quality and other pertinent information.

1.5 PROTECTION

- A. Protect finished surfaces, including jambs and soffits of openings used as passageways, through which equipment and materials are handled.
- B. Provide protection for finished floor surfaces in traffic areas prior to allowing equipment or materials to be moved over such surfaces.
- C. Maintain finished surfaces clean, unmarred and suitably protected until accepted by the Owner.

1.6 REPAIRS AND REPLACEMENTS

- A. In the event of damage, promptly make replacements and repairs to the approval of the Architect and at no additional cost to the Owner.

- B. Additional items required to secure replacements and to make repairs will not be considered by the Architect to justify an extension in the Contract Time of Completion.

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: This Section establishes general requirements pertaining to cutting (including excavating), fitting and patching or the work required to:
 - 1. Make the several parts fit properly;
 - 2. Uncover work to provide for installing, inspection, or both, of ill-timed work;
 - 3. Remove and replace work not conforming to requirements of the Contract Documents; and
 - 4. Remove and replace defective work.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. In addition to other requirements specified, upon the Architect's request uncover work to provide for inspection by the Architect of covered work, and remove samples of installed materials for testing.
 - 3. Do not cut or alter work performed under separate contracts without the Architect's written permission.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

- A. Request for Architect's consent:
 - 1. Prior to cutting which effects structural safety, submit written request to Architect for permission to proceed with cutting.
 - 2. Should conditions of the work, or schedule, indicate a required change of materials or methods for cutting and patching, so notify the Architect and secure his written permission and the required Change Order prior to proceeding.
- B. Notices to Architect:
 - 1. Prior to cutting and patching performed pursuant to the Architect's instructions, submit cost estimate to the Architect. Secure the Architect's approval of cost estimates and type of reimbursement before proceeding with cutting and patching.
 - 2. Submit written notice to the Architect designating the time the work will be uncovered, to provide for the Architect's observation.

PART 2 PRODUCTS

2.1 MATERIALS

- A. For replacement of items removed, use materials complying with pertinent Sections of these Specifications.

2.2 PAYMENT OF COSTS

- A. The Owner will reimburse the Contractor for cutting and patching performed pursuant to the written Change Order, after claim for such reimbursement is submitted by the Contractor. Perform other cutting and patching needed to comply with the Contract Documents at no additional cost to the Owner.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 - 1. Inspect existing conditions, including elements subject to movement or damage during cutting, excavating, patching and backfilling.
 - 2. After uncovering the work, inspect conditions affecting installation of new work.
- B. Discrepancies:
 - 1. If uncovered conditions are not as anticipated, immediately notify the Architect and secure needed directions.
 - 2. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION PRIOR TO CUTTING

- A. Provide required protection including, but not necessarily limited to, shoring, bracing and support to maintain structural integrity of the work.

3.3 PERFORMANCE

- A. Perform required excavating and backfilling as required under pertinent other Sections of these Specifications.
 - 1. Perform cutting and demolition by methods which will prevent damage to other portions of the work and provide proper surfaces to receive installation of remaining and new work.
 - 2. Perform fitting and adjusting of products to provide finished installation complying with the specified tolerances and finishes.
- B. All patching work shall include re-finish of surfaces to nearest corner of wall, floor, or ceiling to result in a seamless appearance.

END OF SECTION

SECTION 01 74 23

FINAL CLEANING

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Throughout the construction period, maintain the buildings and site in a standard of cleanliness as described in this Section.
- B. This section applies to Final Cleaning under Phase One work and also Final Cleaning under Phase Two work.
- C. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. In addition to standards described in this Section, comply with requirements for cleaning as described in pertinent other Sections of these specifications.
- D. Section 01 32 16 Construction Progress Schedule/Phasing.

1.2 QUALITY ASSURANCE

- A. Conduct daily inspection, and more often if necessary, to verify that requirements for cleanliness are being met.
- B. In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.

PART 2 PRODUCTS

2.1 CLEANING MATERIALS AND EQUIPMENT

- A. Provide required personnel, equipment and materials needed to maintain the specified standard of cleanliness.

2.2 COMPATIBILITY

- A. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

PART 3 EXECUTION

3.1 PROGRESS CLEANING

- A. General:
 - 1. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing required protection of materials.
 - 2. Do not allow accumulation of scrap, debris, waste material and other items not required for construction of this Work.
 - 3. At least twice each month, and more often if necessary, completely remove all scrap, debris and waste material from the job site.

4. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.

B. Site:

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris and waste material. Remove such items to the place designated for their storage.
2. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site. Restack, tidy, or otherwise service arrangements to meet the requirements of Subparagraph 3.1-A-1 above.
3. Maintain the site in a neat and orderly condition at all times.

C. Structures:

1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris and waste material. Remove such items to the place designated for their storage.
2. Weekly, and more often if necessary, sweep interior spaces clean.
 - a. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and a hand-held broom.
3. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.
4. Following the installation of finish floor materials, clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which finish materials are installed.
 - a. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from foreign material which, in the opinion of the Architect, may be injurious to the finish floor material.

3.2 FINAL CLEANING

- A. "Clean", for the purpose of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.
- B. Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris and waste. Conduct final progress cleaning as described in Article 3.1 above.

C. Site:

1. Unless otherwise specifically directed by the Architect, broom clean paved areas on the site and public paved areas adjacent to the site.
2. Completely remove resultant debris.

D. Structures:

1. Exterior:
 - a. Visually inspect exterior surfaces and remove all traces of soil, waste materials, smudges and other foreign matter.
 - b. Remove all traces of splashed materials from adjacent surfaces.
 - c. If necessary to achieve a uniform degree of cleanliness, hose down the exterior of the structure.
 - d. In the event of stubborn stains not removable with water, the Architect may require light sandblasting or other cleaning at no additional cost to the Owner.
2. Interior:

- a. Visually inspect interior surfaces and remove all traces of soil, waste materials, smudges and other foreign matter.
- b. Remove all traces of splashed material from adjacent surfaces.
- c. Remove paint droppings, spots, stains and dirt from finished surfaces.
- 3. Glass: Clean inside and outside.
- 4. Aluminum frames: Clean all aluminum frame surfaces of all dirt, grime, excess caulk sealant, carpet glue, etc.
- 5. Polished surfaces: To surfaces requiring routine application of buffed polish, apply polish recommended by manufacturer of the material being polished.
- E. Schedule final cleaning as approved by the Architect to enable the Owner to accept a completely clean Work.

3.3 CLEANING DURING OWNER'S OCCUPANCY

- A. Should the Owner occupy the Work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning shall be as determined by the Architect in accordance with the General Conditions of the Contract.

END OF SECTION

SECTION 01 77 00

CONTRACT CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included:
 - 1. Provide an orderly and efficient transfer of the completed Work to the Owner.
 - 2. This project will be constructed in two consecutive phases, as described in Section 01 32 16 of this Project Manual.
 - 3. Partial Occupancy will be issued for Phase One, as described elsewhere in this Project Manual.
 - 4. All closeout procedures as outlined in the Supplementary Conditions are to be followed at the conclusion of Phase Two construction.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. Activities relative to Contract Closeout are described in, but not necessarily limited to, Paragraphs 9.8, and 9.9 of the General Conditions, as modified by Supplemental Conditions.
 - 3. "Substantial Completion" is defined in Paragraph 9.8 of the General Conditions, as modified by Supplemental Conditions.

1.2 QUALITY ASSURANCE

- A. Prior to requesting inspection by the Architect, use adequate means to assure that the Work is completed in accordance with the specified requirements and is ready for the requested inspection.

1.3 CLOSEOUT PROCEDURES

- A. Comply with procedures stated in the Supplementary Conditions of the Contract for Substantial Completion issuance of Recommendation of Acceptance.
- B. When Contractor considers Work has reached final completion, submit written certification that Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect's inspection.
- C. In addition to submittals required by the condition of the Contract, provide submittals required by governing authorities, and submit a final statement of accounting giving total adjusted Contract Sum, previous payments, and sum remaining due to Contractor.
- D. Architect will issue a final Change Order reflecting approved adjustments to Contract Sum not previously made by Change Order.

1.4 FINAL CLEANING

- A. Execute prior to final inspection.
- B. Vacuum clean and dust the interior of all enclosed spaces and thoroughly clean exterior surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces. Clean equipment and fixtures to a sanitary condition, clean or replace filters of mechanical equipment. Provide new light bulbs.

- C. Remove all waste and surplus materials, rubbish, and construction facilities from the project and from the site. Perform final cleaning just prior to final acceptance. Reclean areas unacceptable to the Architect and/or Owner.

1.5 WARRANTIES AND BONDS

- A. Provide duplicate, notarized copies. Execute Contractor's submittals and assemble documents executed by subcontractors, suppliers, and manufacturers. Provide table of contents and assemble in binder with durable plastic cover.
- B. Submit material prior to final application for payment.
- C. Materials and equipment put into use for the Contractor's convenience or to aid in the completion of the Work will be maintained by the Contractor.
- D. Warranties shall not begin on any item in this project until acceptance by the Owner for his beneficial use and no earlier than the date of Substantial Completion.

1.6 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, and maintenance materials in quantities specified in each Section, in addition to that used for construction of Work. Coordinate with Owner, deliver to Project Site and obtain receipt prior to final payment.

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: To aid the continued instruction of operating and maintenance personnel and to provide a positive source of information regarding the products incorporated into the Work, furnish and deliver the data described in this Section and in pertinent other Sections of these Specifications.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. Required contents of submittals also may be amplified in pertinent other Sections of these Specifications.

1.2 QUALITY ASSURANCE

- A. In preparing data required by this Section, use only personnel who are thoroughly trained and experienced in operation and maintenance of the described items, completely familiar with the requirements of this Section and skilled in technical writing to the extent needed for communicating the essential data.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00, Submittal Procedures.
- B. Submit two copies of a preliminary draft of the proposed Manual of Manuals to the Architect for review and comments.
- C. Unless otherwise directed in other Sections or in writing by the Architect, submit three copies of the final Manual to the Architect prior to instruction of Owner's operation and maintenance personnel.
- D. Contractor to submit required Operation and Maintenance Data as part of close-out Procedures for Phase One.
- E. Duplicates are not required for Phase Two, if all is identical to Phase One, except Test and Balance Report.

PART 2 PRODUCTS

2.1 INSTRUCTION MANUALS

- A. Where instruction Manuals are required to be submitted under other Sections of these Specifications, prepare in accordance with the provisions of this Section.
- B. Format:
 - 1. Size: 8-1/2" x 11"
 - 2. Paper White bond, at least 20 lb. weight
 - 3. Text: Neatly printed (ink-jet or laser)

4. Drawings: 11" in height preferable; bind in with text; foldout acceptable; larger drawings acceptable but fold to fit within the Manual and provide a drawing pocket inside rear cover or bind in with text.
 5. Flysheets: Separate each portion of the Manual with neatly prepared flysheets briefly describing contents of the ensuing portion; flysheets may be in color.
 6. Binding: Use heavy-duty plastic or fiberboard covers with binding mechanism concealed inside the Manual; 3-ring binders will be acceptable; all binding is subject to the Architect's approval.
 7. Measurements: Provide all measurements in U. S. Standard units such as feet-and-inches, lbs, and cfm; where items may be expected to be measured within ten years in accordance with metric formula, provide additional measurements in the "international System of Units" (SI).
- C. Provide front and back covers and along the spine for each Manual, using durable material approved by the Architect and clearly identified on or through the cover with at least the following information:

OPERATING AND MAINTENANCE INSTRUCTIONS

name and address of Work

name of Contractor

general subject of this Manual

space for approval signature of the Architect and

approval date

- D. Contents: Include at least the following:
1. Neatly typewritten index near the front of the Manual, giving immediate information as to location within the Manual of all emergency information regarding the installation.
 2. Complete instructions regarding operation and maintenance of all equipment involved including lubrication, disassembly and reassemble.
 3. Complete nomenclature of all parts of all equipment.
 4. Complete nomenclature and part number of all replaceable parts, name and address of nearest vendor and all other data pertinent to procurement procedures.
 5. Copy of all guarantees and warranties issued.
 6. Manufacturer's bulletins, cuts and descriptive data, where pertinent, clearly indicating the precise items included in this installation and clearly, or otherwise clearly indicating, all manufacturers' data with which this installation is not concerned.
 7. Such other data as required in pertinent Sections of these Specifications.

PART 3 EXECUTION

3.1 INSTRUCTION MANUALS

- A. Preliminary:
1. Prepare a preliminary draft of each proposed Manual.
 2. Show general arrangement, nature of contents in each portion, probably number of drawings and their size and proposed method of binding and covering.
 3. Secure the Architect's approval prior to proceeding.

- B. Final: Complete the Manuals in strict accordance with the approved preliminary drafts and the Architect's review comments.
- C. Revisions:
 - 1. Following the indoctrination and instruction of operation and maintenance personnel, review all proposed revisions of the Manual with the Architect.
 - 2. If the Contractor is required by the Architect to review previously approved Manuals, compensation will be made as provided for under "Changes" in the General Conditions.

END OF SECTION

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.1 DESCRIPTION

A. Work included:

1. Throughout progress of the Work, maintain an accurate record of changes in the Contract Documents, as described in Article 3.1 below.
2. Upon completion of the Work, transfer the recorded changes to a set of Record Documents prints, as described in Article 3.2 below.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
2. Other requirements affecting Project Records Documents may appear in pertinent other Sections of these Specifications.

1.2 QUALITY ASSURANCE

A. Delegate the responsibility for maintenance of Record Documents to one person on the Contractor's staff as approved by the Architect.

B. Accuracy of records:

1. Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of Specifications and each sheet of Drawings and other Documents where such entry is required to show the change properly.
2. Accuracy of records shall be such that future search for items shown in the Contract Documents may rely reasonably on information obtained from the approved Project Record Documents.

C. Make entries within 24 hours after receipt of information that the change has occurred.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 00, Submittal Procedures.

B. The Architect's approval of the current status of the Project Record Documents may be a prerequisite to the Architect's approval of requests for progress payment and request for final payment under the Contract.

C. Prior to submitting each request for progress payment, secure the Architect's approval of the current status of the Project Record Documents.

D. Prior to submitting request for final payment, submit the final Project Record Documents to the Architect and secure his approval.

1.4 PRODUCT HANDLING

- A. Maintain the job set of Record Documents completely protected from deterioration and from loss and damage until completion of the Work and transfer of all recorded data to the final Project Records Documents.
- B. In the event of loss of recorded data, use means necessary to again secure the data to the Architect's approval.
 - 1. Such means shall include, if necessary in the opinion of the Architect, removal and replacement of concealing materials.
 - 2. In such case, provide replacements to the standards originally required by the Contract Documents.

PART 2 PRODUCTS

2.1 RECORD DRAWINGS

- A. Job set: Promptly following receipt of the Owner's Notice to Proceed, secure from the Architect at no charge to the Contractor one complete set of all Drawings, for the sole purpose of recording a record of changes in the Contract Documents.
- B. Final Record Drawings: At a time nearing the completion of the Work, the Contractor shall secure from the Architect, at no charge to the Contractor, one complete set of all Drawings in the Contract and neatly transfer in red ink, date, and cloud all changes, additions, etc., on these so as to produce one complete set of Drawings indicating all modifications to the original Drawings.

PART 3 EXECUTION

3.1 MAINTENANCE OF JOB SET

- A. Immediately upon receipt of the job set described in Paragraph 2.1-A above, identify each of the Documents with the title, "Record Documents - Job Set".
- B. Preservation:
 - 1. Considering the Contract completion time, the probably number of occasions upon which the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set to the approval of the Architect.
 - 2. Do not use the job set for any purpose except entry of new data and for review by the Architect, until start of transfer of data to final Project Record Documents.
 - 3. Maintain the job set at the site of Work as designated by the Architect.
- C. Making entries on Drawings:
 - 1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe the change by graphic line and note as required.
 - 2. Date all entries.
 - 3. Call attention to the entry by a "cloud" drawn around the area or areas affected.
 - 4. In the event of overlapping changes, use different colors for the overlapping changes.
- D. Make entries in the pertinent other Documents as approved by the Architect.
- E. Conversion of schematic layouts:
 - 1. In some cases on the Drawings, arrangements of conduits, circuits, piping, ducts and similar items, are shown schematically and are not intended to portray precise physical layout.

- a. Final physical arrangement is determined by the Contract, subject to the Architect's approval.
 - b. However, design of future modifications of the facility may require accurate information as to the final physical layout of items which are shown only schematically on the Drawings.
2. Show on the job set of Record Drawings, by dimension accurate to within one inch, the centerline of each run of items such as are described in subparagraph 3.1-E-1 above.
 - a. Clearly identify the item by accurate note such as "cast iron drain", "galv. water" and the like.
 - b. Show, by symbol or note, the vertical location of the item ("under slab", "in ceiling plenum", "exposed" and the like).
 - c. Make all identification sufficiently descriptive that it may be related reliably to the Specifications.
3. The Architect may waive the requirements for conversion of schematic layouts where, in the Architect's judgment, conversion serves no useful purpose. However, do not rely upon waivers being issued except as specifically issued in writing by the Architect.

3.2 FINAL PROJECT RECORDS DOCUMENTS

- A. The purpose of the final Project Record Documents is to provide factual information regarding all aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive site measurement, investigation and examination.
- B. Approval of recorded data prior to transfer:
 1. Following receipt of the Drawings described in Paragraph 2.1-B above, and prior to start of transfer of recorded data thereto,
 2. Make required revisions.
- C. Transfer of data to Drawings:
 1. Carefully transfer change data shown on the job set of Record Drawings to the corresponding final Record Drawings, coordinating the changes are required.
 2. Clearly indicate at each affected detail and other Drawing a full description of changes made during construction and the actual location of items described in Subparagraph 3.1-E-1 above.
 3. Call attention to each entry by drawing a "cloud" around the area or areas affected.
 4. Make changes neatly, consistently and with the proper media to assure longevity and clear reproduction.
- D. Transfer of data to other Documents:
 1. If the Documents other than Drawings have been kept clean during progress of the Work, and if entries thereon have been orderly to the approval of the Architect, the job set of those Documents other than Drawings will be accepted as final Record Documents.
 2. If any such Document is not so approved by the Architect, secure a new copy of that Document from the Architect at the Architect's usual charge for reproduction and handling, and carefully transfer the change data to the new copy to the approval of the Architect.
- E. Review and submittal:
 1. Submit the completed set of Project Record Documents to the Architect as described in Paragraph 1.3-D above.
 2. Participate in review meetings as required.
 3. Make required changes and promptly deliver the final Project Record Documents to the Architect.

3.3 CHANGES SUBSEQUENT TO ACCEPTANCE

- A. The Contractor has no responsibility for recording changes in the Work subsequent to Final Completion, except for changes resulting from work performed under Warranty.**

END OF SECTION

**SECTION 01 80 00
GENERAL WORKMANSHIP**

PART 1 GENERAL

1.1 DESCRIPTION

- A. In all Divisions listed hereafter the following items apply:
1. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work described under the Sections and Divisions.
 2. In all cases provide accessories and miscellaneous items, including labor, as required for a complete and professional installation.
 3. Comply with provisions of Sections 01 66 00 in all cases relative to product handling.
 4. Comply with provisions of Section 0133 00 for all submittals.

END OF THIS SECTION

**DIVISION 02
EXISTING CONDITIONS**

CONTENTS

02 30 00	Subsurface Investigation
02 41 10	Demolition

SECTION 02 30 00
SUBSURFACE INVESTIGATION

PART 1 GENERAL

1.1 DESCRIPTION

A. Soils investigation report:

1. A soils investigation report has been prepared for the site of this Work by the soil engineer named on the Project Directory in the Contract Documents.
2. A copy of the soils investigation report is included in Appendix "A" of this Project Manual.

B. Use of data:

1. This report was obtained only for the Architect's use in design and is not a part of the Contract Documents.
2. The report is available for bidders' information, but is not a warranty of subsurface conditions.
3. The Contractor should visit the site and acquaint himself with existing conditions.
4. Prior to bidding, bidders may make their own subsurface investigations to satisfy themselves as to site and subsurface condition, but such investigations may be performed only under time schedules and arrangements approved in advance by the Architect.

1.2 QUALITY ASSURANCE

- A. A soil engineer will be retained by Contractor to observe performance of work in connection with excavating, trenching, filling, backfilling and grading, and to perform compaction tests.
- B. Re-adjust work performed that does not meet technical or design requirements, but make no deviation from the Contract Documents without specific and written approval from the Architect.

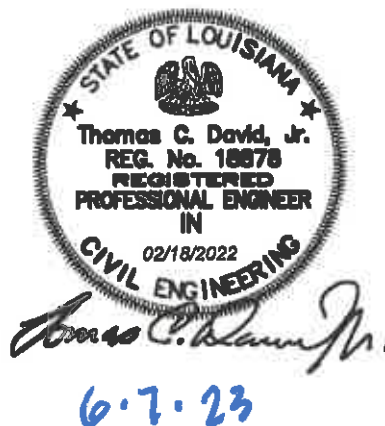
END OF SECTION

The following Contract Documents and Technical Specifications have been prepared under my direct supervision and guidance for Ashe, Broussard, Weinzettle Architects in conjunction with the Plans and for the explicit use by the Owner and Contractors for the bidding and construction of the project:

ASHE, BROUSSARD, WEINZETTLE ARCHITECTS

RED RIVER BANK – METAIRIE, LOUISIANA

**CONSTRUCTION SPECIFICATIONS
DISCIPLINE LEAD SIGNATURES**



**Thomas C. David, Jr., P.E., P.L.S.
CIVIL ENGINEER**

SECTION 02 41 10

REMOVAL OF STRUCTURES AND OBSTRUCTIONS

PART 1 - GENERAL

1.1 Scope: This Section includes furnishing of all labor, materials, tools and equipment, and perform all operations necessary for demolition, abandonment and removal of those existing structures and other obstructions not designated or permitted to remain for construction as indicated on the Drawings and as directed by the ARCHITECT.

1.2 Referenced Standard: Work shall conform to the following Section of the State of Louisiana, Department of Transportation and Development, "Louisiana Standard Specifications for Roads and Bridges", 2016 Edition, except as may be modified herein:

Section 202 - Removing or Relocating Structures and Obstructions

All references made therein to measurement and payment are hereby deleted.

PART 2 - PRODUCTS

2.1 Backfill Material for Removal of Structures and Obstructions: Backfill material for removal of structures and obstructions shall be native material, if acceptable to ARCHITECT. Where native material is unsuitable and where directed by the ARCHITECT, select fill material shall be used for backfilling. Refer to Section 31 22 10 – Excavation and Embankment.

PART 3 - EXECUTION

3.1 General: The CONTRACTOR shall remove, haul off and satisfactorily dispose of all structures and obstructions designated for demolition, etc. that would interfere with construction or are required to permit construction as designed. It shall include backfilling resulting trenches, holes, pits, etc. Debris or excess material shall be disposed of off the project site.

3.2 Material Difference in Conditions: If structures or obstructions are encountered which differ materially from those ordinarily encountered, said conditions shall be immediately reported to the ARCHITECT.

3.3 Compaction: Compaction shall conform to Section 31 22 10 - Excavation and Embankment.

- END OF SECTION -

**DIVISION 03
CONCRETE**

CONTENTS

03 10 00	Concrete Formwork
03 20 00	Concrete Reinforcement
03 33 00	Cast-In-Place Concrete

SECTION 03 10 00
CONCRETE FORMWORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 RELATED SECTIONS

- A. Cast-In-Place Concrete – Section 03 30 00.

1.3 REFERENCES

- A. American Concrete Institute (ACI)
117 Specifications for Tolerances for Concrete Construction and Materials
- B. American Society for Testing and Materials (ASTM)
 - 1. D994-98 (2003) Standard Specifications for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
 - 2. D1751-04 (2008) Standard Specifications for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
 - 3. D1752-04a (2008) Standard Specification for Preformed Sponge Rubber , Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction

1.4 SUBMITTALS

- A. Provide manufacturer's product information (cut sheets) for the following forming materials:
 - 1. Form Ties
 - 2. Expansion Joint Material
 - 3. Formwork Release Agent

PART 2 – MATERIALS

2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete
 - 1. Forms for exposed finish concrete shall produce a smooth, uniform texture on the surface of the concrete.
 - 2. Use plywood, hardboard, metal, plastic or other approved material.
 - 3. Do not use damaged materials with raised grain, dents or other defects.

- B. Forms for Unexposed Finish Concrete
 - 1. Plywood, hardboard, metal, plastic or other material which will provide a relatively uniform surface that is free of honeycomb, voids or rock pockets.
 - 2. Excavation sidewalls shall not be used as forms.

2.1 FORM TIES

- A. Factory-fabricated, adjustable length, removable or snap-off metal ties designed to support forms and prevent deflection.
 - 1. Provide form ties with integral waterstops when required.
- B. For snap ties, provide a minimum of 1" of breakback.
 - 1. Form ties shall be designed to prevent spalling of concrete upon removal.
 - 2. Cone holes on the surface of the concrete shall be limited to 1" diameter.
- C. Absorptive Field-fabricated wire form ties are not acceptable.

2.3 FORM RELEASE AGENTS

- A. Commercially manufactured form release agents that will prevent formwork absorption of moisture, prevent bonding with the concrete and will not stain the concrete surface.
- B. Formwork release agents shall be compatible with subsequent concrete surface treatments required by the drawings or specifications.

2.4 EXPANSION JOINT MATERIAL

- A. Commercially manufactured expansion joint material; asphalt/bituminous, fiber, sponge rubber/cork or closed cell polyethylene.
- B. Expansion joint material shall meet the applicable ASTM requirements. Provide expansion joint material of the type and width as shown on the drawings.

2.2 OTHER IMBEDDED FORMING ITEMS

- A. Commercially or field fabricated chamfers, rustication strips and other imbedded form materials shall be suitable for intended use.
- B. Provided materials shall be smooth, straight, have a uniform cross-section and are free of defects.

PART 3 – EXECUTION

3.1 GENERAL

- A. Design and Engineering of formwork shall be the responsibility of the Contractor.
- B. Formwork shall be designed and selected to withstand the forces resulting from placement and vibration of concrete, while maintaining required tolerances.

3.2 LAYOUT AND CONSTRUCTION

- A. Locate concrete forms as required to provide flatwork and other features as required by the drawings.
- B. Forms shall be of the size, shape and alignment necessary to construct features as required by the drawings.
 - 1. Provide openings for sleeves, keyways, chamfers as required.
- C. To the extent possible, locate forms so as not to interfere with other trades' work.
- D. Fabricate forms to allow easy removal that does not require pounding or prying against concrete surfaces.
- E. Utilize form ties to secure forms and provide construction within specified tolerances; camber forms when necessary.
- F. Form butt joints solidly and securely, and provide backing material as necessary to prevent leakage and fins.
- G. Locate construction and expansion joints as shown on the drawings. Submit a written request for deviations from the jointing plan shown on the drawings to the A/E for approval prior to implementation.
- H. If construction joints are not shown, locate and form construction joints that least impairs the strength and appearance of the structure or slab.
 - 1. For exposed finishes on vertical concrete surfaces, provide rustication strips at construction joints.
 - 2. Locate and install all joints so that they are either parallel or perpendicular to finished surfaces, as applicable.

3.3 TOLERANCES

- A. Provide formwork that will provide finished slabs and structures meeting the following tolerances:
 - Variation from Plumb in Lines and Surfaces: $\frac{1}{4}$ " per 10', but not more than 1" total
 - Variation from Level or From Grade Indicated: $\frac{1}{4}$ " per 20'
 - Variation In Thickness of Slabs or Walls: Minus $\frac{1}{4}$ " or Plus $\frac{1}{2}$ "

3.4 PREPARING FORM SURFACES

- A. Cover surfaces of formwork with form release agent.
 - 1. Used forms shall be scraped clean and have all fasteners removed.
- B. Apply formwork release agent in accordance with manufacturer's recommendations.
 - 1. Do not allow formwork release agent to puddle in the forms.
- C. Do not allow formwork release agent to contact reinforcing steel or existing concrete surfaces requiring a bond.

- D. Reference EPA and OSHA regulations for formwork release agents or at least require EPA and OSHA compliance.

3.5 REMOVING FORMS

- A. Forms may be removed at the Contractor's discretion, but subject to the requirements of this section.
- B. When removing forms, utilize tools and methods that will prevent damage to concrete surfaces.
 - 1. Do not pry against, or pound on concrete surfaces to complete removal.
- C. Maintain curing and protection operations after removal of formwork.
- D. Forms for Flatwork:
 - 1. Forms for flatwork may be removed as soon as concrete is sufficiently hard to not be damaged during removal operations, but no sooner than 24 hours after final placement of concrete.
- E. Forms for Walls and Structures:
 - 1. Forms for walls and structures may be removed as soon as concrete has reached its specified 28-day compressive strength, but no sooner than 7 days after final placement of concrete.
- F. If the Contractor desires to remove forms prior to the concrete reaching its specified 28-day compressive strength, he may submit a written request for deviations to the A/E for approval prior to implementation.

END OF SECTION 03 10 00

SECTION 03 20 00
CONCRETE REINFORCEMENT

PART 1 – GENERAL

1.1 RELATED SECTIONS

- A. Cast-In-Place Concrete – Section 03 30 00.

1.3 PERFORMANCE REQUIREMENTS

- A. Comply with applicable requirements of the following standards, except as herein modified:
 - 1. ACI "Manual of Standard Practice for Detailing Reinforced Concrete Structures", ACI 315, latest edition.
 - 2. "Building Code Requirements for Reinforced Concrete", ACI 318.
 - 3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".
 - 4. American Welding Society, AWS D1.4 "Structural Welding Code - Reinforcing Steel".

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. Shop drawings are required, complete, for all items under this Section.
 - 2. No part of any concrete work for this project shall be installed for which reinforcement shop drawings have not been submitted and reviewed for that part.
 - 3. Details of reinforcing shall conform to applicable reinforcements of reference specifications and standards as listed herein.
 - 4. Drawings shall indicate location, general spacing, and sizes and grades of the reinforcing members, together with all slots, chases, recesses, and openings required for installation of other items of work.
 - 5. Diagrams and general schedules shall indicate the bends, sizes, and lengths of reinforcing members and they shall clearly indicate by diagram or other easily recognizable mark exactly where the steel is to be placed in the beam, girder, slab, etc.
- B. Certificates:
 - 1. Submit copies of steel mill certificates of mill analysis, tensile and bend tests for reinforcing steel.
 - 2. Mill certificates shall be furnished at time of steel delivery.

PART 2 – MATERIALS

2.1 BARS

- A. ASTM A-615, Grade 60, deformed unless otherwise indicated.

2.3 BARS, WELDING GRADE

- A. ASTM A-706; max. 0.30% carbon; max. 0.60% manganese.

2.4 SUPPORTS FOR REINFORCEMENT

- A. Chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place shall be in accordance with CRSI Specifications and as specified hereinafter.
- B. Grade Beams and Slabs on Grade:
 - 1. Supports with sand plates or precast concrete blocks 3 in x 3 in. thickness required for bottom layer of steel.
 - 2. Concrete for blocks shall be of same density as concrete in which it is placed.
 - 3. Masonry units will not be allowed.
- C. Exposed Concrete:
 - 1. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected. (CRSI, Class 2).

2.2 TIE WIRE

- A. Shall be 18 ga. black annealed.

2.3 SHOP FABRICATION

- A. All bends and hooks shall conform to standard hook and radial bending details of ACT 315.
- B. Bars shall be bent cold. Heating of reinforcement or bending by any method not approved will not be permitted.
- C. Bars having kinks or bends not required by approved Bending Schedule shall not be used.
- D. Steel shall be bent by fabricator and delivered to the job in a prepared condition ready for installation unless otherwise approved.

PART 3 – EXECUTION

3.1 CLEANING

- A. Metal reinforcement shall be clean and free from rust, mill scale, oil, earth, ice, and other materials which reduce or destroy bond with concrete.

3.2 INSTALLATION

- A. Comply with the specified standards, and Concrete Reinforcing Steel Institute recommended practice for "Placing Reinforcing Bars" for details and methods of reinforcement placement and supports and as herein specified.

3.3 PLACING REINFORCEMENT

- A. Metal Reinforcement shall be accurately placed in accordance with the Drawings, details, and approved shop drawings.
 - 1. All reinforcement shall have the clearances shown on Drawings and as herein specified.

- B. Adequate chairs shall be placed under all reinforcing to prevent sagging or to prevent being bent when it is in slabs that will be walked on when pouring is taking place.
- C. All wire tying of reinforcing shall be tight loop or a double loop which will prevent bars from slipping or turning over as the concrete operation proceeds, using tie wire.
 - 1. Loose ends of the wires shall be close cut to prevent their becoming exposed in the finished surfaces.
 - 2. Stirrups in beams and girders and ties in columns shall be wired to principal reinforcing members.
- D. When splices other than those shown on Drawings are required, character and detail of splice shall be as approved.
- E. Welding shall not be carried out on any reinforcement without prior approval.
- F. Contractor shall have as many qualified men on hand as necessary to check the steel continuously as the concrete placing is in progress.
 - 1. Their job shall be to make sure there are no changes in the positioning of the steel and to keep the personnel who are placing the concrete from walking on or otherwise dislocating the steel.
- G. Tying:
 - 1. Saddle tie reinforcing at intersections with tie wire.
 - 2. Wire stirrups to both top and bottom bars.
- H. Outside Bars:
 - 1. Place outside bars of slab reinforcement, both main and temperature, parallel to beams or walls, not more than 1/2 bar spacing away from adjacent face of such parallel members.

3.4 SPLICES

- A. General:
 - 1. Do not splice bars at points of maximum stress.
 - 2. Stagger splices in continuous adjacent bars.
- B. Unless indicated otherwise in Drawings, lap reinforcing steel as follows:
 - 1. Unscheduled Bars: 36 bar diameters at splices.
 - 2. Horizontal Wall Steel: 90 degree bends and 12 inch returns at corners.

3.5 ANCHORS AND FITTINGS

- A. Provide all anchors and fittings, etc., required for proper construction of concrete work and the bonding of masonry that is to be anchored to concrete.
- B. Locations, spacing, type of fittings and anchors, etc., shall be according to standard practice and as shown on Drawings.

3.6 RODS AND STIRRUPS

- A. Where there are no stirrups scheduled and/or indicated on the Drawings for beams, No. 3 bar stirrups shall be provided in accordance with the beam schedule notes as listed on the Drawings, or closer if necessary to tie and support the steel in place.
- B. Furnish cut rods of No. 3 or No. 4 bars as may be required for supporting top steel in beams, girders, etc., to hold it in position. These rods shall be securely hung from spreaders or braces on the formwork.

3.7 CONCRETE PROTECTION FOR REINFORCEMENT

A. General:

1. Reinforcement (including stirrups) shall be protected by the thickness of concrete indicated on the drawings.

B. Minimum Coverage:

1. Unless otherwise shown, the thickness of concrete over reinforcement including stirrups shall be as follows:
 - Where concrete is deposited against ground without forms, not less than 3 inches.
 - Where concrete may be exposed to the ground but where placed in forms, not less than 2 inches.
 - All concrete exposed to the weather, not less than 2 in.
 - In slabs not exposed to weather, not less than 3/4 in.

- C. In all cases, the thickness of concrete over reinforcement shall be at least equal to the diameter of the bars except at slabs and joists.

3.8 BLOCK-OUTS OR PENETRATIONS IN ALL CONCRETE

- A. Shall have reinforcing bars 1/2 in. dia. x 2 ft. - 0 in., placed diagonal to the corners of the block-out, or in a square pattern at circular penetrations, unless indicated otherwise.

3.9 INSPECTION OF STEEL PLACEMENT

- A. Contractor shall give 24 hours notice to obtain approval of placement of reinforcing steel before concrete is placed.
- B. Such inspection is in nature of assisting Contractor to minimize errors, and in no case will it operate to relieve Contractor of his responsibility to provide materials and workmanship required by Contract Documents.

END OF SECTION 03 20 00

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 RELATED SECTIONS

- A. Concrete Formwork – Section 03 10 00.
- B. Concrete Reinforcement – Section 03 20 00.

1.3 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.
- B. Cast-in-place concrete includes the following:
 - 1. Foundations.
 - 2. Slabs-on-grade.

1.4 SUBMITTALS

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, joint systems, curing compounds, dry-shake finish materials, and others if requested by Architect.
- C. Shop drawings for reinforcement detailing, fabricating, bending, and placing concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, bent bar diagrams, and arrangement of concrete reinforcement.
- D. Material certificates in lieu of material laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

1.5 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
 - 1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
 - 2. ACI 318, "Building Code Requirements for Reinforced Concrete."
 - 3. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
- B. Concrete Testing Service: The Contractor will employ a testing agency to perform material evaluation tests and to design concrete mixes.

- C. Materials and installed work may require testing and retesting at any time during progress of Work. Tests, including retesting of rejected materials for installed Work, shall be done at Contractor's expense.
- D. Provide 72 hour notice prior to pouring concrete to allow for form work and reinforcement placement inspection by the Engineer and Architect.

PART 2 – PRODUCTS

2.1 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I.
 - 1. Use one brand of cement throughout Project unless otherwise acceptable to Architect.
- B. Fly Ash: ASTM C 618, Type C.
- C. Normal-Weight Aggregates: ASTM C 33 and as specified. Provide aggregates from a single source for exposed concrete.
 - 1. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
 - 2. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Architect.
- D. Water: Potable.
- E. Admixtures, General: Provide concrete admixtures that contain not more than 0.1 percent chloride ions.
- F. Water-Reducing Admixture: ASTM C 494, Type A.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Chemtard, ChemMasters Corp.
 - b. Eucon WR-75, Euclid Chemical Co.
 - c. WRDA, W.R. Grace & Co.
 - d. Pozzolath Normal or Polyheed, Master Builders, Inc.
 - e. Metco W.R., Metalcrete Industries.
 - f. Prokrete-N, Prokrete Industries.
 - g. Plastocrete 161, Sika Corp.
- G. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Super P, Anti-Hydro Co., Inc.
 - b. Eucon 37, Euclid Chemical Co.
 - c. WRDA 19 or Daracem, W.R. Grace & Co.
 - d. Rheobuild or Polyheed, Master Builders, Inc.
 - e. Superslump, Metalcrete Industries.
 - f. PSPL, Prokrete Industries.
 - g. Sikament 300, Sika Corp.
- H. Water-Reducing, Accelerating Admixture: ASTM C 494, Type E.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Q-Set, Conspec Marketing & Manufacturing Co.
 - b. Accelguard 80, Euclid Chemical Co.

- c. Daraset, W.R. Grace & Co.
 - d. Pozzutec 20, Master Builders, Inc.
 - e. Accel-Set, Metalcrete Industries.
- I. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Eucon Retarder 75, Euclid Chemical Co.
 - b. Daratard-17, W.R. Grace & Co.
 - c. Pozzolite R, Master Builders, Inc.
 - d. Protard, Prokrete Industries.
 - e. Plastiment, Sika Corporation.

2.2 RELATED MATERIALS

- A. Sand Cushion: Clean, manufactured or natural sand.
- B. Vapor Retarder: Provide vapor retarder that is resistant to deterioration when tested according to ASTM E 154, as follows:
- 1. Polyethylene sheet not less than 12 mils thick.
- C. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- D. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
- 1. Waterproof paper.
 - 2. Polyethylene film.
 - 3. Polyethylene-coated burlap.
- E. Liquid Membrane-Forming Curing Compound: Liquid-type membrane-forming curing compound complying with ASTM C 309, Type I, Class A. Moisture loss not more than 0.55 kg/sq. meter when applied at 200 sq. ft./gal.
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. A-H 3 Way Sealer, Anti-Hydro Co., Inc.
 - b. Spartan-Cote, The Burke Co.
 - c. Conspec #1, Conspec Marketing & Mfg. Co.
 - d. Day-Chem Cure and Seal, Dayton Superior Corp.
 - e. Eucocure, Euclid Chemical Co.
 - f. Horn Clear Seal, A.C. Horn, Inc.
 - g. L&M Cure R, L&M Construction Chemicals, Inc.
 - h. Masterkure, Master Builders, Inc.
 - i. CS-309, W.R. Meadows, Inc.
 - j. Seal N Kure, Metalcrete Industries.
 - k. Kure-N-Seal, Sonneborn-Chemrex.
 - l. Stontop CS2, Stonhard, Inc.
- F. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Aquafil, Conspec Marketing and Mfg. Co.
 - b. Eucobar, Euclid Chemical Co.
 - c. E-Con, L&M Construction Chemicals, Inc.
 - d. Confilm, Master Builders, Inc.
 - e. Waterhold, Metalcrete Industries.

- G. Bonding Agent: Polyvinyl acetate or acrylic base.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Polyvinyl Acetate (Interior Only):
 1. Superior Concrete Bonder, Dayton Superior Corp.
 2. Euco Weld, Euclid Chemical Co.
 3. Weld-Crete, Larsen Products Corp.
 4. Everweld, L&M Construction Chemicals, Inc.
 5. Herculox, Metalcrete Industries.
 6. Ready Bond, Symons Corp.
 - b. Acrylic or Styrene Butadiene:
 1. Acrylic Bondcrete, The Burke Co.
 2. Strongbond, Conspec Marketing and Mfg. Co.
 3. Day-Chem Ad Bond, Dayton Superior Corp.
 4. SBR Latex, Euclid Chemical Co.
 5. Daraweld C, W.R. Grace & Co.
 6. Hornweld, A.C. Horn, Inc.
 7. Everbond, L&M Construction Chemicals, Inc.
 8. Acryl-Set, Master Builders Inc.
 9. Intralok, W.R. Meadows, Inc.
 10. Acrylpave, Metalcrete Industries.
 11. Sonocrete, Sonneborn-Chemrex.
 12. Stonlock LB2, Stonhard, Inc.
 13. Strong Bond, Symons Corp.
- H. Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Burke Epoxy M.V., The Burke Co.
 - b. Spec-Bond 100, Conspec Marketing and Mfg. Co.
 - c. Resi-Bond (J-58), Dayton Superior.
 - d. Euco Epoxy System #452 or #620, Euclid Chemical Co.
 - e. Epoxitite Binder 2390, A.C. Horn, Inc.
 - f. Epabond, L&M Construction Chemicals, Inc.
 - g. Concessive Standard Liquid, Master Builders, Inc.
 - h. Rezi-Weld 1000, W.R. Meadows, Inc.
 - i. Metco Hi-Mod Epoxy, Metalcrete Industries.
 - j. Sikadur 32 Hi-Mod, Sika Corp.
 - k. Stonset LV5, Stonhard, Inc.
 - l. R-600 Series, Symons Corp.

2.3 PROPORTIONING AND DESIGNING MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use an independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
1. Do not use the same testing agency for field quality control testing.
 2. Limit use of fly ash to not exceed 20 percent of cement content by weight.
 3. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed by Architect.
 4. Design mixes to provide normal weight concrete with the following properties as indicated on drawings and schedules:
 - a. 3000-psi, 28-day compressive strength; water-cement ratio, 0.58 maximum (non-air-entrained), 0.52 maximum (air-entrained).

5. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
 - a. Reinforced foundation systems: As indicated on plans.
 - b. Concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to 2-to-3-inch slump concrete.
6. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in Work.

2.4 ADMIXTURES

- A. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability or when pumping concrete.
- B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).
- C. Use admixtures for water reduction and set accelerating or retarding in strict compliance with manufacturer's directions.

2.5 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.
 1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 – EXECUTION

3.1 GENERAL

- A. Coordinate the installation of joint materials, vapor retarder/barrier, and other related materials with placement of forms and reinforcing steel.

3.2 VAPOR RETARDER/BARRIER INSTALLATION

- A. General: Place vapor retarder/barrier sheeting in position with longest dimension parallel with direction of pour.
- B. Lap joints 6 inches and seal with manufacturer's recommended mastic or pressure-sensitive tape.
 1. Cover sand cushion with vapor retarder/barrier.

3.3 JOINTS

- A. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- B. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces as indicated.

- C. Contraction (Control) Joints in Slabs-on-Grade: Construct contraction joints in slabs-on-grade to form panels of patterns as shown. Use saw cuts 1/8 inch wide by one-fourth of slab depth or inserts 1/4 inch wide by one-fourth of slab depth, unless otherwise indicated.
 - 1. Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.
 - 2. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.

3.4 INSTALLING EMBEDDED ITEMS

- A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.
- B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.5 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.
 - 1. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.
- C. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 - 1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
 - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.
- D. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.
 - 1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
 - 2. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 - 3. Maintain reinforcing in proper position on chairs during concrete placement.

- E. Cold-Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
 - a. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - b. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
- F. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.
 - 1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
 - a. Fog spray forms, reinforcing steel, and subgrade just before placing concrete.
 - b. Keep subgrade moisture uniform without puddles or dry areas.
 - 3. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.

3.6 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.
- C. Smooth-Rubbed Finish: Provide smooth-rubbed finish on scheduled concrete surfaces that have received smooth-formed finish treatment not later than 1 day after form removal.
 - 1. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- D. Related Unformed Surfaces: At horizontal offsets and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.7 MONOLITHIC SLAB FINISHES

CAST-IN-PLACE CONCRETE

- A. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where indicated.
 - 1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances of F(F) 18 (floor flatness) and F(L) 15 (floor levelness) measured according to ASTM E 1155. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- B. Trowel Finish: Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or another thin film-finish coating system.
 - 1. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of F(F) 25 (floor flatness) and F(L) 15 (floor levelness) measured according to ASTM E 1155. Grind smooth any surface defects that would telegraph through applied floor covering system.
- C. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.
- D. Nonslip Broom Finish: Apply a nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.8 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
 - 1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- B. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified.
- C. Provide moisture curing by the following methods:
 - 1. Keep concrete surface continuously wet by covering with water.
 - 2. Use continuous water-fog spray.
 - 3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4-inch lap over adjacent absorptive covers.
- D. Provide moisture-retaining cover curing as follows:
 - 1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and

waterproof tape.

- E. Apply curing compound on exposed interior slabs and on exterior slabs:
 - 1. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - 2. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
- F. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- G. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.
 - 1. Final cure concrete surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.

3.9 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Architect.
- B. Mix dry-pack mortar, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.
 - 1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
 - 2. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- C. Repairing Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.
 - 1. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.
 - 1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling,

- popouts, honeycombs, rock pockets, and other objectionable conditions.
 - 2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
 - 3. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect.
 - 4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- E. Repair isolated random cracks and single holes 1 inch or less in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Place dry-pack before bonding agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- F. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.
- G. Repair methods not specified above may be used, subject to acceptance of Architect.

3.10 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. General: The Contractor will employ a testing agency to perform tests and to submit test reports.
- B. Sampling and testing for quality control during concrete placement may include the following, as directed by Architect.
- 1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - a. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - b. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
 - c. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
 - d. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 - 2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
 - a. When total quantity of a given class of concrete is less than 50 cu. yd., Architect may waive strength testing if adequate evidence of satisfactory strength is provided.
 - b. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
- C. Test results will be reported in writing to Architect, Structural Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the

Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

- D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- E. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed and this retesting shall be paid for by the Contractor.

END OF SECTION 03 30 00

**DIVISION 04
MASONRY**

CONTENTS

04 20 00 Unit Masonry

SECTION 04 20 00

UNIT MASONRY

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Provide unit masonry where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, Sections in Division 01 of these Specifications.
 - 2. Sections:
 - 04 22 00 Concrete Masonry Units
 - 07 10 00 Dampproofing and Waterproofing

1.2 QUALITY ASSURANCE

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

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00, Submittal Procedures.
- B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to provide compliance with the specified requirements.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 66 00, Product Storage and Handling Requirements.

PART 2 PRODUCTS

2.1 BRICK

- A. Face Brick - Reference Drawings for locations of brick. Brick to be modular in dimension and heritage in texture with a tumbled appearance. The finished brick veneer is to be field painted. Conforming to the following physical requirements: ASTM C 216, Type FBX, Grade SW. Designation: Minimum Compressive Strength (Brick Flatwise) PSI Gross Area 600 PSI, 50 cycle freeze thaw test 5 hour boiling 6-7% 24 hour cold water 4-6%.

2.2 CONCRETE MASONRY UNITS:

- A. General:
 - 1. Comply with referenced standards and other specified requirements for each type of masonry unit required.
 - 2. Provide special shapes where required for lintels, corners, jambs, sash, control joints, headers, bonding, cap, cove, and other special conditions.

- B. Concrete Masonry Units: Provide units complying with characteristics specified below for grade, type, face size, exposed face, and weight classifications.
1. Hollow Loadbearing Block: ASTM C 90; lightweight, except use normal weight block for work below grade.
 2. Size: Manufacturer's standard units with nominal face dimensions of 16" long X 8" high X thicknesses indicated.
 3. Type I, moisture-controlled units; cure units to meet specified requirements, including average dry shrinkage of 0.03% when tested in compliance with ASTM C 426.
 4. Exposed faces are to be split face with no integral color pigment and field painted as per section 09 90 00 painters.
 5. Provide corner blocks as indicated and special shapes as per drawings.

2.3 OTHER MATERIALS

- A. Portland Cement: Comply with ASTM C150, Type I or II, low alkali. "Masonry" cement will not be acceptable. Use natural color or white cement as required to produce mortar color selected by Architect.
- B. Aggregate:
1. Sand for mortar: Comply with ASTM C144. Use natural white sand to produce mortar color selected by Architect.
 2. Aggregate for grout: Comply with ASTM C404.
- C. Lime:
1. Quick lime: Comply with ASTM C5.
 2. Hydrated lime: Comply with ASTM C207, Type "S".
- D. Water: Provide potable water free from injurious amount of acids, alkalis, oil and organic matter.
- E. Integral Waterproofing (mortar at exterior veneer): Aqua Stop Plus, Acme Shied, Sonneborn "Hydrocide Powder", or approved equal.
- F. Masonry Accessories: Hohmann & Barnard, Dur-O-Wal, AA Wire Products, Southern
1. Continuous Masonry Wire Reinforcing:
 - a. Provide welded wire units prefabricated in straight lengths of not less than 10', with matching corner and tee units. Fabricate from cold-drawn steel wire complying with ASTM A82, with deformed continuous side rods and plain cross rods, and a unit width of 1 1/2" to 2" less than thickness of wall or partition. Provide manufacturer's standard mill galvanized finish.
 - b. Use truss type fabricated with single pair of 9 gage side rods, and 9 gage continuous diagonal cross rods spaced not more than 16" o.c.
 2. Wall Ties and Anchors: Hot dipped galvanized steel.
 - a. At Concrete Foundations: 1" wide X 1" deep X 3/4" throat, 24 gage anchor slot, and dovetail triangle with 1/4" wire tie and 12 gage dovetail.
 - b. At Steel: 9" long X 3/4" wide, 12 gage, flat continuous adjustable weld-on anchor, and 3/16" gage square nosed beam tie.
 - c. At Intersecting Walls: 1/2" X 1/2" mesh, 16 gage wire mesh tie.
 - d. At Cavity/Composite Walls with Irregular Coursing: Double eye adjustable truss, with eye sections spaced 16" o.c.: eye and pintle length as required by wall conditions.

2.4 MORTAR AND GROUT MIXES

- A. Mortar:

1. Unless otherwise directed by the Architect or governmental agencies having jurisdiction, provide Type "S" mortar consisting of:
 - a. One part Portland Cement; to
 - b. One-half part lime; to
 - c. Not more than four and one-half parts sand measured damp and loose.
2. Measure the ingredients accurately.
3. Mix in a mechanically operated mortar mixer for at least three minutes after all ingredients are in the drum, and at least long enough to make a thorough, complete intimate mix of the materials.
4. Re-temper mortar with water as required to maintain a high plasticity.
 - a. On mortar boards, re-temper only by adding water within a basin formed with mortar, and by working the mortar into the water.
 - b. Discard and do not use mortar which is unused after 1-1/2 hours following the initial mixing.

B. Grout:

1. For wall spaces 2" or less, provide a mixture of:
 - a. One part Portland Cement, to
 - b. Three parts sand; to
 - c. Sufficient water to produce a consistency for pouring without separation of materials.
2. For wall spaces exceeding 2", provide a mixture of:
 - a. One part Portland Cement; to
 - b. Three parts sand; to
 - c. Two parts 3/8" maximum pea gravel, not more than 5% of which shall pass a Number 8 sieve; to
 - d. Sufficient water to produce a consistency for pouring or pumping without separation of materials.
3. For wall spaces exceeding 4", provide a mixture of:
 - a. One part Portland Cement; to
 - b. Four to four and one-half parts combined aggregate; to
 - c. Sufficient water to produce a consistency for pouring or pumping without separation of materials.
4. On coarse grout for pumping, provide not more than 40% pea gravel.
5. Mixing:
 - a. Mix in a mechanical operated batch mixer for not less than three minutes after all ingredients for the batch are in the drum.
 - b. Completely empty the drum before placing materials for the succeeding batch therein.
6. Grout strength:
 - a. Provide grout having not less than 2000 psi compressive strength when tested at 28 days.
 - b. Where compressive strengths exceeding 2000 psi are called for on the Drawings or required by governmental agencies having jurisdiction, provide a laboratory designed mix to the approval of the Architect.
7. Grout to match existing in texture and color.

- C. Admixtures: Use only such admixtures as are specifically approved in advance by the Architect and by governmental agencies having jurisdiction.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Wetting of Bricks:

1. When being laid, provide brick suction sufficient to hold the mortar and to absorb water from the mortar and grout.
2. Provide brick sufficiently damp so that mortar will remain plastic enough to permit the brick to be leveled and plumbed immediately after being laid without destroying the bond.

B. Laying:

1. Unless otherwise indicated on the Drawings, make the brickwork plumb, level and true to line, with square angles and corners.
2. Use only brick that are clean and free from dust and other foreign matter.
3. Lay in running bond unless otherwise shown on the Drawings, joints to be tooled.
4. Weep holes to be full-height head joint located at all thru-wall flashing locations: wall base, lintel angles, window sills, shelf angles.
5. Provide weepholes at 24" o.c. by leaving open head joints. Weepholes shall be unobstructed and free from any blockage. Other methods acceptable as approved by architect in advance. Also refer Section 07 10 00 Dampproofing and Waterproofing.
6. Do not expose cut sections of brick.

3.3 JOINERY

A. General:

1. Cut out and repoint defective joints as shown on Drawings.
2. On all joints exposed to the weather, took and make smooth, solid and watertight.

B. Joint pattern:

1. Joints not exposed to weather, and joints to be covered with a succeeding layer of plaster or similar material, unless otherwise directed, provide "struck" joints.
2. All other joints to be tooled, as directed by Architect.

3.4 POINTING AND CLEANING

- A. At the completion of this portion of the Work, visually inspect the Work of this Section and point, or cut out and repoint if necessary, all holes and defective joints.
- B. Thoroughly clean all brick surfaces to be left exposed in the finished Work, removing all traces or mortar, grout and foreign matter. In the event ordinary cleaning is not adequate, provide light sandblasting when so directed by the Architect, and at no additional cost to the Owner.

3.5 JOINT REINFORCEMENT

- A. At locations where brick masonry and cmu partitions are bonded to form an cavity wall (at all perimeter walls, provide flexible wall anchorage consisting of adjustable brick ties, 16" o.c., each way, and a cmu walls provide truss type wire at 16" o.c., vertically. Provide additional ties within 1'-0" of all openings.
 1. Provide "L" shaped prefab units at corners, in addition to masonry bonding.
 2. Provide "L" shaped prefab units at abutting and adjoining walls.
- B. Anchor masonry to structural members where masonry abuts of faces structural members using flexible anchors embedded in masonry joints and attached to structure. Space anchors maximum of 24" vertically and 36" horizontally.
- C. Provide expansion joints as indicated on the Plans in locations indicated.

END OF SECTION

DIVISION 05
METALS

CONTENTS

05 12 00 Structural Steel Framing
05 50 00 Metal Fabrications
05 51 50 Metal Stairs and Ladders

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Structural steel.
 - 2. Grout.
- B. Related Sections include the following:
 - 1. Division 1 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
 - 2. Division 9 painting Sections for surface preparation and priming requirements.

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

1.4 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand ASD-service loads indicated and comply with other information and restrictions indicated.
 - 1. Select and complete connections using AISC's "Manual of Steel Construction, Allowable Stress Design," Part 4.
- B. Construction: Type 2, simple framing except where noted otherwise.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Include embedment drawings.
 - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
 - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
- C. Welding certificates.
- D. Qualification Data: For installer and fabricator.
- E. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:

1. Structural steel including chemical and physical properties.
2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
3. Shop primers.
4. Nonshrink grout.

F. Source quality-control test reports.

1.6 QUALITY ASSURANCE

- A. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
- B. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."
- C. Comply with applicable provisions of the following specifications and documents:
 1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 2. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
 3. AISC's "Specification for the Design of Steel Hollow Structural Sections."
 4. AISC's "Specification for Allowable Stress Design of Single-Angle Members."
 5. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.
 1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
 2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.8 COORDINATION

- A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. Angles & Pipe Sections: ASTM A 36.
- B. Wide Flange: ASTM A992.
- C. Plate and Bar: ASTM A 36.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
 1. Weight Class: Standard
- F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
 - 1. Finish: Plain
- B. Unheaded Anchor Rods: ASTM A 307, Grade A
 - 1. Configuration: Hooked.
 - 2. Nuts: ASTM A 563 hex carbon steel.
 - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 4. Washers: ASTM F 436 hardened carbon steel.
 - 5. Finish: Plain.
- C. Headed Anchor Rods: ASTM A 307, Grade A
 - 1. Nuts: ASTM A 563 hex carbon steel.
 - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 3. Washers: ASTM F 436 hardened carbon steel.
 - 4. Finish: Plain.
- D. Threaded Rods: ASTM A 307, Grade A
 - 1. Nuts: ASTM A 563 hex carbon steel.
 - 2. Washers: ASTM F 436 carbon steel.
 - 3. Finish: Plain.
- E. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.

2.3 PRIMER

- A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

2.4 GROUT

- A. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404, Size No. 2. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
 - 1. Identify high-strength structural steel according to ASTM A 6/ A 6M and maintain markings until structural steel has been erected.
 - 2. Mark and match-mark materials for field assembly.
 - 3. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.

- C. Bolt Holes: Cut, drill or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning".
- F. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural steel. Straighten as required to provide uniform, square, and true members in completed wall framing.
- G. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
 - 1. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 - 2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
 - 3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
 - a. Grind butt welds flush.
 - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

2.7 SHOP PRIMING – INTERIOR STEEL

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - 2. Surfaces to be field welded.
 - 3. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.
- D. Painting: Apply a 1-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.
- 2.8 Exterior steel for front canopy shall have high performance coating, refer to Division 9 painting Sections.
- 2.9 Structural Steel loose lintels and bent plate lintels shall be hot dipped galvanized.
- 2.10 SOURCE QUALITY CONTROL
- A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:
1. Liquid Penetrant Inspection: ASTM E 165.
 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 3. Ultrasonic Inspection: ASTM E 164.
 4. Radiographic Inspection: ASTM E 94.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design".
- B. Base Plates: Clean concrete of bond-reducing materials, and roughen surfaces prior to setting base plates. Clean bottom surface of base plates.
 - 1. Set base plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of base plate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and base plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure.[Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.]
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection [unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1].
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
 - 1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
 - 4. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances.
 - a. Grind butt welds flush.
 - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.
 - 1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories and abutting structural steel.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
 - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- C. Touchup Painting: Cleaning and touchup painting are specified in Division 9 painting Sections.

END OF SECTION 051200

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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Loose bearing and leveling plates.
 - 2. Loose steel lintels.
 - 3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 4. Miscellaneous metal trim.
- B. Related Sections include the following:
 - 1. Division 5 Section "Structural Steel" for structural-steel framing system components.

1.3 SUBMITTALS

- A. Product Data: For the following:
 - 1. Nonslip aggregates and nonslip-aggregate surface finishes.
 - 2. Paint products.
 - 3. Grout.
- B. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 - 1. Provide templates for anchors and bolts specified for installation under other Sections.
- C. Samples for Verification: For each type and finish of extruded nosing and tread.
- D. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.
- E. Welding Certificates: Copies of certificates for welding procedures and personnel.
- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing metal fabrications 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.
- B. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."
 - 2. AWS D1.3, "Structural Welding Code--Sheet Steel."
 - 3. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.6 COORDINATION

Coordinate installation of anchorages for metal fabrications. 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.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.
- C. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

- D. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.3 PAINT

- A. Shop Primers: Provide primers that comply with Division 9 Section "Painting."
- B. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- C. Shop Primer for Ferrous Metal: Organic zinc-rich primer, complying with SSPC-Paint 20 and compatible with topcoat.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carboline 621; Carboline Company.
 - b. Aquapon Zinc-Rich Primer 97-670; PPG Industries, Inc.
 - c. Tneme-Zinc 90-97; Tnemec Company, Inc.
- D. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 FASTENERS

- A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.
- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Anchor Bolts: ASTM F 1554, Grade 36.
- D. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).
- E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- F. Wood Screws: Flat head, carbon steel, ASME B18.6.1.
- G. Plain Washers: Round, carbon steel, ASME B18.22.1 (ASME B18.22M).
- H. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1 (ASME B18.21.2M).
- I. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Alloy Group 1 or 2 stainless-steel bolts complying with ASTM F 593 (ASTM F 738M) and nuts complying with ASTM F 594 (ASTM F 836M).
- J. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as needed.

2.5 GROUT

- A. 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.

2.6 CONCRETE FILL

- A. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

2.7 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. 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. Shear and punch metals cleanly and accurately. Remove burrs.
- C. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. 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.
- E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- F. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- G. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.
- H. Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- I. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

- J. Remove sharp or rough areas on exposed traffic surfaces.
- K. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

2.8 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize plates after fabrication.

2.9 LOOSE STEEL LINTELS

- A. Fabricate loose structural-steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- B. Bolt to wood framing where indicated.
- C. Size loose lintels to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches (200 mm), unless otherwise indicated.
- D. Galvanize loose steel lintels located in exterior walls.

2.10 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.
- B. General: Provide steel framing and supports indicated and as necessary to complete the Work.
- C. Fabricate units from structural-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 retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 inches (32 mm) wide by 1/4 inch (6 mm) thick by 8 inches (200 mm) long at 24 inches (600 mm) o.c., unless otherwise indicated.
 - 3. Furnish inserts if units must be installed after concrete is placed.
- D. Galvanize miscellaneous framing and supports where indicated.

2.11 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.12 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A 123, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:
 - 1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.
- B. 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.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- D. 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.
- E. 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.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 SETTING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 - 1. Use nonshrink grout, nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
 - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 INSTALLING 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, if any.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.
- C. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified above for setting and grouting bearing and leveling plates.
 - 1. Do not grout baseplates of columns supporting steel girders until girders are installed and leveled.

3.4 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed 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 a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."
- C. 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 05 51 50
METAL STAIRS AND LADDERS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Aluminum fixed vertical ladders.

1.2 RELATED SECTIONS

- A. Section 05 50 00 - Metal Fabrications: Miscellaneous metal supports.
- B. Section 06 10 00 - Rough Carpentry: Roof framing and opening support.
- C. Section 07 54 20 - Thermoplastic - Polyvinyl Chloride membrane Roofing

1.3 REFERENCES

- A. ANSI A14.3: Ladders - Fixed - Safety Requirements.
- B. OSHA 1910.27: Fixed Ladders.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01340.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings for Ladders:
 - 1. Plan and section of ladder installation.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products until installation inside under cover. If stored outside, under a tarp or suitable cover.

1.6 WARRANTY

- A. Limited Warranty: Five years against defective material and workmanship, covering parts only, no labor or freight. Defective parts, if deemed so by the manufacturer, will be replaced at no charge, freight excluded, upon inspection at manufacturer's plant which warrants same.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Precision Ladders, LLC, which is located at: P. O. Box 2279 ; Morristown, TN 37816-2279; Toll Free Tel: 800-225-7814; Tel: 423-586-2265; Email: info@PrecisionLadders.com; Web: www.PrecisionLadders.com
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 ALUMINUM FIXED VERTICAL LADDER

- A. Aluminum Fixed Vertical Ladder and Components: Ladder, cage, rest platforms, floor mounting brackets, security doors, walk-thru, and side rails.
 - 1. Aluminum Fixed Vertical Ladders as manufactured by Precision Ladders LLC. See drawings for locations and profiles of required ladders.
 - 2. Capacity: Unit shall support a 1000 lb (454 kg) loading without failure.
 - 3. Performance Standard: Units designed and manufactured to meet or exceed ANSI A14.3 and OSHA 1910.27.
- B. Components:
 - 1. Ladder Stringer: 2-1/2 inch by 1-1/16 inch by 1/8 inch (64 mm by 27 mm by 3 mm) extruded 6005-T5 aluminum channel. Pitch: 90 degrees.
 - 2. Ladder Tread: 2-1/4 inch by 3/4 inch by 1/4 inch (57 mm by 19 mm by 6 mm) extruded 6005-T5 aluminum with deeply serrated top surface.
 - 3. Ladder Mounting Bracket: 8-1/2 inch by 2 inch by 3 inch by 1/4 inch thick (216 mm by 51 mm by 76 mm by 6 mm) aluminum angle.
 - 4. Floor Brackets: Floor bracket at foot of each stringer, 3 by 2 by 1/4 inch (76 by 51 by 6 mm).

5. Finishes:

- a. Standard: Mill finish on aluminum ladder components.
- b. Optional Finishes
 - 1. Powder Coated
 - 2. Anodized

2.3 FABRICATION

- A. Completely fabricate ladder ready for installation before shipment to the site.
- B. Completely fabricate handrail components and ship to site ready for field assembly and attachment to ladder.

PART 3 EXECUTION

3.1 EXAMINATION

- A. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- B. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.3 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

DIVISION 06
WOOD AND PLASTIC

CONTENTS

06 10 00	Rough Carpentry
06 17 13	Laminated Veneer Lumber
06 17 53	Shop Fabricated Wood Trusses
06 20 00	Finish Carpentry
06 40 00	Architectural Woodwork
06 60 00	Plastic Fabrications
06 61 16	Solid Surfacing Fabrications

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Types of work included in this Section for rough carpentry:
 - 1. Roof Deck Panels;
 - 2. Sheathing;
 - 3. Furring and concealed wood blocking

1.2 RELATED SECTIONS

- A. Concrete Formwork – Section 03 10 00.

1.3 SUBMITTALS

- A. Affidavit: Submit prior to installation of treated materials, affidavits from treating facility certifying treatment method used, name of treatment material, retention of treatment material (lbs./cu.ft.), and depth of penetration.
- B. Product Data: Submit manufacturer's specifications and installation instructions on insulating sheathing.

1.4 STORAGE

- A. Store lumber off ground, well ventilated, and covered. Suitable and effective protection from damage shall be provided for finished work and material, and shall remain in place until final clean-up.

PART 2 – PRODUCTS

2.1 LUMBER

- A. Standards: Comply with DOC PS20, "American Softwood Lumber Standard" for lumber and with the applicable grading rules of inspection agencies certified by American Lumber Standards committee Board of Review.
- B. Identification: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grade stamp of inspection agency and identifying grading agency, grade, species, moisture content at time of surfacing and mill.
- C. Moisture Content: Maximum moisture content for lumber products shall be 19 percent on air dried stock.
- D. Surfacing: Shall be surface four sides (S4S).
- E. Grade: Dimension No. 2 Southern Pine as graded by Southern Pine Inspection Bureau or Douglas Fir standard grade.

- F. Preservative Treatment: Lumber specified or indicated to receive preservative treatment shall be treated in accordance with AWPA Standard Specifications. Each piece shall bear quality mark of an inspection agency approved by the American Lumber Standards Committee. Treatment shall be applied after members are shaped. Subsequent to treatment, all saw cuts, borings, etc., shall be saturated with two coats of same preservative used for treatment. Coating shall be applied prior to installation of treated member. At Contractor's option, one of the following methods of treatment shall be used.

<u>Location</u>	<u>Type</u>	<u>Trade Name</u>	<u>Use Category</u>	<u>AWPA Pres. Std.</u>
Above Ground	Fuor-Chrome	Wolman Salts	USC3	P-5
Above Ground	Ammonical Copper-Quat (ACQ)	ACQ Preserve	USC3	P-5
Above Ground	Copper Boron Azole (CBA)	Naturwood	USC3	P-5

2.2 BOARDS

- A. Shall be No. 2 Southern Pine as graded by SPIB or Douglas Fir, Construction Boards per WWPA. Refer to allowable stress in General Notes of Structural drawings.

2.3 PERFORMANCE RATED WOOD PANELS

- A. General: Conform to DOC PS-1 or PS-2, Exposure 1, structural rating as indicated hereinafter. Each panel shall be identified with grade trademark of American Plywood Association.
- B. Roof Sheathing: OSB Sheathing, span rating 48/24, 3/4 inch thick.
- C. Exterior Wall Sheathing: OSB Sheathing, span rating 48/24, 1/2 inch thick.

2.4 FASTENERS

- A. Provide rough hardware, including nails, screws, bolts, anchors, ties and metal fastenings as required for proper construction and erection of work, or proper type and size suitable for purpose intended and approved by Architect. Where rough carpentry work is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners and anchorages with a hot-dip zinc coating.

PART 3 – EXECUTION

3.1 WORKMANSHIP

- A. All work shall be in accordance with best standard practice and shall be under the constant supervision of a competent foreman. Carefully plan and lay out the work as necessary to carry out the intent of the Drawings, and to accommodate other work properly. Wood framing shall be accurately sawcut and fitted, true to line, grade and level, and permanently secured in proper position with nails, lag screws, bolts or other fastenings and fittings. Lumber framing shall be substantial and rigid in all parts and connections.

3.2 WALL SHEATHING INSTALLATION

- A. Apply sheathing to exterior studs where indicated, with 1 ½ inch long staples or nails (screws). Fasten three (6) inch o.c. at edges and six (12) inch o.c. on intermediate supports. Abut ends of sheathing at center of supports. Install sheathing with long edge parallel to floor line.
- B. Apply asphalt saturated organic felt horizontally with two (2) inch overlap and a six (6) inch end lap. Fasten to sheathing with corrosion-resistant staples. Cut back felt ½ inch on each side of control and expansion joints.

3.3 WALL SHEATHING INSTALLATION AT SHEAR WALLS

- A. Fasten to exterior studs with screws at pattern as indicated.

3.4 WOOD PRESERVATIVE TREATMENT

- A. Following wood members to receive preservative as specified: wood used in roof construction including fascia backup, cants, nailers. Two brush coats of same wood preservative shall be applied to field cuts.

3.5 BLOCKING INSTALLATION

- A. Anchor blocking and nailers using counter-sunk bolts, washers, and nuts. Wedge, align, and anchor blocking and nailers to provide rigid and secure installation of both blocking and other related work. Locate blocking to facilitate installation grilles, registers and fixtures.

3.6 FURRING INSTALLATION

- A. Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finished work. Unless otherwise indicated, provide 1 inch x 2 inch furring at 16 inch o.c. vertically. Provide hangers and attachment devices for suspended furring.

3.7 FASTENING DEVICES

- A. Use power-actuated-steel nails, expansion screws, toggle bolts, metal plugs, or metal inserts for installation of rough carpentry members to masonry or concrete construction. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials.

3.8 ROOF SHEATHING

- A. Install panels with long dimension perpendicular to supports, with end joints staggered between panels and located over supports. Allow 1/8 inch space between joints. Place fasteners as indicated.

END OF SECTION 06 10 00

SECTION 06 17 13

Laminated Veneer Lumber

1.0 GENERAL

1.1 Scope

This work includes the complete furnishings and installation of all laminated veneer lumber (LVL), as shown on the drawings specified and necessary to complete the work.

1.2 Code Approvals

These products shall be designed and manufactured to the standards set forth in the ICC ES Report No. ESR-1040.

1.3 Submittals

- A. General: Submit the following according to Conditions of Contract and Division Specification Sections.
- B. Product data including specifications and installation instructions covering lumber, adhesives, fabrication process, accessories and protection.
- C. Shop drawings showing full dimensions of each member and layout of entire structural system. Show large-scale details of connections, connectors, and other accessories. Indicate species and laminating combination, adhesive type, and other variables in required work. Shop drawings shall be prepared under the supervision of a professional engineer licensed in the state where the material is manufactured.

2.0 PRODUCTS

2.1 Materials

- A. *Code Reports*: Materials shall comply with ICC ES Report No. ESR-1040.
- B. *Adhesives*: Adhesives shall be of the waterproof type conforming to the requirements of ASTM D-2559.

2.2 Fabrication Tolerances

Finished Length (as specified): $\pm 1/8"$
Depth: $\pm 1/16"$
Width: $\pm 1/16"$

2.4 Identification

Identified by a stamp indicating the product type and grade, ICC-ES evaluation report number, manufacturer's name, plant number, date of fabrication, and the independent inspection agency's logo.

2.5 Hardware

Not applicable.

3.0 EXECUTION

3.1 Installation

If stored prior to installation, shall be protected from the weather. It shall be installed in accordance with the plans, and any manufacturer drawings and installation suggestions. Temporary construction loads that cause stresses beyond design limits are not permitted. Safety bracing is to be provided by the installer to keep the members straight and plumb as required, and to ensure adequate lateral support for the individual members and the entire system until the sheathing material is applied.

3.2 Warranty

The products delivered shall be free from manufacturing errors or defects in workmanship and material. The products, when correctly installed and maintained, shall be warranted to perform as designed for the normal and expected life of the building.

END OF SECTION 06 17 13

SECTION 06 17 53

SHOP-FABRICATED WOOD TRUSSES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes wood roof trusses.
- B. Related Sections include the following:
 - 1. Division 6 Section "Rough Carpentry" for roof sheathing and subflooring and dimension lumber for supplementary framing and permanent bracing.

1.3 DEFINITIONS

- A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NELMA - Northeastern Lumber Manufacturers Association.
 - 2. NLGA - National Lumber Grades Authority.
 - 3. SPIB - Southern Pine Inspection Bureau.
 - 4. WCLIB - West Coast Lumber Inspection Bureau.
 - 5. WWPA - Western Wood Products Association.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated.
 - 2. Maximum Deflection Under Design Loads:
 - a. Roof Trusses: Vertical deflection of 1/240 of span.
 - b. Roof Trusses: Horizontal deflection at reactions of 1-1/4 inches.

1.5 SUBMITTALS

- A. Shop Drawings: Show location, pitch, span, camber, configuration, and spacing for each type of truss required; species, sizes, and stress grades of lumber; splice details; type, size, material, finish, design values, orientation, and location of metal connector plates; and bearing details.
 - 1. Provide connection design with adequate connector for uplift requirements from design loads.

2. Submit calculations stamped by a professional engineer registered in the state of the project for review prior to truss fabrication.
 3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- B. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss fabricating firm.
- C. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee Board of Review.
- D. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
1. Metal-plate connectors.
 2. Metal framing anchors.

1.6 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with TPI quality-control procedures for manufacture of connector plates published in TPI 1.
1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that involves inspection by SPIB, Timber Products Inspection, TPI, or other independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.
- C. Source Limitations for Connector Plates: Obtain metal connector plates through one source from a single manufacturer.
- D. Comply with applicable requirements and recommendations of the following publications:
1. TP1 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
 2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
 3. TPI HIB, "Commentary and Recommendations for Handling, Installing & Bracing Metal Plate Connected Wood Trusses."
- E. Wood Structural Design Standard: Comply with applicable requirements in AFPA's "National Design Specifications for Wood Construction" and its "Supplement."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with TPI recommendations to avoid damage and lateral bending. Provide for air circulation around stacks and under coverings.
- B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

1.8 COORDINATION

- A. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work must follow erection of trusses.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Metal Connector Plates:
 - a. Alpine Engineered Products, Inc.
 - b. CompuTrus, Inc.
 - c. Eagle Metal Products.
 - d. Jager Industries, Inc.
 - e. Mitek Industries, Inc.
 - f. Robbins Engineering, Inc.
 - g. TEE-LOK Corporation.
 - h. Truswal Systems Corporation.
 - 2. Metal Framing Anchors:
 - a. Alpine Engineered Products, Inc.
 - b. Cleveland Steel Specialty Co.
 - c. Harlen Metal Products, Inc.
 - d. KC Metals Products, Inc.
 - e. Silver Metal Products, Inc.
 - f. Simpson Strong-Tie Company, Inc.
 - g. Southeastern Metals Manufacturing Co., Inc.
 - h. United Steel Products Company, Inc.

2.2 DIMENSION LUMBER

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive natural or stained finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Provide dressed lumber, S4S, manufactured to actual sizes required by DOC PS 20 for moisture content specified.
 - 4. Provide dry lumber with 19 percent maximum moisture content at time of dressing.
- B. Grade and Species: Provide dimension lumber of any species for truss chord and web members, graded visually or mechanically, and capable of supporting required loads without exceeding allowable design values according to AFPA's "National Design Specifications for Wood Construction" and its "Supplement."
- C. Grade and Species: Provide visually graded dimension lumber for truss chord and web members, of any of the following grade species:
 - 1. Grade for Chord Members: As per design calculations.

2. Grade for Web Members: As per design calculations.
 3. Species: Douglas fir-larch; WCLIB or WWPA.
 4. Species: Douglas fir-south; WWPA.
 5. Species: Douglas fir-larch (north); NLGA.
 6. Species: Hem-fir; WCLIB or WWPA.
 7. Species: Hem-fir (north); NLGA.
 8. Species: Southern pine; SPIB.
 9. Species: Mixed southern pine; SPIB.
 10. Species: Spruce-pine-fir (south); NELMA, WCLIB, or WWPA.
 11. Species: Spruce-pine-fir; NLGA.
- D. Grade and Species: Provide dimension lumber of any species for truss chord and web members, graded as follows and of the following minimum design values for size of member required according to AFPA's "National Design Specifications for Wood Construction" and its "Supplement":
1. Grading Method: Mechanical.
 2. Design Values: Modulus of elasticity of at least 1,600,000 psi.

2.3 METAL CONNECTOR PLATES

- A. General: Fabricate connector plates to comply with TPI 1 from metal complying with requirements indicated below:
- B. Hot-Dip Galvanized Steel Sheet: ASTM A 653/A 653M, G60 (Z180) coating designation; Designation SS, Grade 33, and not less than 0.036 inch (0.9 mm) thick.
- C. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, 80Z (24G) coating designation; ASTM A 570/A 570M, Structural Steel (SS), Grade 33, and not less than 0.047 inch (1.2 mm) thick.
- D. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50 (AZ150) coating designation; Structural Steel (SS), Grade 33, and not less than 0.036 inch (0.9 mm) thick.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
1. Where trusses are exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153.
- B. Nails, Wire, Brads, and Staples: FS FF-N-105.
- C. Power-Driven Fasteners: CABO NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1. (ASME B18.2.3.8M).
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

2.5 METAL FRAMING ANCHORS

- A. General: Provide framing anchors made from metal indicated, of structural capacity, type, and size indicated, and as follows:
 1. Research/Evaluation Reports: Provide products acceptable to authorities having jurisdiction and for which model code research/evaluation reports exist that show compliance of metal framing anchors, for application indicated, with building code in effect for Project.
 2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, which meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
- C. Truss Tie-Downs (Hurricane or Seismic Ties): Manufacturer to design and/or select connectors as required for resisting wind forces.

Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4 inches (32 mm) wide by 0.050 inch (1.3 mm) thick. Clip is fastened to truss through slotted holes to allow for truss deflection.

2.6 FABRICATION

- A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
- B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.
- C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. Before installing, splice trusses delivered to Project site in more than one piece.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.
- G. Anchor trusses securely at bearing points; use metal framing anchors. Install fasteners through each fastener hole in metal framing anchor according to manufacturer's fastening schedules and written instructions.
- H. Securely connect each truss ply required for forming built-up girder trusses.
 - 1. Anchor trusses to girder trusses as indicated.
- I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 - 1. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- J. Install wood trusses within installation tolerances in TPI 1.
- K. Do not cut or remove truss members.
- L. Replace wood trusses that are damaged or do not meet requirements.
 - 1. Do not alter trusses in field.

END OF SECTION 06 17 53

SECTION 06 20 00

FINISH CARPENTRY

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Install wood, nails, screws and other items as needed, and perform finish carpentry for the construction shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

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

1.3 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 66 00, Product Storage and Handling Requirements.

PART 2 PRODUCTS

2.1 GRADE STAMPS

- A. Identify lumber by the grade stamp of the West Coast Lumber Inspection Bureau, or such other grade stamp as is approved in advance by the Architect.
- B. Identify plywood as to species, grade and glue type by the stamp of the American Plywood Association.

2.2 MATERIALS

- A. Provide materials in the quantities needed for the Work as indicated on the Drawings and meeting or exceeding the standards of quality specified.

2.3 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor, subject to approval by the Architect.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 WORKMANSHIP

- A. Product joints which are true, tight and well nailed with all members assembled in accordance with the Drawings.
- B. Jointing:
 - 1. Make joints to conceal shrinkage; miter exterior joints; cope interior joints; miter or scarf end-to-end joints.
 - 2. Install trim in pieces as long as possible, jointing only where solid support is obtained.
- C. Fastening:
 - 1. Install items straight, true, level, plumb and firmly anchored in place.
 - 2. Where blocking or backing is required, coordinate as necessary with other trades to ensure placement of required backing and blocking in a timely manner.
 - 3. Nail trim with finish nails of proper dimension to hold the member firmly in place with splitting the wood.
 - 4. Nail exterior trim with galvanized nails, making joints to exclude water and setting in waterproof glue or the sealant described in Section 07 92 00, Joint Sealants, of these Specifications.
 - 5. On exposed work, set nails for putt.
 - 6. Screw, do not drive, wood screws; except that screws may be started by driving and then screwed home.

3.3 INSTALLATION OF OTHER ITEMS

- A. Install items in strict accordance with the Drawings and the recommended methods of the manufacturer as approved by the Architect, anchoring firmly into position at the prescribed locations, straight, plumb and level.

3.4 FINISHING

- A. Sandpaper finished wood surfaces thoroughly as required to produce a uniformly smooth surface, always sanding in the direction of the grain; except do not sand wood which is designed to be left rough.
- B. No coarse grain sandpaper mark, hammer mark, or other imperfection will be accepted.

3.5 CLEANING UP

- A. Keep the premises in a neat, safe and orderly condition at all times during execution of this portion of the Work, free from accumulation of sawdust, cut-ends and debris.

B. Sweeping:

1. At the end of each working day, and more often if necessary, thoroughly sweep surfaces where refuse from this portion of the Work has settled.
2. Remove the refuse to the area of the job site set aside for its storage.
3. Upon completion of this portion of the Work, thoroughly broom clean all surfaces.

END OF SECTION

SECTION 06 40 00

ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Provide Architectural Woodwork where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Codes and Standards:
 - 1. Comply with pertinent codes and regulations of governmental agencies having jurisdiction; and
 - 2. Comply with "Architectural Woodwork Quality Standards" of the Architectural Woodwork Institute for grade or grades specified.
 - 3. WIC Certification and stamp will not be required.

1.3 SUBMITTALS

- A. Comply with pertinent provision of Section 01 33 00, Submittal Procedures.
- B. Product data: Within 60 calendar days after the Contractor has received the Owner's Notice to proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Shop Drawings in sufficient detail to show fabrication, installation, anchorage and interface of the work of this Section with the work of adjacent trades;
 - 3. Samples of proposed materials.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 66 00, Product Storage and Handling Requirements.

PART 2 PRODUCTS

2.1 GENERAL

- A. Provide architectural woodwork where shown on the Drawings, as specified herein, and as needed for a complete or proper installation.
- B. General: Casework shall be constructed of 3/4" plywood or medium density fiberboard (MDF) with plastic laminate on all exposed surfaces and edges (vertical surfaces .030", horizontal surfaces .050"). Semi-exposed surfaces (interior of cabinets) shall be finished with (.020") cabinet liner. Color-core plastic laminate at all countertops.

Unexposed surfaces shall be sealed with an acrylic sealer. Construction shall generally comply with A.W.I. flush overlay construction and with the following requirements.

- C. Case Bodies: Shall be blind-dadoed or doweled and glued with pressure to receive tops, bottoms and fixed shelves, glued and screwed together to form a rigid unit. Backs shall be screwed attached to perimeter of case. Finished ends and backs to receive plastic laminate after assembly. There shall be no visible screws or other exposed connectors in finished unit. Base boards shall be 3/4" MDF "toe board" and to be covered by rubber base under another section.
- D. At the curved Nurses Station, details 9/A9.5, 10/A9.5, 11/A9.5, and 28/A9.5 facing Lobby B101 and G101, and at the curved computer desks facing Lobby B101 and G101 detail 13/A9.5, at the curved portions, use two (2) layers of 3/8" grooved bendable plywood, a veneer core product.
- E. Doors and Drawers: Doors shall be 3/4" MDF with stock lumber edges with plastic laminate on both faces and all edges, drawers shall have 1/2" thick hardwood sides or lumber sides, or 1/2" hardwood plywood with edge banding and backs, with continuous dovetail joints, grooved to receive 1/4" tempered hardboard bottom, drawer fronts shall be 3/4" plywood with plastic laminate on both faces and all edges. Clear finish applied to wood parts by casework manufacturer.
- F. Tall Cabinets and Closet Doors: All tall cabinet doors and closet doors to be 3/4" MDF with plastic laminate on the exposed face, all horizontal edges, and vertical edge on hinge side. Provide PVC T-molding equal to Charter Industries #4246 3/4" Flipper door at vertical edge on pull side. Color of T-molding to be selected by Architect. Semi-exposed interior surface to be melamine.
- G. Shelves: Shelves to be 1" MDF finished with melamine.
- H. Counter Tops: Shall be 3/4" plywood or MDF with plastic laminate top and edges. Countertops in all sink locations to be 3/4" plywood, MDF is not allowed. Laminate backer sheet to bottom. All splashes shall be 3/4" x 4" high, unless otherwise noted. Full height 3/4" splashes are noted on interior elevations. Laminate backer sheet to backs of splash.
- I. Adhesive: Plastic laminate shall be laminated to core material with a Type 2, water-resistant adhesive, under pressure.
- K. Fillers: Provide filler pieces and strips, trims, etc., for proper fitting of recessed items throughout the job as conditions require, fillers shall be faced with same finish as adjoining casework.
- L. Hardware:
 - 1. KV 1428, Accuride 4032, Grass #6036 or equal drawer slides, full extension
 - 2. At upper and lower cabinet doors - Blum 91A6500-195H7100, Salice 300-94, Grass #3703 or approved equal hinges. 110° opening. Two per door.
 - 3. At tall cabinet doors (over 60" tall) - RPC 456, Stanley HT1592-4-2 3/4-US26D or approved equal hinges, three per door.
 - 4. At all cabinets except the tall resident closet doors and resident room drawers provide Belwith BWPW355-26D, Stanley 4484-US26D, Amerock 979-26D pulls or approved equal. 4" centers.
At all tall resident closet doors and resident room drawers only provide Stanley 4485-US26D, US Futaba UFWP5 BC pulls or approved equal. 5" centers.
 - 5. Epco 1000, Amerock, 9783-AL or equal magnetic catch, one per door, two per door if door is over 60" tall
 - 6. Line-bore type shelf standards, 32 mm o.c., four (4) metal shelf rests per shelf.
 - 7. At each computer, telephone, or electrical outlet location underneath countertops provide and install one black, 60 mm dia. cable set as manufactured by Hafele item #429-99-324, Doug Mockett EDP-2 1/2, or equal. Install in work surface top as per direction of Architect.
 - 8. Lever-type, cam lock, black finish, Hafele 235.06.318, East-loc C5511, or equal, at cabinet doors/drawers.
 - 9. Pull-out keyboard shelves: KV 5710 keyboard trays and KV 8150 keyboard slides or Accuride Cbergo-Tray 200.
 - 10. Provide key locks on doors in locations shown.
 - 11. Closet rod: 1 1/4" wood rod, provide one each per rod of KV 0766 CHR, Hafele 803.60.212 open closet rod support flange and KV 0764 CHR, Hafele 803.60.202 closed closet rod support flange or approved equals.

2.2 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FIELD MEASUREMENTS

- A. Take necessary measurements in the field to assure proper dimensions for the work of this Section.
- B. Prepare Shop Drawing submittal based upon field measurements.

3.3 FABRICATION

- A. Fabricate the work of this Section in strict accordance with the approved Shop Drawings and the referenced standards.

3.4 INSTALLATION

- A. Install the work of this Section in strict accordance with the approved Shop Drawings and the referenced standards, anchoring all items firmly into position.
- B. Cabinets to be installed with chrome plated finish screw and washer in a near, symmetrical pattern.
- C. Install blocking within walls as required to anchor cabinets securely.

END OF SECTION

SECTION 06 60 00

PLASTIC FABRICATIONS

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Provide laminated plastic where shown on the Drawings, specified herein, and needed for complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. Section 06 40 00, Architectural Woodwork.

1.2 QUALITY ASSURANCE

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

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00, Submittal Procedures for submittals and substitutions.
- B. Product data: With 60 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications and other data needed to demonstrate compliance with the specified requirements.
 - 3. Samples of the full range of colors and patterns available in each of the specified grades from the proposed manufacturer.
 - 4. Manufacturer's recommended methods of installation which, when approved by the Architect, will become the basis for acceptance or rejection of actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 66 00, Product Storage and Handling Requirements.

PART 2 PRODUCTS

2.1 LAMINATED PLASTIC

- A. Acceptable manufacturers:

1. Wilsonart International, Inc. (800) 433-3222.
2. Nevamar Company, (800) 638-4380.
3. Formica Corporation, (800) 367-6422

B. Colors and patterns: Provide color/finish selected by the Architect from premium colors and finishes of the approved manufacturer.

C. Qualities and types: Provide general purpose type, 0.050" thick, complying with NEMA LD3.

2.2 ADHESIVES

A. For installation of laminated plastic, use only, "rigid set" (urea-resin) or "semi-rigid set" (PVC acetate) adhesives. "Contact" adhesives are allowed for countertops only.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install the approved laminated plastic in strict accordance with the manufacturer's recommendations as approved by the Architect.

END OF SECTION

SECTION 06 61 16

SOLID SURFACING FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes solid surfacing countertops and splashes. See Additive Alternate Number One for locations of solid surfacing countertops and splashes. Solid surfacing edge banding at countertops in certain other rooms is to be included in the Base Bid, see 2.2.D for locations.
- B. Related Sections:
 - 1. Section 06 10 00 - Rough Carpentry: Wood blocking and supports for cabinet and counters.
 - 2. Section 06 40 00 - Architectural Woodwork: Cabinets with cast plastic counter top, integral sink, and backsplash.
 - 3. Section 07 90 00 - Sealants: Perimeter sealant to adjacent construction.
 - 4. Section 22 42 00 - Plumbing: Plumbing drains and fixture trim.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. National Electrical Manufacturers Association:
 - 1. NEMA MG 1 - Motors and Generators.
- C. National Fire Protection Association:
 - 1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- D. Underwriters Laboratories Inc.:
 - 1. UL - Fire Resistance Directory.
 - 2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.3 DESIGN REQUIREMENTS

- A. Design counter top items with sufficient strength for handling and placement stresses.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate dimensions, thicknesses, required clearances, tolerances, materials, colors, finishes, fabrication details, field jointing, adjacent construction, methods of support, integration of plumbing and electrical components, and anchorages.
- C. Product Data: Submit data on specified component products, electrical characteristics and connection requirements.
- D. Samples: Submit two samples representative of vanity top, bath tub, counter top, 6 x 6 inch in size illustrating color, texture, and finish.

- E. Manufacturer's Installation Instructions: Submit preparation of opening required, rough-in sizes; furnish templates for cast-in or placed frames or anchors; tolerances for item placement, temporary bracing of components.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit list of approved cleaning materials and procedures required; list of substances harmful to component materials. Include instructions for stain removal, surface and gloss restoration, and repair.

1.6 QUALITY ASSURANCE

- A. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84, UL 723.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.9 SEQUENCING

- A. Section 01 11 00 - Summary: Work sequence.
- B. Sequence Work to permit installation of adjacent affected construction, plumbing and electrical rough-in.

1.10 MAINTENANCE

- A. Section 01 77 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Provide Maintenance requirements as specified by manufacture.

PART 2 PRODUCTS

2.1 PLASTIC FABRICATIONS

- A. Solid Surface:
 - 1. Solid Surface shall be Wilsonart, Morning Ice, 9204CE, 1/2"

2.2 COMPONENTS

- A. Homogeneous solid sheets of plastic filled resin complying with material and performance requirements of ANSI Z124.3. Type 5 or Type 6 without a precoated finish
- B. Polishing Cream: Compatible polishing cream to achieve specified sheen to gel coat.
- C. Adhesive: Manufacture approved type, cartridge dispensed.

2.3 LOCATIONS

- A. Refer to Floor Plan on Sheet A4.0 for casework locations.

2.4 FABRICATION

- A. Fabricate components by mold to achieve shape and configuration.
- B. Gel coat exposed finish surfaces smooth and polish to gloss sheen.
- C. Cure components prior to shipment, except sheet materials requiring site handling.

2.5 SHOP FINISHING

- A. Color: to be selected by Architect.
- B. Color to be selected from price ranges C or B.
- C. Exposed to View Surface Visual Texture: Manufacture's standard design.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Inspect areas to receive solid surfacing to verify that all preparation work is complete and area is ready for installation.
- C. Verify joint preparation and affected dimensions are acceptable.

3.2 PREPARATION

- A. Provide anchoring devices for installation and embedding.
- B. Provide templates and rough-in measurements.

3.3 INSTALLATION

- A. Align work plumb and level.
- B. Rigidly anchor to substrate to prevent misalignment.
- C. Seal to adjacent construction in accordance with Section 07 90 00.

3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Indicated Dimension: 1/8 inch over a 10' Length.

- C. Maximum Offset From Indicated Position: 1/8 inch.

3.5 CLEANING

- A. Section 01 74 00 - Final cleaning.
- B. Clean work under provisions of 01 74 00.
- C. Clean and polish fabrication surfaces.

END OF SECTION

DIVISION 07
THERMAL AND MOISTURE PROTECTION

CONTENTS

07 15 00	Dampproofing
07 21 00	Thermal Insulation
07 21 19	Sprayed Insulation with Thermal Barrier
07 25 00	Weather Barrier
07 40 00	Exterior wall Insulation System
07 41 13	Metal Roof Panels
07 54 23	Thermoplastic – Polyvinyl chloride membrane Roofing
07 60 00	Flashing and Sheet Metal
07 90 00	Sealants

SECTION 07 15 00

DAMPPROOFING

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Work of this Section includes dampproofing systems, complete. In general, dampproofing includes dampproof courses at base flashing of masonry walls, under window sills, above windows and doors, and at other locations shown.

PART 2 PRODUCTS

2.1 DAMPPROOFING

- A. Metal flashings: 5 ounce copper laminated to heavy duty Kraft paper with high melting point asphalt; tri-directional glass reinforcing fibers embedded in asphalt.
- B. Mastic: Federal Specification SS-C-153, Type 1 or ASTM D-2822-75, Type 1 Flashing Cement.
- C. Flexible Flashings - .040" synthetic rubber membrane, 12" wide minimum "Pre-Kleened EPDM" by Carlisle, "FLASHGARD" by Firestone or equal. (Contractor may use this material, or equal, at his option at all flashings.)

PART 3 EXECUTION

3.1 DAMPPROOFING

- A. Apply one coat flashing cement. Insert dampproofing strips lapping 4" at joints with flashing cement between laps. Turn up backing courses as detailed, min. 8" behind sheathing.
- B. Extend flashing 1/2" past exterior wall face and turn down to hemmed edge. Turn up inside as detailed to run behind sheathing. Make end dams at window sills.
- C. Take all necessary measures to insure water is prevented from entering the wall assembly and is directed to the exterior.

END OF SECTION

SECTION 07 21 00

THERMAL INSULATION

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Provide building insulation where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
- B. Upon completion of this portion of the Work, complete and post a certificate of insulation compliance in accordance with pertinent requirements of governmental agencies having jurisdiction.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00, Submittal Procedures for submittals and substitutions.
- B. Product data: With 60 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications and other data needed to demonstrate compliance with the specified requirements.
 - 3. Samples of the full range of colors and patterns available in each of the specified grades from the proposed manufacturer.
 - 4. Manufacturer's recommended methods of installation which, when approved by the Architect, will become the basis for acceptance or rejection of actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 66 00, Product Storage and Handling requirements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide and install the following insulation types where shown on the Drawings, or otherwise needed to achieve the degree of insulation required under pertinent regulations of governmental agencies having jurisdiction.
- B. Batt Insulation:
 - 1. At new exterior and interior wall construction provide unfaced fiberglass batt insulation in the stud cavities from floor to above ceiling in thicknesses matching stud width.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Verify that substrate and adjacent materials are dry. Verify that substrate and adjacent materials are dry. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Remove, or protect against, projections in construction framing which may damage or prevent proper insulation.

3.2 INSTALLATION

- A. Install the work of this Section in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect anchoring all components firmly into position.
- B. Contractor shall use wire, plastic strapping, wire mesh, etc. as needed to secure insulation in place.
- C. Install plastic spacers at all soffit locations to insure air flow past batt insulation at ceilings.
- D. Batt insulation must friction fit within walls, without gaps or voids. Do not compress insulation.
- E. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids and perimeter of all door frames and windows.

END OF SECTION

SECTION 07 21 19

SPRAYED INSULATION WITH THERMAL BARRIER

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Light density, open celled, flexible, 100 percent water blown polyurethane foam insulation.
- B.
- C. Related Sections:
 - 1. Section 04 22 00 Concrete Masonry Units
 - 2. Section 06 10 00 Rough Carpentry
 - 3. Section 07 21 00 Thermal Insulation
 - 4.

1.2 REFERENCES

- A. American Society for Testing and Materials International (ASTM)
 - 1. ASTM C 518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
 - 2. ASTM D 2863: Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)
 - 3. ASTM E 84: Test Method for Surface Burning Characteristics of Building Materials
 - 4. ASTM E 96: Standard Test Methods for Water Vapor Transmission of Materials
 - 5. ASTM E 2178: Standard Test Method for Air Permeance of Building Materials
 - 6. ASTM E 283: Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

1.3 SUBMITTALS

- A. Submit Product Data for each type of insulation product specified as outlined under Section 01 33 00 Submittal Procedures.
- B. Product test reports performed by a qualified independent testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire-test-response characteristics, water-vapor transmission, water absorption, and other properties, based on comprehensive testing of current products.
- C. Manufacturer's certificate certifying insulation provided meets or exceeds specified requirements.
- D. Installer's certificate showing the Icynene installation certification.
- E. Sample warranty.

1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Product produced in an ISO9001 registered factory.
- B. Single Source Responsibility: Single source product from one manufacturer.
- C. Installer Qualifications: Engage an Icynene Licensed Dealer (applicator) who has been trained and certified by Icynene.

- D. Fire-Test-Response Characteristics: Provide materials specified as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84
- E. Toxicity/Hazardous Materials
 - 1. Provide products that contain no urea-formaldehyde
 - 2. Products and equipment requiring or using CFCs, HCFCs, or HFCs during the manufacturing or application process will not be permitted
 - 3. Provide products that contain no PBDEs
 - 4. Provide products that are "Low-emitting"

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Section 01 66 00 Product Storage and Handling Requirements.
- B. Comply with manufacturers written instructions for handling and protection prior to and during installation.
- C. Store both components in a temperature controlled area between 50 deg F (15 deg C) and 100 deg F (32 deg C). Do not allow product to freeze.
- D. Use only those components that are supplied by the Manufacturer.

1.6 PROJECT CONDITIONS

- A. Do not expose to sunlight, except to extent necessary for period of installation and concealment.

1.7 WARRANTY

- A. Manufacturer's standard limited lifetime warranty.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Polyurethane Spray Foam Insulation: ICYNENE LD-C-50™ by Icynene Inc., 800-758-7325.
- B. Other Approved Manufacturers
 - 1. Spray Applied Semi-Rigid Polyurethane Foam Insulation System, SEALECTION 500 as manufactured by DEMILEC is an approved equal, (817) 640-4900, www.demilecusa.com.
 - 2. Substitutions are not allowed unless prior approved.

2.2 MATERIALS

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
- B. ICYNENE LD-C-50™ Spray Foam Insulation or approved equal: Low-density, water-blown, conforming to the following:

1. Thermal Resistance (R-Value/inch @75 deg F): ASTM C 518; 3.7 hr/sq ft/degree F/BTU
 - a. Heat Flow Reduction:
 - 1) Through 1 inch: 75 percent
 - 2) Through 3.5 inches 93 percent
 - 3) Through 5.5 inches 95 percent
 - 4) Through 10.5 inches 98 percent
 2. Air Permeance (for 2 inches of material): ASTM E 283; <0.02 L/S.m² @75 Pa
 3. Air Permeance (for 5.5 inches of material): ASTM E 2178; < 0.02 L/s.m² @ 75 Pa
 4. Water Vapor Transmission (for 5.5 inches of material): ASTM E 96; 11 perms [627 ng/(Pa.s.m²)]
 5. Flame Spread and Smoke Developed Rating: ASTM E 84
 - a. Flame Spread: Less than 20
 - b. Smoke Development: Less than 400
 - c. Oxygen Index 23 percent
 6. Bacterial and Fungal Growth and Food Value: Texas Tech. University; not a source of food for mold (no growth)
 7. Minimum thickness to be 6 inches in all locations.
- C. Product Description:
1. ICC/ES Evaluation Report No. ESR 1826
 2. IAPMO-ES Report No. 0165
 3. Collaborative for High-Performance Schools (CHPS) "Low-emitting material" per CA 01350 Criteria
 4. Effective "breathing," (Vapor Permeable), air barrier material that can move with the building to maintain the air barrier characteristic for the life of the building.
- D. Thermal Barrier:
- a. Provide a spray-applied thermal barrier of DC315 at A mils WFT/9 mils DFT.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, under which work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.
 1. Review placement area to determine final location will not be within 3 inches of any heat source where the temperature will exceed 200 deg F per ASTM C 411 or in accordance with authorities having jurisdiction.

3.2 PREPARATION

- A. Clean substrates and cavities of loose materials capable of interfering with insulation placement.

3.3 APPLICATION

- A. Site mix liquid components manufactured by Icynene and supplied by Independent Icynene Licensed Dealer.
- B. Apply insulation to substrates in compliance with manufacturer's written instructions.
- C. Apply insulation to produce minimum thickness as indicated below.

1. R-24 is achieved at 6 inches

D. Extend insulation in thickness indicated to envelop entire area to be insulated.

E. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

F. Install spray-applied Thermal Barrier as per ICC-ES Evaluation Report No.

3.4 REPAIRS

A. Any repairs must be effected by an Icynene Licensed Dealer.

3.5 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse.

END OF SECTION

SECTION 07 25 00

WEATHER BARRIERS

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install air barrier/weather resistant barrier over exterior of wall sheathing at all locations regardless of whether or not indicated on drawings to protect exterior sheathing and interior walls.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. Section 06 10 00 - Rough Carpentry
 - 3. Section 07 21 00 - Thermal Insulation
 - 4. Section 07 60 00 - Flashing and Sheet Metal

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
- B. Install job mock-up using specified air barrier/secondary weather resistant barrier with system of fastening and taping seams as per manufacturer's instructions. Obtain architect's approval of system for appearance and workmanship standard.

1.3 SUBMITTALS

- A. Comply with pertinent provision of Section 01 33 00.
- B. Product data: Within 60 calendar days after the Contractor has received the Owner's Notice to proceed, submit:
 - 1. Product specifications, technical data and installation instructions of manufacturer equaling or exceeding those specified.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 66 00.

PART 2 PRODUCTS

2.1 MATERIALS

- A. A flash spunbonded olefin, non-woven, non-perforated secondary weather resistant barrier equal to DuPont™ Tyvek® CommercialWrap® by DuPont Weatherization Systems or Pinkwrap® by Owens Corning®.
- B. As an approved equal the contractor may elect to provide a fluid applied weather barrier equal to Tyvek Fluid Applied WB or Sto Corp. Air and Moisture Barriers.

2.2 PERFORMANCE CHARACTERISTICS

- A. AATCC-127, Water Penetration Resistance, exceeded at 280

- B. TAPPI T-460, Gurley Hill (sec/100cc) Air infiltration at >1500 seconds
- C. ASTM E 96 Method B (g/m²-24 hr.) Water vapor transmission of 200
- D. TAPPI T-41D, Basis weight of 2.7 oz/yd.
- E. ASTM 396 Method B, Water Vapor Transmission, 28 perms
- F. ASTM #1677, Air Retarder Material Standard Specification, Type I air barrier

2.3 Sealing Tape/Fasteners

- A. DuPont™ Tyvek® Tape, DuPont Weatherization Systems.
- B. For wood frame construction: DuPont™ Tyvek® Wrap Caps, as manufactured by DuPont Building Innovations: #4 nails with large 1-inch plastic cap fasteners.
- C. Caulks or Sealants: polyurethane or elastomeric sealants
 - 1. OSI® Quad Pro-Series®, solvent release butyl rubber sealant
 - 2. DAP® Dynaflex 230™
 - 3. Other products as approved and recommended by air barrier/weather resistant barrier manufacturer.

PART 3 EXECUTION

3.1 Installation

- A. Install Air Barrier over exterior side of exterior wall sheathing.
 - 1. Install Air Barrier after sheathing is installed and before windows and doors are installed. Install lower level barrier prior to upper layers to ensure proper shingling of layers.
 - 2. Overlap Air Barrier at corners of building by a minimum of 12 inches.
 - 3. Overlap Air Barrier vertical seams by a minimum of 6 inches.
 - 4. Ensure barrier is plum and level with foundation, and unroll extending Air Barrier over window and door openings.
 - 5. Attach Air Barrier to wood, insulated sheathing board or exterior gypsum with plastic cap nails every 12" to 18" on vertical stud line with wood stud framing, and screws with washers to metal stud framing. When attaching to masonry, use adhesive recommended by manufacturer.
 - 6. Prepare window and door rough opening as follows:
 - a. Horizontally cut Air Barrier along bottom of header.
 - b. Vertically cut Air Barrier down the center of window openings from the top of the window opening down to 2/3 of the way to the bottom of the window openings.
 - c. Diagonally cut Air Barrier from the bottom of the vertical cut to the left and right corners of opening.
 - d. Fold side and bottom flaps into window opening and fasten every 6 inches. Trim off excess.
 - 7. Prepare each rough door opening by cutting a standard "I" pattern in the Air Barrier.
 - a. Horizontally cut Air Barrier along bottom of door frame header and along top of sill.
 - b. Vertically cut Air Barrier down the center of door openings from the top of the door opening (header) down to the bottom of the door opening (sill).
 - c. Fold side flaps inside around door openings and fasten every 6 inches. Trim off excess.
 - 8. Tape all horizontal and vertical seam of Air Barrier with DuPont™ Tyvek® Tape.
 - 9. Seal all tears and cuts in Air Barrier with DuPont™ Tyvek® Tape.

END OF SECTION

SECTION 07 40 00

EXTERIOR WALL INSULATION SYSTEM

PART 1 GENERAL

- A. The general conditions, supplementary conditions and general requirements of these construction documents apply to the general contractor subcontractors, material suppliers and all other persons furnishing labor and materials under this Section.

1.1 DESCRIPTION

- A. Furnish all materials and labor for a complete installation of the insulation wall system as shown on Drawings and as specified herein.

1.2 SUBMITTALS

- A. Submit copies of manufacturer's specifications and installation instructions.

PART 2 PRODUCTS

2.1 MATERIAL - GENERAL

- A. Manufacturers: Materials are specified by brand names to establish a standard quality, or by performance requirements and general description of product. The Architect will consider substitutions for brand names of products specified provided the procedures set forth for substitutions are followed. The Architect reserves the right to reject any materials which, in his opinion, will not produce the quality of work specified herein.
- B. The following are acceptable manufacturers:
 - 1. STO Industries, Inc.
 - 2. Dryvit approved as equal.

2.2 ADHESIVE

- A. STO BTS® Plus – one component, polymer-modified, cement based adhesive.

2.3 INSULATION BOARD

- A. Expanded Polystyrene (EPS Board) less than 25 flame spread, 1.0 lbs/per BU. FT., average density; U=0.26 per inch; Federal Specifications HH-1-524C, Type 1 Class A.
- B. Board must be manufactured and packaged by a STO Approved and licensed EPS Molder. Each board must be marked on the end with a STO identification mark and boards packaged with proper identification information.
- C. Provide turned column shapes of the same EPS material in dimensions and shapes as shown on the drawings.

2.4 GROUND COAT - RFP

- A. STO RFP - a ready mixed, non-cementitious, 100% acrylic co-polymer emulsion based, water resistant, vapor permeable, glass fiber reinforced non capillary action ground coat. If Stolit R or Superlit Finish is specified, the STO RFP shall be tinted to the same shade as the finish.

- B. STO Flexyl - where indicated on plans and details provide additional coat, to be STO Flexyl, a copolymer-based waterproofer, adhesive and ground coat. Apply as per manufacturer's full recommendations for installation and specific intended use as indicated on Plans and Details.

2.5 FABRIC

- A. Fabric shall be STO reinforced fiber mesh with symmetrical interlaced glass fiber made from twisted multi-end strands, styrene butadiene coated at least 20 grams per square yard to provide a shiftproof and alkaline resistant mesh compatible with STO material.
- B. STO corner mat 4/5 heavy duty woven fiberglass mat pre-bent for maximum impact protection of corners, and to insure sharp corners.

2.6 FINISH

- A. The finish shall be one of STO exterior ready mixed acrylic based wall coatings, as manufactured by STO Industries, Inc. Type, texture, color and aggregate size shall be as indicated on Drawings. Stolit R 1.5.
- B. Color selection: Color is to match existing building stucco previously painted with Sherwin Williams # SW7008.

PART 3 EXECUTION

3.1 INSTALLATION

- A. All installations of STO materials shall be performed by and/or supervised by STO Certified Applicators, according to the manufacturer's recommendations.

END OF SECTION

SECTION 07 41 13

Metal Roof Panels

Part 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Factory-formed sheet metal roofing, including flashings and trim.
- B. Related Sections: Section(s) related to this section include:
 - 1. 07 90 00 Sealants: Division 7 Joint Sealants Section.
 - 2. 07 62 00 Sheet Metal Flashing

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A653/A653M Standard Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A792/A792M Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy Coated by the Hot Dip Process.
 - 3. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 4. ASTM D2247 Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
 - 5. ASTM E1680 Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen.
 - 6. ASTM E1646 Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
 - 7. ASTM G90 Standard Practice for Performing Accelerated Outdoor Weathering of Non-Metallic Materials Using Concentrated Natural Sunlight.
 - 8. ASTM D 2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
 - 9. ASTM D 4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
 - 10. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials
 - 11. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
 - 12. ASTM E 2140 - Standard Test Method for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head.
- B. Underwriters Laboratories (UL):
 - 1. UL 263 - Fire Tests of Building Construction and Materials.
 - 2. 580 - Tests for Uplift Resistance of Roof Assemblies.
 - 3. UL 790 - Standard Test Methods for Fire Tests of Roof Coverings.
 - 4. UL 2218 - Impact Resistance of Prepared Roof Covering Materials.
- C. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA); "Architectural Sheet Metal Manual"
- D. Miami-Dade County
- E. Florida Building Code
- F. Texas Windstorm Approval

1.3 SYSTEM DESCRIPTION

- A. **Performance Requirements:** Provide sheet metal roofing which has been manufactured, fabricated and installed to withstand structural and thermal movement, wind loading and weather exposure to maintain manufacturer's performance criteria without defects, damage, failure or infiltration of water.
1. Air infiltration: Maximum 0.06 cfm per lineal foot (0.33 m³/hr per linear meter) of seam at static pressure of 6.24 psf (3.0 kPa) when tested per ASTM E1680.
 2. Water penetration:
 - a. No uncontrolled water penetration through the joints at a static pressure of 6.24 psf (3.0 kPa) when tested in accordance with ASTM E1646.
 3. Fire rating: Class A
 4. Uplift Tests:
 - a. UL 580 Class 90
 - b. ASTM E 1592 (1.5", 2" & 3")
 5. Miami Dade
 6. Class 4 Impact Resistance: UL 2218
 7. Fire Resistance: UL 263
 8. Florida State Approval
 9. ICC-ES: ESL 1082
- B. **Finish Performance Requirements:**
1. Two coat coil applied, baked on full strength (70% resin, PVF2) fluorocarbon coating consisting of a nominal 0.25 mil dry film thickness primer, and a nominal dry film thickness of 0.7 -0.8 mil color coat for a total 0.9 to 1.1 mil total system dry film thickness.
 2. Color change and fade resistance: No cracking, peeling, blistering or loss of adhesion when tested in accordance with ASTM G23; color change, after removal of surface deposits such as dirt or chalk, maximum 5 NBS units.
 3. Humidity resistance: No blistering, peeling or loss of adhesion after 1000 hours testing, in accordance with ASTM D2247.

1.4 SUBMITTALS

- A. **General:** Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
- B. **Product Data:** Submit manufacturer's product data for specified products.
- C. **Shop Drawings:** Submit shop drawings showing layout, profiles and product components, including anchorage, accessories, finish colors and textures.
1. Indicate layout of roofing panels and roof panel sizes, including custom-fabricated roofing panels if indicated; indicate each item of trim and accessories.
 2. Indicate in detailed drawings profile and gauge of interior and exterior sheets, and locations and types of fasteners; indicate locations, gauges, shapes and methods of attachment of roofing panels, trim and accessory items.
 3. Include Sealant location and denote those that are factory and field applied.
 4. Indicate products/materials required for construction activities and field worked conditions of this section not supplied by manufacturer of products of this section.
- D. **Samples:** Submit selection and verification samples for finishes, colors and textures.
1. Selection Samples: For each product requiring color selection, 2 sets of manufacturer's sample chips representing full range of colors and finishes available.
 2. Verification Samples: For each color and finish selected, 2 chips indicating match to selected color and finish.
- E. **Warranties:**
1. Substrate Warranty
 2. Finish Warranty

3. Weather Tightness Warranty (if applicable)

F. Test and Evaluation Reports: Showing compliance with specified performance characteristics and physical properties.

G. Quality Assurance Submittals: Submit the following:

1. **Contractor Certificates:** Contractor's certification that:
 - a. Manufacturer of products of this section meets specified qualifications.
 - b. Installer of products of this section meets specified qualifications.
2. **Manufacturer Certificates:** Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and physical requirements.
3. **Manufacturer's Instructions:** Manufacturer's installation instructions.
4. **Manufacturer's Field Reports:** Manufacturer's field reports if required.

H. Closeout Submittals: Submit the following:

1. **Warranty:** Warranty documents specified herein.

I. Buy American Certification: Manufacturer's letters of compliance indicating supplied products comply with requirements.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Provider of "hands on" installer training at manufacturer or customer facility.
2. Minimum of ten years' experience in manufacturing metal roof systems.
3. Provider of product produced in a permanent factory environment with fixed roll-forming equipment and also possesses the capability to roll form continuous panels on jobsites with a factory technician for jobs with panel lengths in excess of 50'

B. Installer Qualifications:

1. At least five years' experience in the installation of structural standing seam metal roof panels.
2. Experience on at least five projects of similar size, type and complexity as this project that have been in service for a minimum of two years with satisfactory performance of the roof system.
3. Employer of workers for this project who are competent in techniques required by manufacturer for installation indicated and who shall be supervised at all times when material is being installed.

C. Buy American Compliance: Materials provided under Work of this Section shall comply with the following requirements:

1. Buy American Act of 1933 BAA-41 U.S.C §§ 10a – 10d.
2. Buy American provisions of Section 1605 of the American Recovery and Reinvestment Act of 2009 (ARRA).

1.6 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirements Sections.

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

B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Identify fabricated components with UL 90 label where appropriate.

C. Delivery and Acceptance Requirements: Ensure all panels are received in good condition. In cases where damage is visible, note all paperwork; inform architect and project superintendent.

D. Packing, Shipping, Handling and Unloading:

1. Roofing panels to be crated to protect panels from shipping damage.
2. Package trim and accessories in waterproof wrapping paper.

E. Storage and Protection: Store materials protected from exposure to harmful conditions. Store material in dry, above-ground location.

1. Stack prefinished material to prevent twisting, bending, abrasion, scratching and denting. Elevate one end of each skid to allow for moisture runoff.
2. Store products of this section in manufacturer's unopened packaging until installation of products
3. Maintain dry, heated storage area for products of this section until installation of products.
4. Remove strippable plastic film before storage under high-heat conditions.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed in accordance with manufacturers' written instructions and warranty requirements.

1.8 WARRANTY

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

1. Panel Material: Furnish manufacturers 25 year warranty covering the panel against rupture, structural failure, or perforation.
2. Panel Coating: Furnish manufacturer's 40-year warranty covering cracking, checking, and peeling, and 30 year warranty covering fade and chalk on the Two coat coil applied, baked on full strength (70% resin, PVF2) fluorocarbon coating.
 - a. Manufacturer's warranty may exclude surface deterioration due to physical damage and corrosive environments.

B. Weather Tightness Warranty

1. Weathertightness Warranty: Manufacturers Single Source weathertightness warranty.
2. Warranty Term: 10 years commencing on Date of Substantial Completion.
3. Total Manufacturers Liability: No Repair Limit
4. Warranty must cover winds up to 120 mph
 - a. Manufacturer must supply engineered installation shop drawings, signed and sealed by an Engineer registered in the state in which the project is located.

C. Special Warranty: Installer's standard form in which installer agrees to repair or replace panels that fail due to poor workmanship or faulty installation within the specified warranty period.

1. Warranty Period: 10 years from date of substantial completion.

PART 2 PRODUCTS

2.1 Metal Roof Panels

A. Manufacturer: McElroy Metal, Inc.

1. Contact: 1500 Hamilton Rd., Bossier City, LA 71111; Telephone: (800) 950-6531; Fax: (318) 747-8099; E-mail: info@mcelroymetal.com; website: www.mcelroymetal.com.
2. Proprietary Products: McElroy Metal Preformed Sheet Metal Roofing Panels.

B. Substitutions:

1. **Basis of Design Product:** Subject to compliance with requirements provide McElroy Metal Medallion Lok
 2. **Substitution Limitations**
 - a. Requests for approval must be submitted in writing at least ten (10) days prior to bid date, and are accompanied by all related test reports and design calculations listed in section 1.4 and Design and Performance criteria Section 2.2.
 - b. Substitute manufacturers will be approved by written addendum to all bidders. Voluntary alternates will not be considered. Substitutions will not be permitted after the bid date of this project.
 - c. Roof panels proposed for substitution shall fully comply with specified requirements in appearance, assembly, and performance.
- C. **Forming:** Use continuous end rolling method. No end laps are permitted on panels without architect approval. No portable rollforming machines will be permitted on this project, no installer—owner or installer-rented machines will be permitted. It is the intent of the Architect to provide factory-manufactured panel systems only for this project.

2.2 MANUFACTURED UNITS

A. McElroy Metal Medallion-Lok Panels:

1. **Profile:** Vertical leg standing seam panel with male/female seams that are interlocked via snapping during installation.
2. **Size:** 1.75" high seam by 16" width (51 x 406 mm) Length as indicated on drawings.
3. **Panel Surface:** Striated-
4. **Material:** Galvalume steel sheet conforming to ASTM A792, AZ55 coating for bare; AZ50 coating for painted; 24 standard gauge sheet thickness.

2.3 METAL ROOF PANEL ACCESSORIES

- A. **General:** Provide complete metal roof panel assembly incorporating trim, copings, fasciae, gutters and downspouts, and miscellaneous flashings, in profiles as indicated. Provide required fasteners, closure strips, support plates, and sealants as indicated in manufacturer's written instructions.
- B. **Flashing and Trim:** Match material, thickness, and finish of metal panel face sheet.
- C. **Panel Clips:** ASTM A 653/A 653M, G90 (Z180) hot-dip galvanized zinc coating, configured for concealment in panel joints, and identical to clips utilized in tests demonstrating compliance with performance requirements.
- D. **Panel Fasteners:** Self-tapping screws and other acceptable corrosion-resistant fasteners recommended by roof panel manufacturer. Where exposed fasteners cannot be avoided, supply fasteners with EPDM or neoprene gaskets, with heads matching color of metal panels by means of factory-applied coating.
- E. **Joint Sealers:** Manufacturer's standard or recommended liquid and preformed sealers and tapes, and as follows:
1. **Factory-Applied Seam Sealant:** Manufacturer's standard hot-melt type.
 2. **Tape Sealers:** Manufacturer's standard non-curing butyl tape, AAMA 809.2.
 3. **Concealed Joint Sealant:** Non-curing butyl, AAMA 809.2.
- F. **Steel Sheet Miscellaneous Framing Components:** ASTM C 645, with ASTM A 653/A 653M, G60 (Z180) hot-dip galvanized zinc coating.

2.4 FABRICATION

- A. General: Provide factory fabricated and finished metal panels and accessories meeting performance requirements, indicated profiles, and structural requirements.
- B. Fabricate metal panel joints configured to accept factory-applied sealant providing weathertight seal and preventing metal-to-metal contact and minimizing noise resulting from thermal movement.
- C. Form panels in continuous lengths for full length of detailed runs, except where otherwise indicated on approved shop drawings.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings. Form from materials matching metal panel substrate.

2.5 FINISHES

- A. Two coat coil applied, baked on full strength (70% resin, PVF2) fluorocarbon coating consisting of a nominal 0.25 mil dry film thickness primer, and a nominal dry film thickness of 0.7 -0.8 mil color coat for a total 0.9 to 1.1 mil total system dry film thickness. Finish to be selected from manufacturer's standard color selection. The back side of the material should be 0.25 mil primer and a 0.25 mil polyester wash coat.
 - 1. Roof Panel Color:
 - a. Selected from full range of manufacturer's standard colors.
 - b. Color: To be selected by architect.
 - 2. Roof Related Trim/Accessories Color:
 - c. Selected from full range of manufacturer's standard colors.
 - d. Color: To be selected by architect.

2.6 RELATED MATERIALS

- A. General: Coordinate use of related materials:
 - 1. Underlayment: Provide self-adhered High-Temperature underlayment.
 - 2. Plywood Deck: Refer to Division 6 Rough Carpentry Section
 - 3. Sealants: Refer to Division 7 Joint Sealants Section

2.7 SOURCE QUALITY

- A. Source Quality: Obtain metal panel products from a single manufacturer.
- B. Quality Control: Obtain standing seam metal roof panels, trim and other accessories from a manufacturer capable of providing on-site technical support and installation assistance.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data, recommendations and installation instructions for substrate verification, preparation requirements and installation.
 - 1. Strippable Film: Remove manufacturer's protective film, if any, from surfaces of roofing panels.
- B. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.
 - 1. Verification of Conditions:
 - a. Panel support systems are ready for construction activities of this section and within specified tolerances.
 - b. Rough-in utilities are in correct locations.

2. **Installer's Examination:**
 - a. Have installer of this section examine conditions under which construction activities of this section are to be performed, then submit written notification if such conditions are unacceptable.
 - b. Transmit 2 copies of installer's report to Architect within 24 hours of receipt.
 - c. Delay construction activities of this section until unacceptable conditions have been corrected.
 - d. Beginning construction activities of this section indicates installer's acceptance of conditions.

3.2 PREPARATION

- A. **Coordination:** Coordinate metal roofing with other work to provide a noncorrosive and leak-proof installation.
 1. Install substrate boards, hat channels, purlins, or furring channels in accordance with manufacturer's recommendations.
 2. Coordinate work, with installation of other associated work, to ensure quality application.
 3. Coordinate work with installation of associated metal flashings and building walls.
 4. Coordinate work to minimize foot traffic and construction activity on installed finished surfaces.
 5. Coordinate location of pipe penetrations to allow centering of pipe in panel.
 6. Coordinate location of roof curbs, to allow proper integration with roof panel.
 7. Coordinate work to minimize foot traffic and construction activity on installed finished. surfaces.
 8. Dissimilar Metals: Prevent galvanic action of dissimilar metals.

3.3 INSTALLATION

- A. **General:** Install metal roofing panels to profiles, patterns and drainage indicated and required for leak-proof installation. Provide for structural and thermal movement of work. Seal joints for leak-proof installation.
 1. Shim or otherwise plumb substrates receiving metal panels.
 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws.
 3. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 4. Install screw fasteners in predrilled holes for clip installation.
 5. Locate and space fasteners in uniform vertical and horizontal alignment.
 6. Install flashing and trim as metal panel work proceeds.
 7. Install continuous length panels.
 8. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws.
 9. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 10. Provide weathertight EPDM Flashing for pipe- and conduit-penetrating panels.
 11. Seams: Provide uniform, neat seams.
 12. Fix panels at location depicted on reviewed shop drawings.
 13. Allow for required panel clearance at penetrations for thermal movement.
 14. Align pipe penetrations to occur at center of roof panel. Report and have corrected improperly placed penetrations before proceeding with panel installation. Remove and replace roof panels which have improperly placed penetration flashings.
 15. Allow for required panel clearance at penetrations for thermal movement.
 16. Fasteners: Conceal fasteners where possible in exposed work. Cover and seal fasteners and anchors for watertight and leak-proof installation.
 17. Sealant-Type Joints: Provide sealant-type joint where indicated. Form joints to conceal sealant. Comply with Division 7 Joint Sealants Section for sealant installation.
- B. **Roofing Installation:**
 1. Install roofing plumb, true and in correct alignment with structural framing, in accordance with shop drawings and manufacturer's printed installation instructions.
 2. Install roofing using manufacturer's concealed fastening system or non-corroding fasteners color-matched to panel.
 3. Install trim using concealed fasteners where possible; sight-exposed non-corroding fasteners color-matched to trim are permitted on vertical surfaces only.

C. Installation Tolerances:

1. Variation from Plumb: Maximum 1/8" (3.2 mm) in 20 feet (6.096 m).
2. Variation from Level: Maximum 1/8" (3.2 mm) in 20 feet (6.096 m).
3. Variation from True Plane: Maximum 1/4" (3.2 mm) in 20 feet (6.096 m).

D. Underlayment Installation

1. Underlayment to be supplied by metal roof panel manufacturer.
2. Self-adhered High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 40 mils thick adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
3. Thermal Stability: Stable after testing at 240 degree F; ASTM D1970.
4. Low-Temperature Flexibility: Passes after testing at minus 20 degree F; ASTM D1970.
5. Supplied by metal roof panel manufacturer.
6. Apply over the entire roof surface.

E. Flashing and Trim Installation: Comply with performance requirements, manufacturer's written installation instructions, and the SMACNA "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and install units to true level. Install work with laps, joints, and seams that will be permanently watertight.

3.4 FIELD QUALITY REQUIREMENTS

- A. Site Tests: Owner reserves right to perform post-installation testing of installed metal panel installation.**
- B. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.**

3.5 CLEANING

- A. Cleaning: Remove temporary coverings and protection of adjacent work areas.**
- B. Repair or replace damaged installed products.**
- C. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance.**
- D. Remove construction debris from project site and legally dispose of debris.**
- E. Remove strippable coating and perform dry wipe-down cleaning of panels as erected.**

3.6 PROTECTION

- A. Protection: Protect installed product's finish surfaces from damage during construction:**
1. Protect installed products from damage by subsequent construction activities.
 2. Replace products having damage other than minor finish damage.
 3. Repair products having minor damage to finish in accordance with panel Manufacturer's recommendation
 4. Architect shall be sole judge of acceptability of repair to damaged finishes; replace products having rejected repairs

END OF SECTION

SECTION 07 54 23

THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Adhered TPO membrane roofing system.
- B. Cover board.
- C. Roof insulation.

1.2 RELATED SECTIONS

- A. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, cants, curbs, and blocking and for wood-based, structural-use roof deck panels.
- B. Division 07 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counter flashings.
- C. Division 22 Section "Storm Drainage Piping Specialties" for roof drains.

1.3 REFERENCES

- A. Roofing Terminology: Refer to the following publications for definitions of roofing work related terms in this Section:
 - 1. ASTM D 1079 "Standard Terminology Relating to Roofing and Waterproofing."
 - 2. Glossary of NRCA's "The NRCA Roofing and Waterproofing Manual."
 - 3. Roof Consultants Institute "Glossary of Building Envelope Terms."
- B. Sheet Metal Terminology and Techniques: SMACNA "Architectural Sheet Metal Manual."

1.4 DESIGN CRITERIA

- A. General: Installed roofing membrane system shall remain watertight; and resist specified wind uplift pressures, thermally induced movement, and exposure to weather without failure.
- B. Material Compatibility: Roofing materials shall be compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.
- C. Installer shall comply with current code requirements based on authority having jurisdiction.

- D. **Wind Uplift Performance:** Roofing system shall be identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist wind uplift pressure calculated in accordance with ASCE 7.
- E. **Fire-Test-Response Characteristics:** Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

1.5 SUBMITTALS

- A. **Product Data:** Manufacturer's data sheets for each product to be provided.
- B. **Detail Drawings:** Provide roofing system plans, elevations, sections, details, and details of attachment to other Work, including:
 - 1. Base flashings and membrane terminations.
 - 2. Tapered insulation, including slopes.
 - 3. Crickets, saddles, and tapered edge strips, including slopes.
 - 4. Insulation fastening and adhesive patterns.
- C. **Verification Samples:** Provide for each product specified.
- D. **Installer Certificates:** Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.
- E. **Maintenance Data:** Refer to Johns Manville's latest published documents on www.JM.com.
- F. **Guarantees:** Provide manufacturer's current guarantee specimen.
- G. Prior to beginning the work of this section, roofing sub-contractor shall provide a copy of the final System Assembly Letter issued by Johns Manville Roofing Systems indicating that the products and system to be installed shall be eligible to receive the specified manufacturer's guarantee when installed by a certified JM contractor in accordance with our application requirements, inspected and approved by a JM Technical Representative.
- H. Prior to roofing system installation, roofing sub-contractor shall provide a copy of the Guarantee Application Confirmation document issued by Johns Manville Roofing Systems indicating that the project has been reviewed for eligibility to receive the specified guarantee and registered.

1.6 QUALITY ASSURANCE

- A. **Installer Qualifications:** Qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive the specified manufacturer's guarantee.
- B. **Manufacturer Qualifications:** Qualified domestic U.S. owned and based manufacturer that has UL listing for roofing system identical to that used for this Project.

- C. **Testing Agency Qualifications:** An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 329.
- D. **Test Reports:**
 - 1. Roof drain and leader test or submit plumber's verification.
- E. **Source Limitations:** Obtain all components from the single source roofing manufacturer guaranteeing the roofing system. All products used in the system shall be labeled by the single source roofing manufacturer issuing the guarantee.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.8 PROJECT CONDITIONS

- A. **Weather Limitations:** Proceed with installation only when current and forecasted weather conditions permit roofing system to be installed in accordance with manufacturer's written instructions and guarantee requirements.

1.9 GUARANTEE

- A. Provide manufacturer's system guarantee equal to Johns Manville's Peak Advantage No Dollar Limit Roofing System Guarantee.
 - 1. Single-source special guarantee includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, cover board, walkway products, manufacturer's expansion joints, manufacturer's edge metal products, and other single-source components of roofing system marketed by the manufacturer.
 - 2. Guarantee Period: 20 years from date of Substantial Completion.
 - 3. Contractor is required to list "ASHE BROUSSARD WEINZETTE ARCHITECTS" as the Specifier/Consultant of record in the appropriate fields ("Specifier Account") when applying for the manufacturer's warranty.
- B. **Installer's Guarantee:** Submit roofing Installer's guarantee, including all components of roofing system for the following guarantee period:

1. Guarantee Period: Two years from date of Substantial Completion.
- C. Existing Guarantees: Guarantees on existing building elements should not be affected by scope of work.
1. Installer is responsible for coordinating with building owner's representative to verify compliance.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC POLYOLEFIN ROOFING MEMBRANE - TPO

- A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: ASTM D 6878, uniform, flexible sheet formed from a thermoplastic polyolefin, internally fabric or scrim reinforced. Basis of design: JM TPO
1. Membrane Thickness: 60 mils (1.52 mm), nominal
 2. Exposed Face Color: White

2.2 AUXILIARY ROOFING MATERIALS - SINGLE PLY

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's internally reinforced or scrim reinforced, smooth backed membrane with same thickness and color as sheet membrane. Basis of design: JM TPO
- C. Sheet Flashing (Self-Adhered): 60 mil (1.5 mm) thick, manufacturer's internally reinforced or scrim reinforced with weldable selvage edges on each side of roll, one encapsulated edge and self-adhering capabilities in a wide installation temperature range. Basis of design: JM TPO SA - Flashing Membrane
1. Serviceable Installation Substrate Temperature: 20 °F (-7 °C) and rising.
- D. Bonding Adhesive: Manufacturer's standard solvent-based bonding adhesive for membrane, and solvent -based bonding adhesive for base flashings. Basis of design: JM Membrane Bonding Adhesive (TPO&EPDM)
1. Serviceable Installation Ambient Air Temperature: 25 °F and rising
- E. Self-Adhered Primer: One-part penetrating primer solution to enhance the adhesion of self-adhering membranes. Basis of design: SA Primer
- F. Liquid Applied Flashing: Manufacturer's single ply liquid and fabric reinforced flashing system created with a fleece polyester scrim and a two-component polyurethane based liquid applied flashing material, consisting of a liquid resin and a curing agent. Basis of design: JM SP Liquid Flashing Resin and JM SP Liquid Flashing Scrim

- G. **Liquid Applied Flashing Primer:** Manufacturer's single ply liquid flashing primer. Basis of design: JM SP Liquid Flashing TPO and PVC Primer, JM SP Liquid Flashing Concrete Primer, or JM SP Liquid Flashing Metal and Wood Primer
- H. **Metal Termination Bars:** Manufacturer's standard predrilled stainless-steel or aluminum bars, with anchors. Basis of design: JM Termination Systems
- I. **Fasteners:** Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer. Basis of design: All Purpose Fasteners
- J. **Miscellaneous Accessories:** Provide pourable sealers, primers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, cover strips, and other accessories required for full installation. Basis of design: JM TPO Pourable Sealer A & B, JM TPO Pipe Boots, JM TPO Universal Corners, JM TPO Edge Sealant, JM TPO T-Joint Patch, JM TPO Membrane Cleaner, JM TPO Membrane Primer, JM TPO Membrane Primer (Low VOC), JM TPO Sealing Mastic, JM TPO Cover Tape, JM TPO Detail Membrane, JM TPO Peel & Stick 10" RPS, JM TPO Peel & Stick 6" RTS, JM TPO-Coated Metal, JM TPO Curb Flashing and JM Single Ply Caulk

2.3 WALKWAYS

- A. **Flexible Walkways:** Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads sourced from membrane roofing system manufacturer. Basis of design: JM TPO Walkpad

2.4 COVER BOARD

- A. **High-Density Polyisocyanurate:** ASTM C 1289, Type II, Class 4, Grade 3, High-density Polyisocyanurate technology bonded in-line to mineral-surfaced, fiber glass reinforced facers with greater than 140 lbs of compressive strength. Basis of design: Invinsa Roof Board
- B. **General:** Preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
- C. **Polyisocyanurate Board Insulation:** ASTM C 1289, Type II, Class 1, Grade 2 (20 psi), Basis of design: ENRGY 3
 - 1. Provide insulation package with minimum thickness: 1.5 inches.
 - 2. Provide insulation package in multiple layers.
 - 3. Minimum Long-Term Thermal Resistance (LTTR): 5.7 per inch.
 - a. Determined in accordance with CAN/ULC S770 at 75°F (24°C)

2.5 TAPERED INSULATION

- A. Tapered Insulation:** ASTM C 1289, Type II, Class 1, Grade 2 (20 psi), provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48), unless otherwise indicated. Basis of design: Tapered ENRGY 3

2.6 INSULATION ACCESSORIES

- A. General:** Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
- B. Provide factory preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated. Basis of design:** Diamondback Pre-Cut Cricket, Diamondback Pre-Cut Miter, or Tapered Fesco Edge Strip
- C. Fasteners:** Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and furnished by roofing system manufacturer. Basis of design: UltraFast Fasteners and Plates
- D. Wood Nailer Strips:** Comply with requirements in Division 06 Section "Miscellaneous Rough Carpentry."

2.7 EDGE METAL COMPONENTS

- A. Expansion Joints:** Provide factory fabricated weatherproof, exterior covers for expansion joint openings consisting of flexible rubber membrane, supported by a closed cell foam to form flexible bellows, with two metal flanges, adhesively and mechanically combined to the bellows by a bifurcation process. Provide product from single-source roofing system supplier that is included in the No Dollar Limit guarantee. Basis of design: Expand-O-Flash Expand-O-Gard
- B. Coping System:** Manufacturer's factory fabricated coping consisting of a base piece and a snap-on cap. Provide product from single-source roofing system supplier that is included in the No Dollar Limit guarantee. Basis of design: Presto-Lock Coping
- C. Fascia System:** Manufacturer's factory fabricated fascia consisting of a base piece and a snap-on cover. Provide product from single-source roofing system supplier that is included in the No Dollar Limit guarantee. Basis of design: Presto-Tite Fascia Presto-Tite Edge One Fascia
- D. Metal Edge System:** Manufacturer's factory fabricated metal edge system used to terminate the roof at the perimeter of the structure. Provide product from single-source roofing system supplier that is included in the No Dollar Limit guarantee. Basis of design: Presto-Weld Drip Edge JM TPO-Coated Metal
- E. Shop-Fabricated Edge Metal:** Custom-fabricated edge metal meeting the criterion of ANSI/SPRI ES-1. Must be approved by manufacturer technical representative. Minimum requirements:
 - 1. Steel:** 24 gauge minimum, fastened 6 inches on center.

2. Aluminum: 0.05 inch thick, fastened 6 inches on center.

F. Metal Flashing Sheet: Metal flashing sheet is specified in Division 07 Section "Sheet Metal Flashing and Trim."

2.8 Louver Wall Vent

A. Louvered wall vent with T.P.O. flange by Flash Co., 14" x 24".

B. Provide two (2) at tower parapet where indicated.

C. Flash CO (866) 323-5274, flashco.com.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with the requirements affecting performance of roofing system.

1. General:

- a. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
- b. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

2. Wood Decks:

- a. Verify that wood decking is visibly dry and free of moisture according to manufacturer's approved method.
- b. Verify that wood has ability to provide minimum fastener pull-out resistance.

- 1) Provide documentation of pull out resistance values using manufacturer's approved procedures.

3. Ensure general rigidity and proper slope for drainage.

4. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units more than 1/16 inch (1.6 mm) out of plane relative to adjoining deck.

B. Unacceptable panels should be brought to the attention of the General Contractor and Project Owner's Representative and shall be corrected prior to installation of roofing system.

3.2 PREPARATION

A. Clean and remove from substrate sharp projections, dust, debris, moisture, and other substances detrimental to roofing installation in accordance with roofing system manufacturer's written instructions.

- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction.
- C. If applicable, prime surface of deck with asphalt primer at a rate recommended by roofing manufacturer and allow primer to dry.
- D. Proceed with each step of installation only after unsatisfactory conditions have been corrected.

3.3 INSULATION INSTALLATION

- A. Coordinate installation of roof system components so insulation and cover board are not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system manufacturer's written instructions for installation of roof insulation and cover board.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation boards with long joints in a continuous straight line. Joints should be staggered between rows, abutting edges and ends per manufacturer's written instructions. Fill gaps exceeding 1/4 inch (6 mm) with like material.
- E. Install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
- F. Trim surface of insulation boards where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- G. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- H. Loose Laid Insulation: Loose lay all layers of insulation with staggered joints.

3.4 COVER BOARD INSTALLATION

- A. Coordinate installing membrane roofing system components so cover board is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system manufacturer's written instructions for installing roof cover board.
- C. Install cover board with long joints in a continuous straight line. Joints should be staggered between rows, abutting edges and ends per manufacturer's written instructions. Fill gaps exceeding 1/4 inch (6 mm) with cover board.
 - 1. Cut and fit cover board within 1/4 inch (6 mm) of nailers, projections, and penetrations.

- D. Trim surface of cover board where necessary at roof drains so completed surface is flush and does not restrict flow of water.
 - 1. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- E. Mechanically Fastened Cover Board: Install cover board and secure to deck using mechanical fasteners designed and sized for fastening specified cover board to deck type.
 - 1. Fasten to resist uplift pressure at corners, perimeter, and field of roof.

3.5 ROOFING MEMBRANE INSTALLATION, GENERAL

- A. Install roofing membrane in accordance with roofing system manufacturer's written instructions, applicable recommendations of the roofing manufacturer and requirements in this Section.
- B. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system.
- C. Coordinate installing roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is imminent.
 - 1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation.
 - 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
 - 3. Remove and discard temporary seals before beginning work on adjoining roofing.

3.6 ADHERED ROOFING MEMBRANE INSTALLATION

- A. Install roofing membrane over area to receive roofing in accordance with membrane roofing system manufacturer's written instructions.
 - 1. Unroll roofing membrane and allow to relax before installing.
 - 2. Install sheet in accordance with roofing system manufacturer's written instructions.
- B. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- C. Solvent Based Bonding Adhesive for smooth backed membranes: Apply solvent-based bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.
- D. Mechanically fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.
- E. Apply roofing membrane with side laps shingled with roof slope, where possible.

- F. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.
 - 2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - a. Remove and repair any unsatisfactory sections before proceeding with installation.
 - 3. Repair tears, voids, and incorrectly lapped seams in roofing membrane that do not meet requirements.
- G. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.
- H. Install roofing membrane and auxiliary materials to tie into existing roofing.

3.7 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates per membrane roofing system manufacturer's written instructions.
- B. Apply solvent-based bonding adhesive at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
- C. Self-Adhere membrane to smooth approved substrates, when substrate temperatures are 40 °F (4.5 °C) and rising.
 - 1. The use of SA Primer or SA LVOC Primer is required for flashing applications on curbs and parapet walls for temperatures between 40 °F (4.5 °C) and 20 °F (-7 °C).
 - 2. The use of SA Primer or SA LVOC Primer is required for flashing applications over approved substrates with a porous or rough surface, including: Dens Deck Prime, Dens Deck, DEXcell, concrete and smooth faces CMU.
- D. Apply single ply liquid applied flashing system per manufacturer's written instructions.
- E. Flash penetrations and field-formed inside and outside corners per manufacturer's installation instructions.
- F. Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.
- G. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.8 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Heat weld and adhere walkway products to substrate according to roofing system manufacturer's written instructions.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.
- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical representative to inspect roofing installation on completion and submit report to Architect.
 - 1. Notify Architect or Owner 48 hours in advance of date and time of inspection.
- C. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 PROTECTION AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 07 60 00

FLASHING AND SHEET METAL

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Provide flashing and sheet metal not specifically described in other Sections of these Specifications but required to prevent penetration of water through the exterior shell of the building.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. In addition to complying with pertinent codes and regulations, comply with pertinent recommendations contained in current edition of "Architectural Sheet Metal Manual" published by the Sheet Metal and Air-conditioning Contractors National Association (SMACNA).
- C. Standard commercial items may be used for flashing, trim, reglets and similar purposes provided such items meet or exceed the quality standards specified.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00, Submittal Procedures.
- B. Product data: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
 - 3. Shop Drawings in sufficient detail to show fabrication, installation, anchorage and interface of the work of this Section with the work of adjacent trades;
 - 4. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.
 - 5. Samples, 8" x 8" of each type of material proposed to be used.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 66 00, Product Storage and Handling Requirements.

PART 2 PRODUCTS

2.1 MATERIALS AND GAGES

- A. Where sheet metal is required, and no material or gage is indicated on Drawings provide the highest quality and gage commensurate with the referenced standards.

2.2 PREFINISHED STEEL SHEETS

- A. 24 gauge, hot dipped galvanized steel (G90) commercial quality, primed and finished on one (1) side with Kynar 500 fluoropolymer coating 1.0 mil DPT. Vincent "Color Clad", Petersen "Pac-Clad", or approved equal.

2.3 ALUMINUM

- A. Provide prefinished aluminum .040" thickness, Kynar 500 or equal coating, .040" thickness, typical where indicated on the Drawings, and as needed for complete weathertightness.
- B. Zinc Coating:
 - 1. Where galvanizing is required, provide zinc coating by hot-dip galvanize to all surfaces.
 - 2. Weight - Provide not less than 1-1/4" oz. per sq. ft., nor more than 1-1/2 oz. per sq. ft., to surfaces required to be galvanized.
 - 3. Comply with ASTM A93.

2.4 NAILS, RIVETS AND FASTENERS

- A. Use only soft iron rivets having rust-resistive coating, galvanized nails and cadmium plated screws and washers in connection with galvanized iron and steel.
- B. Use color-coordinated prefinished fasteners where fasteners will be visible.
- C. Use fasteners of same or compatible metal with respective flashing metal type.

2.5 FLUX

- A. Where flux is required, use raw muriatic acid.

2.6 SOLDER

- A. Where solder is required, comply with ASTM B32.

2.7 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.
- B. Flashing: Where indicated on the Drawings, provide .040" aluminum, prefinished in color selected by Architect. Install with concealed clips or "zee" channels to avoid through-fasteners. Submit shop drawings of profiles for Architect's review and approval.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 WORKMANSHIP

A. General:

1. Form sheet metal accurately and to the dimensions and shapes required, finishing molded and broken surfaces with true, sharp and straight lines and angles and, where intercepting other members, coping to an accurate fit and soldering securely.
2. Unless otherwise specifically permitted by the Architect, turn exposed edges back 1/2".

B. Form, fabricate and install sheet metal so as to adequately provide for expansion and contraction in the finished work.

C. Weatherproofing:

1. Finish watertight and weathertight where so required.
2. Make lock seam work flat and true to line, sweating full of solder.
3. Make lock seams and lap seams, when soldered, at least 1/2" wide.
4. Where lap seams are not soldered, lap according to pitch, but in no case less than 3".
5. Make flat and lap seams in the direction of flow.
6. At roof edge flashing, provide splice plates 8" wide, centered on joint, embed in sealant, all hidden fasteners. Under each joint, install a section of flexible flashing membrane 8" wide by the depth of the metal flashing less 1/2" each end, equal to WR Grace or Firestone.
7. Where metal flashing extends underneath siding or roofing material, typically provide a hemmed edge to prevent passage of water. Secure hemmed edge with clips or large head nails adjacent to hemmed edge - do not penetrate flashing with fasteners.
8. Use two-part "snap-lock" flashing/counterflashing as per details at roof-wall intersections.

D. Joints:

1. Join parts with rivets or sheet metal screws only where absolutely necessary for strength and stiffness. Typically install with hemmed edges over concealed clips or zee-clips.
2. Provide suitable watertight expansion joints for runs of more than 40'-0", except where closer spacing is indicated on the Drawings or required for proper installation.
3. At all parapet coping and expansion joint covers, all joints to be 1/2" tall standing seam.

E. Nailing:

1. Secure metal by means of concealed clips or cleats, without nailing through the metal, unless absolutely necessary to be done otherwise.
2. In general, space nails, rivets and screws not more than 8" apart and, where exposed to the weather, use lead washers.
3. For nailing into wood, use barbed roofing nails 1-1/4" long by 11 gage.
4. For nailing into concrete, use drilled plugholes and plugs.
5. All nails or fasteners shall be prefinished to match metal finish.

3.3 EMBEDMENT

- A. Embed metal in connection with roofs in a solid bed of sealant, using materials and methods described in Section 07 92 00 of these Specifications or other materials and methods approved in advance by the Architect.**

3.4 TESTS

- A. Upon request of the Architect, demonstrate by hose or standing water that the flashing and sheet metal are completely watertight.**

3.5 CLEAN-UP

- A. **Cleaning:** After completion of work, remove all debris from site. Clean roofing cement, sealant, and paint from flashing, floors, and adjacent surfaces. Remove strippable film from flashing. Leave all surfaces neat and clean.

END OF SECTION

SECTION 07 90 00

SEALANTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes sealants and joint backing, precompressed foam sealers, and accessories.
- B. Related Sections:
 - 1. Section 04 20 00 - Unit Masonry
 - 2. Section 04 22 00 - Concrete Unit Masonry
 - 3. Section 07 10 50 - Cold Fluid-Applied Waterproofing
 - 4. Section 07 84 00 - Firestopping: Firestopping sealants.
 - 5. Section 08 80 00 - Glazing: Glazing sealants and accessories.
 - 6. Section 09 29 00 - Gypsum Board

1.2 REFERENCES

- A. ASTM C834 - Latex Sealing Compounds.
- B. ASTM C919 - Practice for Use of Sealants in Acoustical Applications.
- C. ASTM C920 - Elastomeric Joint Sealants.
- D. ASTM C1193 - Guide for Use of Joint Sealants.
- E. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Products Data: Submit data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.
- C. Manufacturer's Installation Instructions: Submit special procedures, surface preparation, and perimeter conditions requiring special attention.
- D. Warranty: Include coverage for installed sealants and accessories failing to achieve airtight seal, watertight seal, exhibit loss of adhesion or cohesion, and sealants, which do not cure.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with documented experience.
- B. Applicator: Company specializing in performing Work of this section with documented experience and approved by manufacturer.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 66 00 – Product Storage and Handling Requirements.
- B. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

1.6 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

- B. Coordinate Work with sections referencing this section.

PART 2 PRODUCTS

2.1 JOINT SEALERS

- A. Manufacturers:
1. Dow Corning Corp.
 2. GE Silicones.
 3. Pecora Corp.
 4. Sika Corp.
 5. Substitutions: Section 01 33 00 – Submittal Procedures.
- B. Products Description:
1. High Performance General Purpose Exterior (Nontraffic) Sealant: Sealant Type 1: polyurethane, ASTM C920, Grade P, Class 25; single component.
 - a. Color: Standard colors matching finished surfaces.
 - b. Applications: Use for:
 - 1) Control, expansion, and soft joints in masonry.
 - 2) Joints between concrete and other materials.
 - 3) Joints between metal frames and other materials.
 - 4) Other exterior nontraffic joints for which no other sealant is indicated.
 - 5) Joints between cement board wall panels and between cement board wall panels and dissimilar materials: Sealant manufacturer shall obtain certification from cement board manufacturer accepting products for applications detailed and confirming bondability to panel surfaces.
 2. General Purpose Traffic Bearing Sealant Type 2: Polyurethane; ASTM C920, Grade P, Class 25; single or multi-component, self leveling.
 - a. Color: Standard colors matching finished surfaces.
 - b. Applications: Use for exterior and interior pedestrian and vehicular traffic bearing joints.
 3. Exterior Foam Expansion Joint Sealer Sealant Type 3: Precompressed foam sealer; Polyurethane with water-repellent.
 - a. Color: Face color as selected to match masonry grout color.
 - b. Size: As required to provide weathertight and watertight seal when installed.
 - c. Applications: Use for exterior wall expansion joints.
 4. Sealant Backer Rod: Compressible rod stock open cell polyurethane foam. Provide size and shape of rod which will control joint depth for sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back side, and provide a highly compressible backer to minimize the possibility of sealant extrusion when joint is compressed.
 5. General Purpose Interior Sealant: Sealant Type 5 Acrylic emulsion latex; ASTM C834, single component, paintable.
 - a. Color: Standard colors matching finished surfaces.
 - b. Applications: Use for interior wall and ceiling control joints, joints between door and window frames and wall surfaces, and other interior joints for which no other type of sealant is indicated.
 6. Plumbing Fixtures/Tile Sealant: Sealant Type 6: Clear silicone; ASTM C920; single component, mildew resistant.
 - a. Applications: Use for joints between plumbing fixtures and floor and wall surfaces, and joints between countertops and wall surfaces.

2.2 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D1056, sponge or expanded

rubber; oversized 30 to 50 percent larger than joint width.

- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify substrate surfaces and joint openings are ready to receive work.
- B. Verify joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

- A. Remove loose materials and foreign matter impairing adhesion of sealant.
- B. Clean and prime joints.
- C. Perform preparation in accordance with ASTM C1193.
- D. Protect elements surrounding Work of this section from damage or disfiguration.

3.3 INSTALLATION

- A. Perform installation in accordance with ASTM C1193.
- B. Perform acoustical sealant application work in accordance with ASTM C919.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.
- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- G. Tool joints concave unless detailed otherwise.
- H. Pre-compressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.
- I. Compression Gaskets: Avoid joints except at ends, corners, and intersections; seal joints with adhesive; install with face 1/8 to 1/4 inch below adjoining surface.

3.4 CLEANING

- A. Section 01 74 23 - Final Cleaning.
- B. Clean adjacent soiled surfaces.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 74 23 – Final Cleaning.
- B. Protect sealants until cured.

END OF SECTION

**DIVISION 08
DOORS AND WINDOWS**

CONTENTS

08 12 14	Standard Hollow Metal Frames
08 13 14	Standard Hollow Metal Doors
08 14 00	Wood Doors
08 41 13	Aluminum-Framed Entrances and Storefronts
08 71 00	Finish Hardware
08 80 00	Glazing

SECTION 08 12 14

HOLLOW METAL FRAMES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes rated, non-rated and impact resistant hollow metal frames, including door and window frames, see Drawings.
- B. Related Sections:
 - 1. Section 04 20 00 – Concrete Unit Masonry: Masonry grout fill of metal frames and placement of anchors into masonry wall construction.
 - 2. Section 08 13 14 - Hollow Metal Doors.
 - 3. Section 08 71 00 – Finish Hardware: Hardware, silencers, and weatherstripping.
 - 4. Section 08 80 00 - Glazing.

1.2 REFERENCES

- A. ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated by the Hot-Dip Process.
- B. DHI (Door Hardware Institute) - The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
- C. SDI-100 (Steel Doors Institute) – Hollow Metal Doors and Frames.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures and substitutions.
- B. Shop Drawings: Indicate frame elevations, reinforcement, anchor types and spacing, location of cut-outs for hardware, and finish.
- C. Product Data: Submit frame configuration and finishes.
- D. Manufacturer's Installation Instructions: Submit special installation instructions.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Conform to requirements of SDI-108.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 66 00 - Product Storage and Handling Requirements: Product storage and handling requirements.
- B. Accept frames on site in manufacturer's packaging. Inspect for damage.
- C. Break seal on-site to permit ventilation.

1.7 COORDINATION

- A. Coordinate Work with frame opening construction, door, and hardware installation.
- B. Sequence installation to accommodate required door hardware electric wire connections.

PART 2 PRODUCTS

2.1 STANDARD STEEL FRAMES

- A. Manufacturers:
 - 1. National Custom Metal Doors and Frames
 - 2. Republic Builders Products
 - 3. Steelcraft
 - 4. Substitutions: 01 66 00 – Product Storage and Handling requirements
- B. Type and design:
 - 1. Interior Frames: Provide frames of the types and dimensions shown on the Drawings, labeled or non-labeled as indicated on the Door Schedule and Interior Window Schedule in the Drawings. Provide a minimum 18 gauge metal for interior door/window frames except that all fire rated interior hollow metal frames to be minimum 16 gauge. See Door and Frame Schedule for required fire ratings. Reinforce frames for finish hardware described in Section 08 71 00, Finish Hardware, of these Specifications.
 - 2. Exterior Frames: Provide frames of the types and dimensions shown on the Drawings, and as indicated on the Door Schedule and Window Schedule in the Drawings complying with the criteria for protection from wind-born debris in Inland 1 Zones. Assembly shall pass Missile Level D. Provide a minimum 16 gauge welded metal for single exterior door/window frames and 14 gauge welded metal for double exterior door frames. Reinforce frames for finish hardware described in Section 08 71 00, Finish Hardware, of these Specifications
- C. Finish:
 - 1. Interior Frames: Pre-clean and shop prime each frame for finish painting which will be performed at the job site under Section 09 90 00, Painting and Coating, of these Specifications.
 - 2. Exterior Frames: Galvanized in accordance with ASTM A525 and finish painting which will be performed at the job site under Section 09 90 00, Painting and Coating, of these Specifications.
- D. Fire Rated Frames: Where fire-resistance classifications are shown or scheduled for door assemblies, provide hollow metal frames complying with all requirements for such. Provide UL label on frame.

2.2 ACCESSORIES

- A. Removable Stops: Rolled steel channel shape, mitered corners; prepared for countersink style tamper proof screws.
- B. Bituminous Coating: Non-asbestos fibered asphalt emulsion.
- C. Primer: Zinc chromate type.
- D. Silencers: Resilient rubber fitted into drilled hole at interior door locations only.
- E. Weatherstripping: Specified in Section 08 71 00 Finish Hardware for all exterior door locations only.

2.3 FABRICATION

- A. Fabricate frames as welded unit.
- B. Fabricate frames with hardware reinforcement plates welded in place. Provide mortar guard boxes.
- C. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.
- D. Prepare interior frames for silencers. Provide three single silencers for single doors and mullions of double doors on strike side. Provide two single silencers on frame head at double doors without mullions.
- E. Omit holes for silencers at exterior doors.
- F. Fabricate frames to suit masonry wall coursing as detailed, and where applicable.

2.4 SHOP FINISHING

- A. Steel Sheet: Galvanized to ASTM A525
- B. Primer: Baked.
- C. Coat inside of frame profile with bituminous coating to minimum thickness of 1/16 inch.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify opening sizes and tolerances are acceptable.

3.2 INSTALLATION

- A. Install frames in accordance with manufacturer requirements for use and location.
- B. All frames in masonry walls to be fully grouted, both interior and exterior.
- C. Coordinate with masonry wall construction for anchor placement.
- D. Coordinate installation of frames with installation of hardware specified in Section 08 71 00 and doors in Section 08 13 14 and 08 14 00.
- E. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

3.3 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edges, crossed corner to corner.

3.4 SCHEDULE

- A. Refer to Door and Frame Schedule and Interior Window Schedule included in Construction Document Drawings.

END OF SECTION

SECTION 08 13 14

HOLLOW METAL DOORS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes thermally insulated non-rated hollow metal doors for exterior locations.
- B. Related Sections:
 - 1. Section 08 12 14 - Standard Hollow Metal Frames.
 - 2. Section 08 71 00 - Finish Hardware.
 - 3. Section 09 90 00 - Paints and Coatings: Field painting of doors.

1.2 REFERENCES

- A. ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated by the Hot-Dip Process.
- B. DHI (Door Hardware Institute) - The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
- C. SDI-100 (Steel Door Institute) - Standard Steel Doors and Frames.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals and substitutions.
- B. Shop Drawings: Indicate door elevations, internal reinforcement, closure method, and cut-outs for louvers and finishes.
- C. Product Data: Submit door configurations, location of cut-outs for hardware reinforcement.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with SDI 108.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with documented experience.
- B. Installer: Company specializing in performing work of this section with documented approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. 01 66 00 - Product Storage and Handling Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Protect doors with resilient packaging sealed with heat shrunk plastic.
- C. Accept doors on site in manufacturer's packaging. Inspect for damage.
- D. Break seal on site to permit ventilation.

1.7 COORDINATION

- A. Coordinate Work with door opening construction, door frame, and door hardware installation.
- B. Coordinate installation to accommodate door hardware electric wire connections.

PART 2 PRODUCTS

2.1 STANDARD STEEL DOORS

- A. Manufacturers:
 - 1. Natural Custom Metal Doors and Frames
 - 2. Republic Builders Products.
 - 3. Steelcraft.
 - 4. Substitutions: 01 66 00 – Product Storage and Handling Requirements.
- B. Product Description:
 - 1. Exterior Doors: ANSI 250.8, SDI-108, 1-3/4 inch thick, insulated.
 - a. Level 3 – Extra heavy duty, Model 1, full flush design.
- C. Type and design:
 - 1. Provide full-flush design, in dimensions and types shown on the Drawings, labeled or non-labeled as indicated on the Door Schedule in the Drawings, 16 gauge for exterior doors, properly reinforced for the finish hardware described in Section 08 71 00 Finish Hardware of these Specifications.
 - 2. Doors shall comply with criteria for protection from wind-born debris in Inland I zones. Assembly shall pass Missile Level D.
- D. Finish:
 - 1. Galvanized in accordance with ASTM A525 for finish painting which will be performed at the job site under Section 09 90 00, Painting and Coating, of these Specifications.

2.2 COMPONENTS

- A. Face: Steel sheet in accordance with SDI-108.
- B. Top and Bottom Closure: Channel, 14 gauge, inverted for flush surface.
- C. Core: Polyurethane Core.

2.3 ACCESSORIES

- A. Removable Stops: Rolled steel, channel shape, mitered corners; prepared for countersink style tamper proof screws.
- B. Primer: Zinc chromate type.

2.4 FABRICATION

- A. Fabricate doors with hardware reinforcement welded in place.
- B. Configure exterior doors with edge profile to receive recessed weatherstripping.

2.5 SHOP FINISHING

- A. Primer: Baked.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify opening sizes and tolerances are acceptable.

3.2 INSTALLATION

- A. Install doors in accordance with SDI-108 and DHI.
- B. Install door louvers, plumb and level.
- C. Coordinate installation of doors with installation of frames specified in Section 08 12 14 and hardware specified in Section 08 71 00.
- D. Touch-up damaged shop finishes.

3.3 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.4 ADJUSTING

- A. Adjust door for smooth and balanced door movement.

3.5 SCHEDULE

- A. Refer to Door and Frame Schedule in Construction Documents Drawings.

END OF SECTION

SECTION 08 14 00

WOOD DOORS

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Provide wood doors complete in place with finish hardware installed where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. Section 08 12 14, Standard Steel Frames.
 - 3. Section 08 71 00, Finish Hardware.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. In addition to complying with pertinent codes and regulations of governmental agencies having jurisdiction, comply with:
 - 1. "Architectural Woodwork Quality Standards" of the Architectural Woodwork Institute, for the grade and grades specified.
 - 2. Certification and stamps will not be required.
 - 3. Fire-Rated Wood Doors: Where fire-resistance classifications are shown or schedule for wood door assemblies, provide doors which comply with the requirements of NFPA No. 80 "Standards for Fire Doors and Windows" and which have been tested and rated with single point hardware by UL.
 - 4. Provide UL Label on door and panel.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00, Submittal Procedures for submittals and substitutions.
- B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to provide compliance with the specified requirements;
 - 3. Samples, approximately 8"x 8" in size, of each of the proposed door face materials.
 - 4. Submit veneer sheet from each available flitch to be used for Premium grade face veneers. Also submit three (3) strips of solid wood 2"x 1'-0" of species to be used for exposed edges, trim and other solid wood components.
- C. Warranty - Wood Doors: Submit written agreement in door manufacturer's standard form signed by the manufacturer, installer and contractor, agreeing to repair or replace defective doors which have been warped (bow, cup or twist) or which show photographing of construction below in face veneers, or do not conform to tolerance limitations of NWMA.
 - 1. The warranty shall also include refinishing and reinstallation which may be required due to repair or replacement of defective doors.

2. Warranty shall be in effect during the following period of time after the date of acceptance:
 - a. Solid Core flush Interior Doors: Five (5) years.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 66 00, Product Storage and Handling Requirements.
- B. Delivery:
 1. Deliver doors and frames to site after plaster and cement are dry, and after building has reached average prevailing humidity of its locality.
 2. Deliver prefinished doors in manufacturer's original containers, clearly marked with manufacturer's name, brand name, size, thickness and identifying symbol on the covering.
 3. Seal all four edges of unfinished doors when delivered to the job site.
- C. Storage:
 1. Stack flat on 2"x 4" lumber, laid 12" from ends and across center.
 2. Under bottom door and over top of stack, provide plywood or corrugated cardboard to protect door surfaces.
 3. Store doors in area where there will be not great variations in heat, dryness and humidity.
- D. Do not drag doors across one another; lift doors and carry them into position.

PART 2 PRODUCTS

2.1 MATERIALS AND COMPONENTS

- A. General: Provide wood doors complying with the applicable requirements of NWMA I.S.1 for the kinds and types of doors indicated and as further specified.
- B. Face panels: Manufacturer's standard 2 or 3 ply face panels, unless otherwise indicated. Wood type to be Stain Grade White Birch, Rift Sawn.
- C. Exposed surfaces: Provide the kind shown or scheduled and as further specified, provide same exposed surface material on both faces of each door, unless otherwise indicated. Wood type to be Stain Grade White Birch.
- D. Fire-Rated doors: Provide exposed faces and edges to match non-fire-rated doors in the same area of the building, unless otherwise indicated. Provide trim for openings (if any) which have been tested and listed for the kind of door and rating indicated.

2.2 SOLID CORE WOOD DOORS

- A. Type II water-resistant bond.
- B. Core construction: Solid wood block, wood particleboard, or mineral with wood lock blocks, as required by door manufacturer to comply with specified warranty period.
- C. Face panels: Manufacturer's standard 2 or 3 ply face panels.
- D. Exposed surfaces for transparent finish: Where solid core interior wood doors are shown or scheduled to receive a transparent finish, provide manufacturer's standard thickness face veneers of the following quality.
 - 1. Quality: NWMA I.S.1 Premium grade face veneers of the species and cut shown or scheduled. Book-match (match for color and grain) at veneer joints, unless otherwise indicated. Provide exposed edges and other exposed solid wood components of the same species as face veneers. Wood type to be Stain Grade White Birch. Hardwood edges on interior, glue block core on exterior.
- E. Acceptable Manufacturers:
 - 1. Algoma Hardwoods, Inc.
 - 2. Eggers Industries
 - 3. Mohawk Flush Doors
 - 4. Weyerhaeuser
 - 5. Benton
 - 6. VT Industries
 - 7. Substitutes: Section 01 33 00 – Submittal Procedures.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory condition are corrected.

3.2 INSTALLATION

- A. Fitting and machining:
 - 1. Unless doors are completely fitted and machine at the mill, fit them for width by planing and fit them for height by sawing:
 - a. Bottom: 1/2" clearance maximum
 - b. Top: 1/2" clearance maximum
 - c. Lock edge and hinge edge: Bevel 1/8" in 2" maximum
 - 2. Machine doors for hardware in accordance with recommendations of the hardware manufacturers, as those recommendations have been approved by the Architect.
- B. Receive and retain custody of finish hardware furnished for the work of this Section under Section 08710 of these Specifications and, except as otherwise directed by the Architect, install all such finish hardware in strict accordance with the recommendations of its manufacturer.
- C. Replace or re-hang doors which are hingebound and do not swing or operate freely.
- D. See painting section of these specifications for requirements for finishing wood doors.

END OF SECTION

SECTION 08 41 13

ALUMINUM FRAMED ENTRANCES and STOREFRONTS

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work of this Section includes flush aluminum storefront system, windows, transoms, sidelites and all miscellaneous items required for a complete installation.
- B. Contractor shall familiarize himself with various locations and types of materials shown, scheduled and detailed.
- C. Related work:
 - 1. Following items of related work are specified in other sections of this Specifications:
 - a. Section 08 80 00 Glass and Glazing
 - b. Section 07 84 00 Caulking and Sealants
 - c. Section 08 71 00 Finish Hardware
 - d. Section 07 60 00 Flashing and Sheet Metal

1.2 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00, Submittal Procedures for submittal and substitutions.
- B. Submit Shop Drawings for approval in accordance with the General Conditions. Include elevations of storefront systems, sash systems, details and methods of anchorage to openings, details for construction, finishes, methods for assembling section, location and installation of hardware, size, shape and thickness of materials, joints and connections and details of joining with other work.
- C. Submit samples of finish to Architect for approval. Samples shall show extremes from light to dark with allowable commercial tolerances.

1.3 QUALITY ASSURANCE

- A. For purpose of designating type and quality of work under this Section specifications are based on products manufactured by Kawneer Company, Inc., TubeLite, Vistawall or YKKAP.

1.4 INSPECTION OF SURFACES

- A. Inspect substrates to which work adjoins. Contractor responsible for field checking all dimensions, elevations and slopes on connecting work affecting work of this Section to insure proper fit and weather-tight construction.
- B. Insure all flashing is installed as required prior to storefront installation. Refer to Drawings for details concerning required sub-sill flashing with integral end dams.

1.5 GUARANTEES

- A. Furnish to the Owner, through Architect, two year guarantee on all materials furnished through storefront manufacturer to be free from defects due to faulty workmanship and/or materials. Defective material repaired or replaced after proper notice immediately at no cost to the Owner. Also, guarantee installation, including caulking, free from leaks for not less than five (5) years from date of final acceptance; provided, however, that such leaks and/or defects are not resulting from abuse by Owner, damage caused by fire, tornado, hail, hurricane, act of God, war, riot or civil commotion.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General: As a standard quality, various components of storefront systems mentioned herein are manufactured by the Kawneer Company, Inc. Alternate manufacturers/products are TubeLite "Versa Therm" and YKK "YES 20" and Vistawall, with impact resistance and thermal break.
- B. Finish: Exposed surfaces of all aluminum members to be Kawneer Permadiize (50% PVDF), AAMA, color to be selected by Architect from manufacturer's standard colors.
Note: Finish on interior to be clear anodized, see 2.2.E below.
- C. Metal: Aluminum extrusions shall conform to ASTM B 221-73, Type 6063-T5 Aluminum alloy. Major portions of sections .125" minimum thickness. Moldings, trim, stops .050" thickness.
- D. Sub-sills: Aluminum sub-sills with integral flashing end dams shall be provided at all sill locations.

2.2 ALUMINUM ENTRANCES AND STOREFRONT

- A. Exterior aluminum storefront located as per the Drawings at exterior window openings shall be equal to Kawneer series IR 501T (impact resistant thermal break) Framing System, 2 3/4" x 5" to receive 1 5/16" impact resistant glazing, meeting all specifications of the above, including frames, mullions and transom bars, construction of tubular aluminum, with finish as indicated above.
- C. Aluminum storefront entrance doors to be equal to Kawneer Standard Entrance 350T IR medium stile. Single acting, size as indicated. Provide beveled or square glass stops for 1/4" infill.

All hardware, except keying, to be provided and certified by entrance door supplier. Hardware to include continuous hinges, Dor-O-Matic/Falcon 1690 touch bar with concealed rod exit device, style CO-9 pull, 4" low profile threshold with door sweep and weatherstripping.
- D. Aluminum storefront located at interior aluminum windows and door frames shall be equal to Kawneer Trifab 400 framing system, 1 3/4" x 4" to receive 1/4" glazing.
- E. Finish on interior storefront: Exposed surfaces of all aluminum members to be NAAMM AA-M12C22A4/clear anodized Class 1 (minimum thickness 0.7 mils) with hot water seal for exposed surfaces including fasteners and hardware.
- F. Coordinate with other trades to insure a complete and proper installation.

PART 3 EXECUTION

3.1 PROTECTION FROM DISSIMILAR MATERIALS

- A. Protect aluminum surfaces that will abut masonry, concrete, wood or steel from contact with neoprene gaskets, or bituminous paint to prevent galvanic or corrosive action. Protect as recommended by manufacturer.

3.2 GLAZING

- A. Glass and glazing are specified in Section 08 80 00. Storefront manufacturer shall furnish all glazing accessories required for complete installation of aluminum frames, transoms, window frames and sidelights.

3.3 CAULKING

- A. Caulking and sealants are specified in Section 07 92 00. Completely caulk perimeter of doors and frames.

3.4 INSTALLATION

- A. Install framing members in accordance with manufacturer's approved Shop Drawings in prepared openings. Members level, square, plumb and at proper elevations and in alignment with other work. All joints between exterior storefront metal and opening substrates tightly sealed in order to secure watertight job. All materials accurately cut and fitted and rigidly secured in place. All cuts and machined ends and recesses true, accurate and free of burrs or rough edges.
- B. Handle doors in accordance with manufacturer's approved Shop Drawings and coordinate all work involved in such. Make final adjustments to provide easy operation and opening.

3.5 CLEANING AND PROTECTION

- A. After installation, clean doors and frames following procedure recommended by manufacturer. Protect doors and frames from damage during subsequent construction activities. Replace damaged materials at no additional cost to the Owner.

3.6 OWNER'S INSTRUCTIONS

- A. Give Owner's representative written and verbal instructions as to procedure required for keeping work furnished herein maintained and adjusted. Adjusting wrenches and small tools furnished with operating hardware turned over to Owner, properly tagged and identified. Foregoing shall not relieve Contractor any responsibilities under guaranty specified herein before.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 GENERAL

1.1 DESCRIPTION

A. Work included:

1. Furnish finish hardware required to complete the Work as shown on the Drawings and as specified herein;
2. Furnish trim attachments and fastenings, specified or otherwise required, for proper and complete installation;
3. Deliver to the job site those items of finish hardware scheduled to be installed at the job site; and deliver to other points of installation those items of finish hardware scheduled to be factory installed.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
2. Installation of finish hardware is described in other Sections of these Specifications.

1.2 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 00, Submittal Procedures.

B. Product data: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Materials list of items proposed to be provided under this Section.
 - a. In this regard, note that the Door Hardware Schedule in Part 3 of this Section is firm and that substitutions will not be considered except as approved in advance by the Architect or as shown to be required because of non-availability of the specified item.
 - b. Approval of this list by the Architect will not relieve the Contractor of the responsibility to provide all finish hardware items required for the Work even though such required for the Work even though such required items may not have been shown on the approved list.

C. Samples:

1. Within 15 calendar days after being so requested by the Architect, deliver to the Architect samples of each finish hardware item.
2. All samples will be returned to the Contractor; provided those samples which are approved by the Architect are positively identified and are installed in the Work at locations agreed to by the Architect.

D. Templates: In a timely manner to assure orderly progress of the Work, deliver templates or physical samples of the approved finish hardware items to pertinent manufacturers of interfacing items such as doors and frames.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 66 00, Product Storage and Handling Requirements.

- B. Individually package each unit of finish hardware, complete with proper fastenings and appurtenances, clearly marked on the outside to indicate contents and specific locations on the Work.

PART 2 PRODUCTS

2.1 GENERAL

A. Fasteners:

1. Furnish necessary screws, bolts and other fasteners of suitable size and type to anchor the hardware in position for long life under hard use.
2. Where necessary, furnish fasteners with toggle bolts, expansion shields, sex bolts and other anchors approved by the Architect, according to the material to which the hardware is to be applied and according to the recommendations of the hardware manufacturer.
3. Provide fasteners which harmonize with the hardware as to finish and material.

- B. Where butts are required to swing 180 degrees, furnish butts or sufficient throw to clear the trim.

- C. Furnish silencers for door frames at the rate of three for each single door and two for each door or pair of doors; except weatherstripped doors and doors with light seals or sound seals.

2.2 KEYING

- A. Factory key, masterkey and grand-masterkey locks and cylinders as directed by the Architect.

- B. Furnish three (3) keys for each lock, twelve masterkeys for each set, and three (3) grand-masterkeys.

C. Construction keying:

1. Furnish a construction masterkey system with 15 keys for locks and cylinders.
2. Use only the construction keys during construction.
3. Upon Substantial Completion of the Work, as that Date if established by the Architect, void the construction key system and, in the presence of the Architect, demonstrate that the specified keying system is operating properly.

D. Identification and delivery:

1. Factory stamped permanent keys, "DO NOT DUPLICATE".
2. Identify permanent keys with tags, and send direct to the Owner by registered mail or receipted personal delivery.

- E. All existing keyed locks are to be re-keyed as part of this project.

2.3 TOOLS AND MANUALS

- A. With the delivery of permanent keys, deliver to the Owner one complete set of adjustment tools and one set of maintenance manuals for locksets, latchsets, closers and panic devices.

2.4 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 EXECUTION

3.1 DELIVERIES

- A. Stockpile items sufficiently in advance to assure their availability, and make necessary deliveries in a timely manner to assure orderly progress of the total work.

3.2 COORDINATION

- A. Coordinate as necessary with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Upon completion of the Work, and as a condition of its acceptance, provide the inspection, adjustment and report described in Article 1.2 above.

3.3 FINISH HARDWARE SCHEDULE

- A. Furnish the following hardware groups in the amounts indicated on the Drawings.
 - 1. This material shall be furnished by a firm regularly engaged in supplying Finishing Hardware for commercial, industrial and institutional construction and have in their employ at least one qualified Hardware Consultant that is a regular member in good standing of the American Society of Architectural Hardware Consultants. This supplier shall have an office and stocking warehouse within 100 miles of the project with inventory to service the job and be available to later service the Owner.
 - 2. This supplier shall furnish and deliver to the General Contractor, at the job site, all Finishing Hardware required for the complete construction of this Building with the exception of certain items of Hardware which are specifically noted herein as being furnished by others.
 - 3. All Finishing Hardware shall be in accordance with the Architectural Plans of the Building and schedules included in this specifications.
 - 4. It is the intent of this schedule of openings to specify necessary Finishing Hardware for each and every opening. should any opening be omitted or any Hardware that is obviously necessary for the completion of this Building, Hardware of equal quality and design as specified for a similar opening shall be used. The Hardware supplier will be expected to furnish Hardware for all openings and not extras will be allowed for Hardware not covered in attached schedule.
 - 5. All numbers, types and design of Hardware are taken from the catalogs as shown at end of schedule, unless otherwise noted. hardware of equal quality and design of other recognized manufacturers will be acceptable upon approval of the Architect.
 - 6. Hardware supplier shall furnish Architect with itemized schedule of all openings showing type, design and number of all Hardware and shall receive Architect's approval before placing orders with the Manufacturers for this Hardware.
 - 7. Hardware supplier shall mark each item of hardware with item number, door number and location. He shall furnish an experienced Hardware Consultant to confer with the Architect and General Contractor when the Hardware is delivered to the job and shall be available when needed by the Architect or General Contractor. He shall make as many trips to the job as the Architect or General Contractor feels is advisable.
 - 8. Hardware supplier to accumulate and hold to ship in one shipment when requested by the Contractor. Direct shipments from factories to job site will not be permitted.
 - 9. KEYING: Locks shall be furnished with permanent factory keying, factory registered change key combination and factory registered masterkeys. Key system by distributor or other than factory will not be accepted.

FINISH HARDWARE SCHEDULE:

HW SET: H-01

DOOR NUMBER:
105

EACH TO HAVE

1 OR 2 EA CYLINDERS AS MAY BE REQUIRED
BALANCE OF HARDWARE BY DOOR AND FRAME SUPPLIER.
COORDINATE FOR CYLINDER REQUIREMENTS.

HW SET: H-02

DOOR NUMBER:
123

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	AL80PD NEP	626	SCH
1	EA	SURFACE CLOSER	1261 EDA SLIM	689	LCN
1	EA	SEALS	705EV-TEK	AL	NGP
1	EA	DOOR SWEEP	C627A-TEK	AL	NGP
1	EA	THRESHOLD	896V	AL	NGP
3	EA	SILENCER	SR64	GRY	IVE

HW SET: H-03

DOOR NUMBER:
117

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	SURFACE BOLTS	SB453-8	626	IVE
1	EA	STOREROOM LOCK	AL80PD NEP	626	SCH
2	EA	SILENCER	SR64	GRY	IVE

HW SET: H-04

DOOR NUMBER:
113 118

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	AL80PD NEP	626	SCH
1	EA	OVERHEAD STOP	450-S	630	GLY
3	EA	SILENCER	SR64	GRY	IVE

HW SET: H-05

DOOR NUMBER:
106 111

EACH TO HAVE:

4	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ELECTRONIC LOCK	CO-100-CY-70-KP-SPA-PD	626	SCE
1	EA	SURFACE CLOSER	1261 RW/PA SLIM	689	LCN
1	EA	DOME STOP	FS436	626	IVE

3	EA	SILENCER	SR64	GRY	IVE
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HW SET: H-06

DOOR NUMBER:

119	120
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EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	AL10S NEP	626	SCH
1	EA	FLOOR STOP	FS436	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: H-07

DOOR NUMBER:

101	102	104
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EACH TO HAVE:

4	EA	HINGE	5PB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE LOCK	AL53PD NEP	626	SCH
1	EA	DOMESTOP	FS436	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: H-08

DOOR NUMBER:

114	115
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EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY SET	AL40S NEP	626	SCH
1	EA	DOMESTOP	FS436	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

MISCELLANEOUS ITEMS REQUIRED:

2	EA	CHANGE KEYS PER LOCKSET / CYLINDER
6	EA	SET LOCKSETS TO EXISTING RRB GMK SYSTEM. KEY AS DIRECTED BY OWNER

MANUFACTURERS USED:

EQUALS PRODUCTS

HINGES:	IVES	BOMMER(BB5000,5000), MCKINNEY (TB2714 2714)
LOCKSETS:**	SCHLAGE	FALCON (B), SARGENT (7 Line)
**Locksets must accept Schlage KIL Cylinders – Set to existing keying. Hardware supplier to provide keyed cylinders.		
KEYED CYLINDERS	SCHLAGE	SET TO EXISTING KEY SYSTEM.
ELECTRONIC LOCKSETS:	SCHLAGE	SARGENT (KP10G77), ALARM LOCK (DL2700)
CLOSERS:	LCN	FALCON (SC60) CORBIN RUSSWIN(DC6000)
TRIM / AUXILLARY:	IVES	ROCKWOOD, TRIMCO
THRESHOLDS / SEALS:	N.G.P.	REESE, PEMKO

END OF SECTION

SECTION 08 80 00

GLAZING

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Provide glazing and glazing accessories where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. In addition to complying with pertinent codes and regulations of governmental agencies having jurisdiction, comply with pertinent recommendations contained in:
 - 1. Flat Glass Marketing Association:
 - a. "Glazing Sealing Systems Manual"
 - b. "Glazing Manual"
- C. Glazing products by Pittsburgh Plate Glass Company and Oldcastle are acceptable. Any substitutions must be prior approved as outlined elsewhere in this Project Manual. Conform to DD-G-451 and to CPSA types, qualities and thicknesses indicated and specified.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00, Submittal Procedures for submittals and substitutions.
- B. Product data: Within 60 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to provide compliance with the specified requirements.
 - 3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.
- C. Samples: Accompanying the above product data, submit:
 - 1. Samples of each type of glass and glazing compound proposed to be used;
 - 2. Samples, at least 12" long, of each type of sealant proposed to be used, installed between samples of the material to be glazed, fully cured.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 66 00, Product Storage and Handling Requirements.
- B. During storage and handling of glass, provide cushions at edges to prevent impact damage.

PART 2 PRODUCTS

2.1 GLASS

- A. General:
 - 1. For all glass, provide the type and thickness shown on the Drawings or specified herein.
 - 2. Where type of thickness, or both, are not shown on the Drawings or specified herein, provide type and thickness directed by the Architect.
- B. Labels:
 - 1. Each piece of glass shall bear manufacturer's label showing strength, grade, thickness, type and quality. Labels must remain until glass has been set and inspected. When glass is not cut to size by manufacturer and is furnished unlabeled from local stock, submit affidavit stating quality, thickness, type and manufacturer of glass furnished.

2.2 TYPES

- 1. 1/8" mirror
- 2. 1/4" clear plate
- 3. 1/4" clear safety
- 4. 1/4" clear wire
- 5. 1/4" tinted plate
- 6. 1/4" tinted safety
- 7. 3/8" insulated, impact resistant, low e
- 8. 1" insulated impact resistant, low e, with U-Factor $\leq .26$ and SHGC $\leq .28$
- 9. 1 5/16" insulated impact resistant, low e, with U-Factor $\leq .26$ and SHGC $\leq .28$

2.3 GLAZING COMPOUND

- A. Glass installed in glazing compound of type recommended for setting required. Compound of consistency to remain in perfect condition for minimum of two years.
 - 1. Compound product of recognized manufacturer, formulated from selected processed oils and pigments shall be non-hardening and of type which does not require painting. Color selected by Architect from standard colors. Comply with FS TT-G-401.

2.4 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

- B. Clean glazing channels, stops and rabbets to receive the glazing materials, making free from obstructions and deleterious substances which might impair the work.
 - 1. Remove protective coatings which might fail in adhesion or interface with bonds of sealants.
 - 2. Comply with manufacturer's instructions for final wiping of surfaces immediately prior to application of primer and glazing compounds or tapes.
 - 3. Prime surfaces to receive glazing compounds in accordance with manufacturer's recommendations.

3.2 INSTALLATION

- A. Inspect each piece of glass immediately prior to start of installation.
 - 1. Do not install items which are improperly sized, have damaged edges, or are scratched, abraded, or damaged in any other manner.
 - 2. Do not remove labels from glass until so directed by the Architect.
 - 3. Install glass so distortion waves, if present, run in the horizontal direction.
- B. Locate setting locks at sills one quarter of the width of the glass in from each end of the glass, unless otherwise recommended by the glass manufacturer.
 - 1. Use blocks of proper size to support the glass in accordance with the manufacturer's recommendations.
 - 2. Provide spacers for all glass sizes larger than 50 united inches, to separate glass from stops; except where continuous glazing gaskets or felts are provided.
 - a. Locate spacers no more than 24" apart, and no closer than 12" to a corner.
 - b. Place spacers opposite one another.
 - c. Make bite of spacer on glass 1/4" or more.
- C. Set glass in a manner which produces the greatest possible degree of uniformity in appearance.
- D. Do not use two different glazing materials in the same joint system unless the joint use is approved in advance by the Architect.
- E. Mask, or otherwise protect, surfaces adjacent to installation of sealants.
- F. Miter-cut and seal the joints of glazing gaskets in accordance with the manufacturer's recommendations, to provide watertight and airtight seal at corners and other locations where joints are required.

3.3 PROTECTION

- A. Protect glass from breakage after installation by promptly installing streamers or ribbons, suitably attached to the framing and held free from glass. Do not apply warning markings, streamers, ribbons or other items directly to the glass except as specifically directed by the Architect.

END OF SECTION

**DIVISION NINE
FINISHES**

CONTENTS

09 29 00	Gypsum Board
09 30 00	Ceramic Tile
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09 65 00	Resilient Flooring
09 68 00	Carpeting
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SECTION 09 29 00

GYPSUM BOARD

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Provide gypsum drywall and accessories where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Sections in Division 01 of these Specifications.
 - 2. Section 06 10 00 Rough Carpentry

1.2 QUALITY ASSURANCE

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

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00, Submittal Procedures for submittals and substitutions.
- B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
 - 3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 66 00, Product Storage and Handling Requirements.

PART 2 PRODUCTS

2.1 GYPSUM WALLBOARD

- A. General:
 - 1. Provide gypsum wallboard complying with Fed. Spec. SS-L-30D, in 48" widths and in such lengths as will result in a minimum of joints.
- B. Types:
 - 1. Provide regular 5/8" gypsum wallboard, tapered edges, as indicated on the Drawings except as noted.

2. Fire-Rated Gypsum Wallboard: Provide 5/8" type "x" gypsum wallboard, ASTM-36. Typical at all fire-rated wall assemblies and at one-hour ceilings as called out in Drawings. One-hour ceiling as per Factory Mutual Design FC 172, 2-25-72.
 - a. USG FIRECODE
 - b. National Gypsum "Fire-Shield"
 - c. Approved equal.
3. Gypsum Wallboard, water-resistant, Type WR, 5/8" thickness, tapered edge, chemically treated multi-layered face and back paper and water-resistant gypsum core, typical at all ceilings in Showers, Toilets, and Soiled Utility rooms. Refer FINISH SCHEDULE for all locations of water resistant gypsum board, noted C-PGB-WR.
4. Gypsum Wallboard Exterior: Where indicated on plans at building exterior, Georgia Pacific Dens Glass 5/8" thickness, with fiberglass reinforced facing or equal product.

2.2 METAL TRIM

- A. Form from zinc-coated steel not lighter than 26 gauge, complying with Fed. Spec. QQ-S-775, Type I, Class D or E.
- B. Casing beads:
 1. Provide channel-shapes with an exposed wing, and with a concealed wing not less than 7/8" wide.
 2. The exposed wing may be covered with paper cemented to the metal, but shall be suitable for joint treatment.
- C. Corner beads: Provide angle shapes with wings not less than 7/8" wide and perforated for nailing and joint treatment, or with combination metal and paper wings bonded together, not less than 1-1/4" wide and suitable for joint treatment.
- D. Edge beads for use at perimeter of ceilings:
 1. Provide angle shapes with wings not less than 3/4" wide.
 2. Provide concealed wing perforated for nailing, and exposed wing edge folded flat.
 3. Exposed wing may be factory finished in white color.

2.3 JOINTING SYSTEM

- A. Provide a jointing system, including reinforcing tape and compound, designed as a system to be used together and as recommended for this use by the manufacturer of the gypsum wallboard approved for use on this Work.
- B. Jointing compound maybe used for finishing if so recommended by its manufacturer.

2.4 FASTENING DEVICES

- A. For fastening gypsum wallboard in place on metal studs and metal channels, use flat-head screws, shouldered, specially designed for use with power-driven tools, not less than 1" long, with self-tapping threads and self-drilling points.

2.5 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. General:
 - 1. Install the gypsum wallboard in accordance with the Drawings and with the separate boards in moderate contact but not forced into place.
 - 2. At internal and external corners, conceal the cut edges of the boards by the overlapping covered edges of the abutting boards.
 - 3. Stagger the boards so that corners of any four boards will not meet at a common point except in vertical corners.
- B. Ceilings:
 - 1. Install the gypsum wallboard to ceilings with the long dimensions of the wallboard at eight angles to the supporting members.
 - 2. Wallboard may be installed with the long dimensions parallel to supporting members that are spaced 16" on center when attachment members are provided at end joints.
- C. Walls:
 - 1. Install the gypsum wall board to studs at right angles to the furring or framing members.
 - 2. Make end joints, where required, over framing or furring members.
- D. Attaching:
 - 1. Drive the specified screws with clutch-controlled power screwdrivers, spacing the screws 12" on centers at ceilings and 16" on centers at walls.
 - 2. Where framing members are spaced 24" apart on walls, space screws 12" on centers.
 - 3. Attach double layers in accordance with the pertinent codes and the manufacturer's recommendation as approved by the Architect.
 - 4. Attach to wood as required by governmental agencies having jurisdiction.
- E. Access Doors:
 - 1. By careful coordination with the Drawings and with the trades involved, install the specified access doors where required.
 - 2. Anchor firmly into position, and align properly to achieve an installation flush with the finished surface.

3.3 JOINT TREATMENT

- A. General:
 - 1. Inspect areas to be joint treated, verifying that the gypsum wallboard fits snugly against supporting framework.
 - 2. In areas where joint treatment and compound finishing will be performed, maintain a temperature of not less than 55 degrees for 24 hours prior to commencing the treatment, and until joint and finishing compounds have dried.
 - 3. Apply the joint treatment and finishing compound by machine or hand tool.
 - 4. Provide a minimum drying time of 24 hours between coats, with additional drying time in poorly ventilated areas.

- B. Embedding compounds:
 - 1. Apply to gypsum wallboard joints and fastener heads in a thin uniform layer.
 - 2. Spread the compound not less than 3" wide at joints, center the reinforcing tape in the joint and embed the tape in the compound. Then spread a thin layer of compound over the tape.
 - 3. After this treatment has dried, apply a second coat of embedding compound to joints and fastener heads, spreading in a thin uniform coat to not less than 6" wide at joints and feather edged.
 - 4. Sandpaper between coats as required.
 - 5. When thoroughly dried dry, sandpaper to eliminate ridges and high points.
- C. Finishing compounds:
 - 1. After embedding compound is thoroughly dry and has been completely sanded, apply a coat of finishing compound to joints and fastener heads.
 - 2. Feather the finishing compound to not less than 12" wide.
 - 3. When thoroughly dry, sandpaper to obtain a uniformly smooth surface, taking care to not scuff the paper surface of the wallboard.

3.4 CORNER TREATMENT

- A. Internal corners: Treat as specified for joints, except fold the reinforcing tape lengthwise through the middle and fit neatly into the corner.
- B. External corners:
 - 1. Install the specified corner bead, fitting neatly over the corner and securing with the same type fasteners used for installing the wallboard.
 - 2. Space the fasteners approximately 6" on centers, and drive through the wallboard into the framing or furring member.
 - 3. After the corner bead has been secured into position, treat the corner with joint compound and reinforcing tape as specified for joints, feathering the joint compound out from 8" to 10" on each side of the corner.

3.5 CONTROL JOINTS

- A. Provide vertical control joints at each side of the top corner of all interior door and window frames. Control joints are to extend from top of frames to ceiling above.

3.6 OTHER METAL TRIM

- A. General:
 - 1. The Drawings do not purport to show all locations and requirements for metal trim.
 - 2. Carefully study the Drawings and the installation, and provide all metal trim normally recommended by the manufacturer of the gypsum wallboard approved for use in the Work.

3.6 CLEANING UP

- A. In addition to other requirements for cleaning, use necessary care to prevent scattering gypsum wallboard scraps and dust, and to prevent tracking gypsum and joint finishing compound onto floor surfaces.
- B. At completion of each segment of installation in a room or space, promptly pick up and remove from the working area all scrap, debris and surplus material of this Section.

END OF SECTION

SECTION 09 30 00

CERAMIC TILE

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Provide ceramic tile where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
- C. One (1) box of each type of tile to be left at job site as surplus material.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Provide manufacturer's Master Grade Certificate stating type and location of each tile material in this Section.

1.3 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI A108.1 - Installation of Ceramic Tile, A collection.
 - 2. ANSI A108.1A - Specifications for Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar.
 - 3. ANSI A108.1B - Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar.
 - 4. ANSI A108.1C - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar -or- Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar.
 - 5. ANSI A108.5 - Specifications for Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
 - 6. ANSI A108.6 - Specifications for Ceramic Tile Installed with Chemical-Resistant, Water-Cleanable Tile-Setting and -Grouting Epoxy.
 - 7. ANSI A108.7 - Specifications for Electrically Conductive Ceramic Tile Installed with Conductive Dry-Set Portland Cement Mortar.
 - 8. ANSI A108.9 - Specifications for Ceramic Tile Installed with Modified Epoxy Emulsion Mortar/Grout.
 - 9. ANSI A108.10 - Specifications for Installation of Grout in Tilework.
 - 10. ANSI A118.1 - Standard Specification for Dry-Set Portland Cement Mortar.
 - 11. ANSI A118.3 - Chemical-Resistant, Water-Cleanable, Tile-Setting and -Grouting Epoxy and Water-Cleanable Tile-Setting Epoxy Adhesive.
 - 12. ANSI A118.4 - Latex-Portland Cement Mortar.
 - 13. ANSI A118.6 - Ceramic Tile Grouts.
 - 14. ANSI A118.8 - Modified Epoxy Emulsion Mortar/Grout.
 - 15. ANSI A118.9 - Test Methods and Specifications for Cementitious Backer Units.
 - 16. ANSI A137.1 - Ceramic Tile.

- B. Tile Council of America:
 - 1. TCA - Handbook for Ceramic Tile Installation.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications and other data needed to provide compliance with the specified requirements.
 - 3. Samples of each type, class and color of ceramic tile required, not less than 12" square, mounted on plywood or hardboard backing and grouted as specified.
- C. Except when specifically exempted by the Architect, submit Master Grade Certificates for each shipment of ceramic tile prior to arrival of the shipment at the job site.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 33 00 - Submittal Procedures f

PART 2 PRODUCTS

2.1 CERAMIC TILE

- A. Restrooms: American Olean, Laurel Heights, 2" x 4", Gray Summit, LH98

2.2 SETTING METHODS

- A. Comply with pertinent recommendations contained in the Tile Council of American "Handbook for Ceramic Tile Installation".
- B. Methods and materials:
 - 1. Provide thin set method at all floor conditions, as per Tile Council of American, Inc., Specification Number F-115-88.
 - 2. Provide thin set method at all wall conditions, Tile Council of American, Inc., Specification Number W243-88.
 - 3. Upon completion of placing and grouting, clean the work of this Section in accordance with the recommendations of the manufacturers of the materials used.
 - 4. Protect metal surfaces, cast iron and vitreous items from effects of acid cleaning.
 - 5. Flush surfaces with clean water before and after cleaning.
 - 6. Provide tile surfaces clean and free from cracked, broken, chipped, unbonded and otherwise defective units.
 - 7. Provide required protection of tile surfaces until completion of project.

2.3 GROUT

- A. Grout to be MAPEL, color gray, #09.

2.4 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.
- B. Furnish and install sections of low profile ½" thick x 4" deep marble thresholds full width of doorways. Color to be selected by Architect.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. General:
 - 1. Comply with ANSI A108.5, ANSI A108.10, and the "Handbook for Ceramic Tile Installation" of the Tile Council of America, except as otherwise directed by the Architect or specified herein.
 - 2. Maintain minimum temperature limits and installation practices recommended by materials manufacturers.
 - 3. Do not install tile floors over membrane until the membrane has been tested and accepted.
- B. Limits of tile:
 - 1. Extend tile into recesses and under equipment and fixtures to form a complete covering without interruptions.
 - 2. Terminate tile neatly at obstructions, edges and corners, without disruption of pattern or joint alignment.
- C. Joining pattern:
 - 1. Lay tile in grid pattern unless otherwise indicated on the Drawings or directed by the Architect.
 - 2. Align joints when adjoining tiles on floor, base, trim and walls are the same size.
 - 3. Layout tile work, and center the tile fields both directions in each space or on each wall area.
 - 4. Adjust to minimize tile cutting.
 - 5. Provide uniform joint widths.
- D. Provide expansion and control joints where shown on the Drawings, and where otherwise recommended by the "Handbook for Ceramic Tile Installation" of the Tile Council of America, sealing in accordance with Section 07920 of these Specifications.
- E. Cleaning:
 - 1. Upon completion of placing and grouting, clean the work of this Section in accordance with recommendations of the manufacturers of the materials used.
 - 2. Protect metal surfaces, cast iron and vitreous items from effects of acid cleaning.
 - 3. Flush surfaces with clean water before and after cleaning.
- F. Provide tile surfaces clean and free from cracked, broken, chipped, unbonded and otherwise defective units.
- G. Provide required protection of tile surfaces to prevent damage and wear prior to acceptance of the Work by the Owner.

END OF SECTION

SECTION 09 51 00

ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work of this Section includes acoustical tile and support systems complete.

1.2 APPLICABLE STANDARDS

- A. Conform to applicable requirements of Standards:
1. Federal Specifications (FS):
 - a. SS-S-118A(3) - "Sound Controlling Blocks and Boards (Acoustical Tile and Panels, Prefabricated):
 2. American Society for Testing and Materials (ASTM):
 - a. C 635 - "Metal Suspension Systems for Acoustical Tiles and Lay-in Panels"
 - b. C 636 - "Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels"
 - c. E 84 - "Surface Burning Characteristics for Building Materials"
 3. Acoustical Materials Association (AMA):
 - a. "Sound Absorption Coefficients for Building Materials"
 4. Ceiling and Interior Systems Contractors Association (CISCA):
 - a. "Installation Guide"

1.3 JOB CONDITIONS

- A. Materials installed under temperature and humidity conditions closely approximating those which will exist when building is occupied. All windows and doors shall be in place and glazed. Conditions are as outlined in Job Conditions Section of current AMA Bulletin and in CISCA Installation Guide.

1.4 SAMPLES

- A. Submit representative samples in duplicate of ceiling tile (12"x12") and suspension system for approval.

1.5 QUALITY ASSURANCE

- A. For standard of quality, suspension systems products of Eastern, Donn Company and Chicago Metallic; acoustical tile products of Armstrong, U. S. Gypsum and Conwed Company. Both grid and ceiling panel must be from a single source/manufacturer.

1.6 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.

PART 2 PRODUCTS

2.1 MATERIALS (ACT - Acoustical Ceiling Tile)

- A. Acoustical Tile:
1. Armstrong, "CIRRUS High CAC" - #572, white, 24" x 24" x 7/8", angled tegular lay-in, fine texture, humidity resistant, in 15/16" exposed tee grid. CAC .40, NRC: 0.70, Class A (UL), .86 light

reflectivity, with HumiGuard Plus, BioBlock+ Anti-Microbial. Other acceptable manufacturers include USG or other approved equals.

2.2 SUSPENSION SYSTEMS

- A. Components: Main beams and cross tees, base metal and end detail, fabricated from commercial quality hot dipped galvanized steel complying with ASTM A653. Main beams and cross tees are double-web steel construction with flange type exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.
 - 1. Structural Classification: ASTM C 635 (Duty Class) duty.
 - 2. Color: white and match the actual color of the selected ceiling tile, unless noted otherwise.
 - 3. Acceptable Product: As manufactured by Armstrong World Industries, Inc. Other acceptable manufacturers include Chicago Metallic, USG, or other approved equal.
- B. High Humidity Finish: Comply with ASTM C 635 requirements for Coating Classification for Severe Environmental Performance where high humidity finishes are indicated:
 - 1. Structural classification: ASTM C 635 duty class.
- C. Suspension system shall be equal to:
 - 1. Armstrong PRELUDE ML 15/16" exposed tee grid. Acceptable manufacturers include Chicago Metallic.
- D. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.
- E. Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft temper, prestretched, with a yield stress load of at least three times design load, but not less than 12 gauge.
- F. Edge Moldings and Trim: Metal or extruded aluminum o types and profiles indicated, or if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner.
- G. Accessories: Provide other accessories as needed for a complete and finished installation.

PART 3 EXECUTION

3.1 SPECIAL REQUIREMENTS

- A. Shop and Erection Drawings: A detailed set of Shop Drawings showing complete layout of components to correlate with light fixtures and grilles will be required.

3.2 CEILING SYSTEM CONTRACTOR

- A. Materials and suspension systems installed by subcontractor thoroughly experienced in fire rated installation and approved by manufacturer.

3.3 ACOUSTICAL UNITS AND SUSPENSION SYSTEMS

- A. Installation and Suspension System: Furnish and install exposed grid system and direct attachment specified in strict accordance with standards and manufacturer's recommendations. Install to permit border units of greatest possible size. System level, straight and square; ceilings secure. Deflection maximum span 1/360 span. Where recessed troffer lights are used, provide grid components on both sides of lights. Lights securely supported from structural work above. Air outlets and lights occurring in ceilings center of grid where possible. Where located on main supports, support cut members and channel framing wired above ceiling.
 - 1. Space main beams not more than 4' on centers and 3" from parallel walls. Space wires maximum 4' each way. Secure wires to structure and wrap minimum three turns around itself at grid.
 - 2. Coordinate with electrical and mechanical work for required support and clearances.

3.4 CLEANING

- A. Contractor shall clean or replace an soiled or discolored units. Contractor shall replace any damaged or improperly installed units.

3.5 GUARANTEE

- A. Furnish Architect with regular guarantee that acoustical ceilings meet requirements of manufacturer's specifications and standards stated above.

END OF SECTION

SECTION 09 65 00

RESILIENT FLOORING

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work of this Section includes vinyl composition flooring and vinyl wall base for areas scheduled and detailed. No asbestos fibers allowed.

1.2 APPLICABLE STANDARDS

- A. Conform to applicable portions of:
 - 1. Asphalt and Vinyl Tile Institute Publications.
 - 2. Federal Specifications SS-T-312B: Tile, Floor, Asphalt, Rubber, Vinyl.
 - 3. Federal Specifications SS-W-40A: Wall Base: Rubber and Vinyl Plastic.

1.3 DELIVERY AND STORAGE

- A. Deliver materials to job in original, unopened containers, with manufacturer's brand name clearly marked thereon. Handle and store materials in accordance with manufacturer's instructions. See Section 01 66 00, Product Storage and Handling Requirements.

1.4 SAMPLES

- A. Submit representative samples in duplicate of vinyl composition tile (12"x12") and vinyl wall base for approval. See Section 01 33 00, Submittal Procedures.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Luxury Vinyl Plank
 - 1. Prestige 836DB 7.25" x 48" (dark brown wood look)
- B. Sheet Vinyl
 - 1. Mannington, Assurance III, homogeneous, slip resistant, 6'-6" sheet, Color: Riviera.
- B. Resilient base:
 - 1. Resilient base shall be FLEXCO, 024 Stone 4" cove.

PART 3 EXECUTION

3.1 PREPARATION

- A. Examine surfaces to receive materials before work is started.
- B. Correct defects which might interfere with laying resilient materials in proper manner.
- C. Starting of work construed as acceptance of conditions under which work will be done.
- D. Store materials in original packages, at temperature of not less than 70 degrees Fahrenheit for at least 24 hours prior to laying.

- E. Remove grease, dirt and other deleterious substances. Substrate must be free from holes and without high or low points.

3.2 INSTALLATION - ADHESIVES

- A. Mix and apply in accordance with manufacturer's instruction and recommendations.
- B. Prevent soiling and staining of adjacent surfaces with adhesive.
- C. Apply adhesive at rate of permit installation of flooring within working time of adhesive.

3.3 INSTALLATION - FLOORING AND BASE

- A. Install flooring in accordance with manufacturer's instructions and recommendations.
- B. Level floors, or run true to plane, to within 1/8" in six feet. Correct minor variations with underlayment. Lay tile with tight joints and straight lines. Cut to fit accurately at joining with other materials. Lay symmetrically about center line of room to avoid use of less than 1/2 tile where practicable. After floor has set sufficiently to become seated, wash with neutral cleaner. Apply one coat of high grade water emulsion wax and thoroughly buff. Restrict traffic unless floors are protected. Leave clean, smooth, free from buckles, cracks and projecting edges.
- C. Backing for base shall be dry and clean. Install base tight to wall and floor. Cement base to wall using adhesive and method recommended by manufacturer. Form in and out angles neatly from as long lengths as possible. scribe accurately to time at openings. Base must adhere tightly to walls. Leave in clean, unmarred condition, with all edges straight and level.
- D. Do not install base until flooring is complete. Straight base installed prior to carpet installation.

END OF SECTION

SECTION 09 68 00

CARPETING

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Provide carpeting and carpet accessories where shown on the Drawings, as specified herein, and as needed for complete and proper carpet installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

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

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00, Submittal Procedures.
- B. Product data: Within 60 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to provide compliance with the specified requirements;
 - 3. Shop Drawings showing location of seams and locations and types of carpet metal and accessories.
 - 4. Samples of the full range of colors and patterns of carpet and exposed accessories available from the proposed manufacturers in the specified quantities.
 - 5. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.
- C. After the Architect has selected the color and pattern, submit three samples of each specified color and pattern from the stock proposed to be installed. Secure the Architect's approval of these samples prior to installation.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 66 00, Product Storage and Handling Requirements.

PART 2 PRODUCTS

2.1 CARPET

- A. Carpet shall be Mannington Commercial, Bark II, color Walnut 85294, 24" x 24" tile, direct glue. Color to be selected by Architect.

2.2 OTHER MATERIALS

- A. Provide seam adhesive such as W. W. Henry Company No. 246, Roberts Company No. 41-0502, or an equal approved by the Architect and recommended for the purpose by the manufacturer of the proposed carpet.
- B. At intersection of carpet and floor tile, provide Mercer Plastics Company, Inc., "Custom Edge Carpet Bar No. 90", rubber, or equal, in color selected by the Architect.
- C. Concrete sealer: 35% solution of 42 deg Baume sodium silicate and non-acid penetrating agent compatible with adhesive.
- D. Provide other materials, including tackless strips, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 SURFACE PREPARATION

- A. Make substrate level and free from irregularities. Assure one constant floor height after carpet is installed, filling low spots and grinding high spots as required.

3.3 INSTALLATION

A. General:

- 1. Install in strict accordance with the manufacturer's recommendations as approved by the Architect.
- 2. Scribe the carpet accurately to vertical surfaces.
- 3. Align the lines of carpet, as woven, using no fill strips less than 6" wide, laying all carpet in the same direction unless specifically directed otherwise by the Architect.
- 4. Where carpeting is used on the walls, install as directed by the manufacturer, and trim the tip edge and exposed vertical edges with a brass cap approved by the Architect.

B. Seams:

- 1. Locate seams only where shown on the approved Shop Drawings, or where specifically otherwise approved by the Architect.
 - 2. Locate seams to the maximum extent practicable out of the way of traffic.
 - 3. Fabricate seams by the compression method, using a butt joint, and proper bead and seal.
 - 4. Make seams as inconspicuous as possible, flat, unpuckered and completely free from glue on the exposed surface.
 - 5. Do not stretch seams.
- C. In addition to the cleaning requirements stated elsewhere, thoroughly clean carpet and adjacent surfaces prior to final acceptance of the carpeted areas by the Owner.

3.4 PROTECTION

- A. Provide a heavy non-staining paper or plastic walkway as required over carpeting in direction of traffic, maintaining intact until carpeted space is accepted by the Owner.

3.5 SURPLUS MATERIAL

- A. Allow the Owner to inspect and select from scrap carpet remaining after the installation. Bundle, wrap in burlap, and deliver to the Owner the carpet scraps selected by him.

END OF SECTION

SECTION 09 90 00
PAINTING AND COATING

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Paint and finish the exterior and interior exposed surfaces listed on the Painting Schedule in Part 3 of this Section, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. Priming or priming and finishing of certain surfaces may be specified to be factory-performed or installer-performed under pertinent other Sections.
- C. Work not included:
 - 1. Unless otherwise indicated, painting is not required on surfaces in concealed areas and inaccessible areas such as furred spaces, foundation spaces, utility tunnels, pipe spaces and duct shafts.
 - 2. Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not required painting under this Section except as may be so specified.
 - 3. Do not paint moving parts of operating units; mechanical or electrical parts such as valve operators; linkages; sending devices; and motor shafts, unless otherwise indicated.
 - 4. Do not paint over required labels or equipment identification, performance rating, name, or nomenclature plates.
- D. Definitions:
 - 1. "Paint," as used herein, means coating systems materials including primers, emulsions, epoxy, enamels, sealers, fillers and other applied materials whether used as prime, intermediate, or finish coats.

1.2 QUALITY ASSURANCE

- A. Use adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Paint coordination:
 - 1. Provide finish coats which are compatible with the prime coats actually used.
 - 2. Review other Sections of these Specifications as required, verifying the prime coats to be used and assuring compatibility of the total coating system for the various substrata.
 - 3. Upon request, furnish information on the characteristics of the specific finish materials to assure that compatible prime coats are used.
 - 4. Provide barrier coats over noncompatible primers, or remove the primer and reprime as required.
 - 5. Notify the Architect in writing of anticipated problems in using the specified coating systems over prime coatings supplied under other Sections.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00, Submittal Procedures.
- B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
- C. Samples:
 - 1. Following the selection of colors and glosses by the Architect, submit samples for the Architect's review.
 - a. Provide three (3) Samples of each color and each gloss for each material on which the finish is specified to be applied.
 - b. Except as otherwise directed by the Architect, make Samples approximately 8"x10" in size.
 - c. If so directed by the Architect, submit Samples during progress of the Work in the form of actual application of the approved materials on actual surfaces to be painted.
 - 2. Revise and resubmit each Sample as requested until the required gloss, color and texture is achieved. Such Samples, when approved, will become standards of color and finish for accepting or rejecting the work of this Section.
 - 3. Do not commence to finish painting until approved Samples are on file at the job site.
 - 4. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 66 00, Product Storage and Handling Requirements.

1.5 JOB CONDITIONS

- A. Do not apply solvent-thinned paints when the temperature of surfaces to be painted and the surrounding air temperatures are below 45 degrees Fahrenheit, unless otherwise permitted by the manufacturer's printed instructions as approved by the Architect.
- B. Weather conditions:
 - 1. Do not apply paint in snow, rain, fog or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces, unless otherwise permitted by the manufacturer's printed instructions as approved by the Architect.
 - 2. Applications may be continued during inclement weather only within the temperature limits specified by the paint manufacturer as being suitable for use during application and drying periods.

1.6 EXTRA STOCK

- A. Upon completion of the work of this Section, deliver to the Owner an extra stock equaling 10% of each color, type and gloss of paint used in the Work, tightly sealing each container, and clearly labeling with contents and locations where used.

PART 2 PRODUCTS

2.1 MATERIALS - GENERAL

- A. Top grade products of well-know manufacturers, applied in strict accordance with directions and recommendation of manufacturer. Submit list of materials to be used for approval in writing.
- B. Paint materials mentioned herein are used as standard of quality. Materials equal to those of Pittsburgh Plate Glass Company, Sherwin-Williams Company, Devoe & Raynolds Company, DeSoto Company, Tnemac, Rust-o-leum Corporation and Benjamin Moore Company.
- C. Materials and workmanship must conform to requirements of the Occupational Safety and Health Act (OSHA).
- D. Undercoats and thinners:
 - 1. Provide undercoat paint produced by the same manufacturer as the finish coat.
 - 2. Use only the thinners recommended by the paint manufacturer, and use only to the recommended limits.
 - 3. Insofar as practicable, use undercoat, finish coat, and thinner material as parts of a unified system of paint finish.

2.2 COLOR SCHEDULES

- A. The Architect will prepare a color schedule with samples for guidance in painting.
- B. The Architect may select, allocate, and vary colors on different surfaces throughout the Work, subject to the following:
 - 1. Exterior work: A maximum of five (5) different colors will be used.
 - 2. Interior work: A maximum of ten (10) different pigmented colors will be used.

2.3 APPLICATION EQUIPMENT

- A. For application of the approved paint, use only such equipment as is recommended for application of the particular paint by the manufacturer of the particular paint and as approved by the Architect.
- B. Prior to use of application equipment, verify that the proposed equipment is actually compatible with the material to be applied and that integrity of the finish will not be jeopardized by use of proposed equipment.

2.4 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 MATERIALS PREPARATION

- A. General:
 - 1. Mix and prepare paint materials in strict accordance with the manufacturer's recommendations as approved by the Architect.
 - 2. When materials are not in use, store in tightly covered containers.

3. Maintain containers used in storage, mixing, and application of paint in a clean condition, free from foreign materials and residue.

B. Stirring:

1. Stir materials before application, producing a mixture of uniform density.
2. Do not stir into the material any film which may form on the surface, but remove the film and, if necessary strain the material before using.

3.3 SURFACE PREPARATION

A. General:

1. Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's recommendations as approved by the Architect.
2. Remove removable items which are in place and are not scheduled to receive paint finish; or provide surface-applied protection prior to surface preparation and painting operations.
3. Following completion of painting in each space or area, reinstall the removed items by using workmen who are skilled in the necessary trades.
4. Clean each surface to be painted prior to applying paint or surface treatment.
5. Remove oil and grease with clean cloths and cleaning solvent of low toxicity and flash paint in excess of 200 degrees Fahrenheit, prior to start of mechanical cleaning.
6. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall onto wet newly painted surfaces.

B. Preparation of wood surfaces:

1. Clean wood surfaces until free from dirt, oil and other foreign substance.
2. Smooth finished wood surfaces exposed to view, using the proper sandpaper. Where so required, use varying degrees of coarseness in sandpaper to produce a uniformly smooth and unmarred wood surface.
3. Unless specifically approved by the Architect, do not proceed with painting of wood surfaces until the moisture content of the wood is 12% or less as measured by a moisture meter approved by the Architect.
4. Remove existing painting from areas indicated to fresh surface and provide smooth wood surface for painting.

C. Preparation of metal surfaces:

1. Thoroughly clean surfaces until free from dirt, oil and grease.
2. On galvanized surfaces, use solvent for the initial cleaning, and then treat the surface thoroughly with phosphoric acid etch. Remove etching solution completely before proceeding.
3. Allow to dry thoroughly before application of paint.

3.4 PAINT APPLICATION

A. General:

1. Touch-up shop applied prime coats which have been damaged, and touch-up bare areas prior to start of finish coats application.
2. Slightly vary color of succeeding coats.
 - a. Do not apply additional coats until the completed coat has been inspected and approved.
 - b. Only the inspected and approved coats of paint will be considered in determining the number of coats applied.
3. Sand and dust between coats to remove defects visible to the unaided eye from a distance of five feet.
4. On removable panels and hinged panels, paint the back sides to match the exposed sides.

B. Drying:

1. Allow sufficient drying time between coats, modifying the period as recommended by the material manufacturer to suit adverse weather conditions.
2. Consider oil-base and oleo-resinous solvent-type paint as dry for recoating when the paint feels firm, does not deform or feel sticky under moderate pressure of the thumb, and when the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

C. Brush applications:

1. Brush out and work the brush coats onto the surface in an even film.
2. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, and other surface imperfections will not be acceptable.

D. Spray application:

1. Except as specifically otherwise approved by the Architect, confine spray application to metal framework and similar surfaces where hand brush work would be inferior.
2. Where spray application is used, apply each coat to provide the hiding equivalent of brush coats.
3. Do not double back with spray equipment to build up film thickness of two coats in one pass.

E. For completed work, match the approved Samples as to texture, color and coverage. Remove, refinish, or repaint work not in compliance with the specified requirements.

F. Miscellaneous surfaces and procedures:

1. Exposed mechanical items:
 - a. Finish electric panels, access doors, conduits, pipes, sprinkler pipes, ducts, grilles, registers, vents and items of similar nature to match the adjacent wall and ceiling surfaces, or as directed.
 - b. Paint visible duct surfaces behind vents, registers and grilles flat black.
 - c. Wash metal with solvent, prime and apply two coats of alkyd enamel.
2. Exposed pipe and duct installation:
 - a. Apply one coat of latex paint on insulation which has been sized or primed under other Sections; apply two coats on each surface when unprepared.
 - b. Match color of adjacent surfaces.
 - c. Remove band before painting, and replace after painting.
3. Hardware: Paint prime coated hardware to match adjacent surfaces.
4. Wet areas:
 - a. In toilet rooms and contiguous areas, add an approved fungicide to paints.
 - b. For oil base paints, use 1% phenolmercuric or 4% tetrachlorophenol.
 - c. For water emulsion and glue size surfaces, use 4% sodium tetrachlorophenate.
5. Interior: Use "stipple" finish where enamel is specified.
6. Exposed vents: Apply two coats of heat-resistant paint approved by the Architect.
7. 4" high exposed section of sheetrock or cmu between storefront and rubber base to be painted to match rubber base color.

3.5 PAINTING SYSTEMS

A. Exterior Steel and Iron:

1. Where rusting or mechanical damage has occurred to primer or existing finish, wire brush to bare metal and prime with Moore's Ironclad Retardo Rust Inhibitive Paint.

2. Apply one coat of "Improve Gloss Enamel" to which has been added one ounce per gallon of MilDoEnd as manufactured by the Dianol Division of Mills Pearson Corporation of St. Petersburg, Florida. Apply to film thickness of not less than 2 mils. Apply second coat to not less than same thickness as the first coat.
 - a. MilDoEnd shall be kept away from open flame, from children and animals. Do not take internally. Keep bottle closed when not in use. Observe all safety precautions required in handling toxic inflammables.

B. Exterior Paint Systems:

1. Existing Concrete Masonry Units:
 - 1st coat: S-W Pro Industrial Acrylic, B66-650 Series
 - 2nd coat: S-W Pro Industrial Acrylic, B66-650 Series
(6 mils wet, 2.1 mils dry per coat)
2. New Concrete Masonry Units:
 - 1st coat: S-W Loxon Block Surfacers, A24W200 (50-100 sq ft/gal)
 - 2nd coat: S-W Loxon Acrylic Coating, A24W300 Series
 - 3rd coat: S-W Loxon Acrylic Coating, A24W300 Series
(8 mils wet, 3.7 mils dry per coat)
3. Existing Plywood or Wood Surfaces:
 - 1st coat: Spot prime as required, S-W Exterior Latex Wood Primer B42W8041
(4 mils wet, 1.4 mils dry per coat)
 - 2nd coat: S-W Pro Industrial Acrylic, B66-650 Series
 - 3rd coat: S-W Pro Industrial Acrylic, B66-650 Series
(6 mils wet, 2.1 mils dry per coat)
4. New Plywood or Wood Surfaces:
 - 1st coat: S-W Exterior Latex Wood Primer B42W8041
(4 mils wet, 1.4 mils dry per coat)
 - 2nd coat: S-W Pro Industrial Acrylic, B66-650 Series
 - 3rd coat: S-W Pro Industrial Acrylic, B66-650 Series
(6 mils wet, 2.1 mils dry per coat)
5. Ferrous metals:
 - 1st coat: Kem Bond HS Primer, B50Z Series
 - 2nd coat: Pro Industrial Water Based Alkyd Urethane, B53-1050 Series
 - 3rd coat: Pro Industrial Water Based Alkyd Urethane, B53-1050 Series
(5 mils wet, 1.7 mils dry per coat)

C. Interior Paint Systems:

1. Ferrous metals:
 - 1st coat: S-W Pro Industrial Pro-Cryl Primer, B66-310 Series
 - 2nd coat: S-W Pro Industrial Water Based Alkyd Urethane Semi-Gloss, B53-1150 Series
 - 3rd coat: S-W Pro Industrial Water Based Alkyd Urethane Semi-Gloss, B53-1150 Series
(5 mils wet, 1.7 mils dry per coat)
2. Painted woodwork:
 - 1st coat: S-W Premium Wall and Wood Primer B28W8111
(4 mils wet, 1.8 mils dry per coat)
 - 2nd coat: S-W Pro Industrial Water Based Alkyd Urethane Semi-Gloss, B53-1150 Series
 - 3rd coat: S-W Pro Industrial Water Based Alkyd Urethane Semi-Gloss, B53-1150 Series
(5 mils wet, 1.7 mils dry per coat)

3. **Stained woodwork:**
 - 1st coat: S-W Wood Classics Oil Stain, A49 Series (450-500 sq. ft./ gal.)
 - 2nd coat: S-W Wood Classics Polyurethane Varnish, A67 Series
 - 3rd coat: S-W Wood Classics Polyurethane Varnish, A67 Series (350-400 sq. ft./ gal.)
4. **Transparent Woodwork:**
 - 1st coat: S-W Wood Classics Polyurethane Varnish, A67 Series
 - 2nd coat: S-W Wood Classics Polyurethane Varnish, A67 Series (350-400 sq. ft./ gal.)
5. **Gypsum Board- Epoxy Paint:**
 - 1st coat: S-W Pro Mar 200 Zero VOC Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry)
 - 2nd coat: S-W Pro Industrial Water Based Catalyzed Epoxy, Eg-Shel B73-360 Series
 - 3rd coat: S-W Pro Industrial Water Based Catalyzed Epoxy, Eg-Shel B73-360 Series (5 mils wet, 2 mils dry/coat)
6. **Gypsum Board- Regular Paint:**
 - 1st coat: S-W Pro Mar 200 Zero VOC Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry)
 - 2nd coat: S-W Pro Mar 200 Zero VOC Latex Eg-Shel, B20-2600 Series
 - 3rd coat: S-W Pro Mar 200 Zero VOC Latex Eg-Shel, B20-2600 Series (4 mils wet, 1.6 mils dry per coat)

*Ceilings to have flat finish.
7. **Existing Concrete Masonry Units:**
 - 1st coat: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy Eg-Shel, K45-150 Series
 - 2nd coat: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy Eg-Shel, K45-150 Series (4mils wet, 1.5 mils dry per coat)
8. **New Concrete Masonry Units:**
 - 1st coat: S-W Prep Rite Block Filler, B25W25 (75-125 sq. ft./ gal.)
 - 2nd coat: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy Eg-Shel, K45-150 Series
 - 3rd coat: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy Eg-Shel, K45-150 Series (4 mils wet, 1.8 mils dry/coat)
9. **Existing Concrete Floors-Epoxy Paint (Satin Finish)**
 - 1st Coat: S-W Armorseal 8100 Water Based Epoxy Floor Coating, B70-8160 Series
 - 2nd Coat: S-W Armorseal 8100 Water Based Epoxy Floor Coating, B70-8160 Series (5 mils wet, 2 mils dry per coat)
10. **New Concrete Floors-Epoxy Paint (Satin Finish)**
 - 1st Coat: S-W Armorseal 8100 Water Based Epoxy Floor Coating, B70-8160 Series (reduced with one pint of water per gallon)
 - 2nd Coat: S-W Armorseal 8100 Water Based Epoxy Floor Coating, B70-8160 Series
 - 3rd Coat: S-W Armorseal 8100 Water Based Epoxy Floor Coating, B70-8160 Series (5 mils wet, 2 mils dry per coat)
11. **Gypsum Board Preparation:** External angles provided with Perf-A-Trim. Per-A-Tape Cement and Perf-A-Tape Topping Cement mixed in accordance with manufacturer's recommendations. Using suitable tool or machine, thick uniform layer of Perf-A-Tape cement (embedding type), applied 3" wide applied over joint to be reinforced. Tape shall then be centered over joint and sealed into cement, leaving sufficient cement adhesive under tape to provide proper bond. Wall inside vertical corner angles shall be reinforced with reinforcing tape folded to conform to adjoining surfaces and to form a straight, true angle. Joints allowed to dry thoroughly, 24 hour minimum between each application of cement. Tape covered with topping cement, spread evenly over and slightly beyond tapered edge of board and feathered at edges. After previous

coat is dry, cover with second coat of topping cement with smooth uniform slight crown over joint and edge feathered slightly beyond preceding coat. Dimples such as nail heads shall receive three coats of cement applied as each coat of cement is applied to joints. Cemented areas sanded after each application of cement has dried. Final coat of cement and subsequent sanding shall leave gypsum board and treated areas uniformly smooth and ready for painting.

12. Concrete: Solvent-Based Concrete Sealer equal to H&C® Concrete Sealer Solid Color Solvent-Based, clear. Apply 2 coats at the application rate of 200-250 sq. ft. per gallon and apply in accordance with the manufacturer's recommendations.

END OF SECTION

**DIVISION 10
SPECIALTIES**

CONTENTS

10 28 13	Toilet Accessories
10 35 00	Flag Poles
10 44 00	Portable Fire Extinguishers
10 73 16	Canopies
10 80 00	Other Specialties

SECTION 10 28 13

TOILET ACCESSORIES

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work in this Section includes toilet and bath accessories complete.
- B. Surface mounted accessories mounted on concealed back plates. Accessories shall have concealed fastenings.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00, Submittal Procedures.
- B. Product data: Within 60 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications, catalog cuts and other data needed to demonstrate compliance with the specified requirements;
 - 3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 66 00, Product Storage and Handling Requirements.

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Approved accessories are those equal to those manufactured by Bradley, Miami-Carey, Bobrick, Hall-mack, Ketcham, American Standard and Fort Howard Paper Company.

2.2 SCHEDULE OF ACCESSORIES: Model numbers listed refer to Bobrick.

- A. Men 103 and Women 104 provide each with:
 - 1 B-6806 x 36 grab bar
 - 1 B-6806 x 42 grab bar
 - 1 B-165 2436 mirror
 - 1 B-282 coat hook

PART 3 EXECUTION

3.1 INSTALLATION

- A. Locate accessories as directed. Securely install at height as directed. Rigidly anchor and leave clean and in unmarred condition.
- B. Follow directions of manufacturer for accessory installation for concealed mounting. Use manufacturer's mounting kits.
- C. Verify all mounting heights. Where handicapped accessories are called out verify exact required height prior to installation.

END OF SECTION

SECTION 10 35 00

FLAGPOLES

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Provide flagpoles where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

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

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Product data: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to provide compliance with the specified requirements;
 - 3. Shop Drawings showing general layout, dimensions, base design and its connection to foundation, anchoring and support system and grounding system.
 - 4. Design, calculations, drawings and other data needed to secure approval of foundation from governmental agencies having jurisdiction.
 - 5. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 66 00.

PART 2 PRODUCTS

2.1 FLAGPOLES

- A. Provide flagpoles, accessories, bases and anchorage devices as complete units furnished by one manufacturer, and with the following attributes:
 - 1. Overall dimensions:
 - a. 35'-0" high, with 6" butt and 3.5" top diameter, wall thickness of .188", vertical wall mount, tapered shaft, revolving.
 - 2. Design:

- a. Uniform, straight line, cone tapered sections above cylindrical butt sections, manufactured from seamless aluminum tube of 6063-T6 alloy, heat treated and age hardened.
 - b. Taper 1" in 5'6".
 - c. Provide internal splicing, self-aligning sleeve of same material as flagpole for snug fitting, precision field joints.
3. Finish:
- a. Exposed aluminum surfaces: Satin.
 - b. Gold anodized finial ball

B. Fittings and accessories:

1. Provide VW-1 wall mount design.
2. Provide finial ball 8" in diameter of 14 gauge spun aluminum of each flagpole.
3. Provide truck assembly on each flagpole consisting of cast aluminum assembly with ball bearing non-fouling, revolving double truck.
4. Provide cast aluminum cleats, 9" long, two per flagpole, with aluminum fastenings.
5. Provide two continuous 5/16" diameter braided polypropylene halyards per flagpole, each with two bronze snaps with neoprene or vinyl covers.
6. At each cleat, provide a cast aluminum cover with hasp for padlock, staple and tamperproof screws.
7. Finish exposed surfaces to match the flagpoles.

C. Approved manufacturers:

1. Concord Industries, Inc.
2. Other manufacturers when meeting all requirements of this Section.

2.2 STRUCTURAL WALL MOUNT

- A. Coordinate installation and manufacturer wall mount bolt plates with structural drawings.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install the flagpoles and accessories in strict accordance with the manufacturer's recommendations as approved by the Architect, aligning plumb to a vertical tolerance of one in 1000 and adjusting operating components for optimum smoothness of operation.

END OF SECTION

SECTION 10 44 00

PORTABLE FIRE EXTINGUISHERS

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Provide hand-portable fire extinguishers where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00, Submittal Procedures.
- B. Product data: Within 60 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications, catalog cuts and other data needed to demonstrate compliance with the specified requirements;
 - 3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 66 00, Product Storage and Handling Requirements.

PART 2 PRODUCTS

2.1 FIRE EXTINGUISHERS

- A. At each location where shown on the Drawings, provide one (1) multi-purpose chemical fire extinguisher with UL Rating 4A-60BC, 10 lb., ABC dry chemical.
- B. Service, charge and tag each fire extinguisher not more than five calendar days prior to the Date of Substantial Completion of the Work as that date is established by the Architect.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install the work of this Section in strict accordance with the manufacturer's recommendations as approved by the Architect, anchoring all components firmly into position for long life under hard use.
- B. Fire extinguisher to be mounted on walls with standard brackets unless noted to be installed in cabinet.
- C. Where indicated to be installed in cabinet, provide J.L. Industries Division, J.N. Johnson Company, Inc. Model Number 999-2-1/2, or Larsen Manufacturing Company Number 6-AL24096R, or Elkhart Model 6-AL24096R, semi-recessed type, vertical series, white face with red letters.

END OF SECTION

SECTION 10 73 26

PROTECTIVE COVER

PART 1 - GENERAL:

1.1 Description of Work

- A. Work in this section includes furnishing and installation of post and hanger rod supported canopies as manufactured by Mapes Industries, Inc. Approved equals include Metal USA, Superior Metal Products, or other approved equals.
- B. The prefabricated protective covers are shown on drawings and details, and assembled in accordance with manufacturer instructions.
- C. For purposes of this specification, information is based on Mapes "Lumideck".

1.2 SUBMITTALS

- A. Provide shop drawings and product data as required to clearly illustrate materials and installation details. All shop drawings shall be signed and sealed by a Registered Professional Engineer, and certify design compliance with local wind speed and pressure requirements.
- B. Provide samples of aluminum finishes for roof panel and extruded support structure.

1.3 QUALITY ASSURANCE

- A. Installer: A company having a minimum of 5 years successful experience installing pre-fabricated protective covers similar in extent is required for this project.

1.4 Field Measurement

- A. Confirm dimensions prior to preparation of shop drawings when possible.
- B. Submit shop drawings showing structural components locations/positions, material dimensions and details of construction and assembly.

1.5 Delivery, Storage, Handling

- A. Deliver and store all canopy components in protected areas.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Products manufactured by Mapes Industries, Inc. are used in this specification. Other approved equals are listed in 1.1.A above.

2.2 MATERIALS

- A. Decking shall consist of an interlocking roll-formed, 2 1/2" x 12" x .032 aluminum decking as indicated on drawings.
- B. Required hat beams and 6" x 6" posts shall be extruded aluminum, alloy 6063-T6, in profile and thickness as shown on drawings.
- C. Attachment hardware shall be galvanized/zinc plated.

- D. Fascia shall be standard 8" extruded J stile (minimum .078 aluminum).
- E. Provide sealants and flashings or other non-structural items, as per manufacturer's recommendation.
- F. Standard factory finish to be clear anodized.

2.3 FABRICATION

- A. All canopies are shipped in K.D.
- B. All connections shall be mechanically assembled utilizing 3/16" fasteners with a minimum shear stress of 350 lb. Pre-welded or factory-welded connections are not acceptable.
- C. Decking shall be designed with interlocking roll-formed aluminum members.
- D. Concealed drainage. Water shall drain from covered surfaces into beams and to ground level discharge via one or more designated posts.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Prior to start of work, verify that surrounding conditions are acceptable installation of protective covers.

3.2 CONFIRM THE SURROUNDING AREA IS READY FOR THE INSTALLATION

- A. Confirm that surrounding area is ready for the canopy installation.
- B. Installer shall confirm dimensions and elevations to be as shown on drawings provided by Mapes Industries.
- C. Erection shall be performed by an approved installer and scheduled after all concrete, masonry and roofing in the area is completed.

3.3 INSTALLATION

- A. Installation shall be in strict accordance with manufacturers shop drawings. Particular attention should be given to protecting the finish during handling and erection.

3.4 After installation, entire system shall be left in a clean condition.

END OF SECTION

SECTION 10 80 00

SPECIALTIES

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work of this Section includes miscellaneous items complete.

1.2 STANDARDS

- A. Materials specified in this section have reference to specific standards, commercial standards, Federal Specification, trade association standards, individual brand names or other similar standards and shall comply with requirements of the latest editions thereof.

1.3 SHOP DRAWINGS

- A. Submit in quadruplicate, Shop Drawings and Installation Drawings and information sheets or brochures on all items listed in accordance with requirements of General Conditions.

PART 2 PRODUCTS

- 2.1 Signage: At Men Restroom 115, provide each with one ADA compliant wall sign, 9" x 6", white graphics on a blue field, with text and graphics as displayed below:



- 2.2 Signage: At Women Restroom 114, provide each with one ADA compliant wall sign, 9" x 6", white graphics on a blue field, with text and graphics as displayed below:



- 2.3 Signage: At Doors 105 and 123, provide each with one ADA compliant wall sign, 9" x 6", white graphics on a black field, with text and graphics as displayed below:



2.4 ROOF HATCH

- A. Provide and install two (2) Bilco, Type E-50 HZ, 12" insulated curb. Each to have a Bilco LU-1 safety post.
- B. Substitutions accepted with prior approval.

2.5 Fypon Exterior Moulding

- A. At exterior parapet grout entire perimeter of building, provide and install Fypon #MLD644-16 moulding.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install on the room exterior on the latch side of the door in accordance with manufacturer's recommendations and ADA requirements.
- B. Refer to Drawings for location and related trades.

END OF SECTION

**DIVISION 11
EQUIPMENT**

CONTENTS

None in this Project Manual

**DIVISION 12
FURNISHINGS**

CONTENTS

None in this Project Manual

**DIVISION 13
SPECIAL CONSTRUCTION**

CONTENTS

None in this Project Manual

**DIVISION 14
CONVEYING SYSTEMS**

CONTENTS

None in this Project Manual

**DIVISION 21
FIRE SUPPRESSION**

CONTENTS

None in this Project Manual

DIVISION 22
PLUMBING

CONTENTS

22 01 00	BASIC MECHANICAL MATERIALS AND METHODS FOR PLUMBING & HVAC
22 02 00	MOTORS FOR PLUMBING & HVAC
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22 05 53	MECHANICAL IDENTIFICATION FOR PLUMBING AND HVAC PIPING & EQUIPMENT
22 07 19	PIPE INSULATION FOR PLUMBING AND HVAC
22 11 16	DOMESTIC WATER PIPING
22 13 16	SOIL, WASTE, & VENT PIPING SYSTEM
22 42 13	PLUMBING FIXTURES

RED RIVER BANK
1918 VETERANS BOULEVARD
METAIRIE, LOUISIANA 71005

ABW PROJECT No: 2021-53

GUTH PN 3-7220

SEALS

SPECIFICATION DIVISIONS/SECTIONS PREPARED UNDER MY RESPONSIBLE SUPERVISION:

DIVISION 22 PLUMBING

DIVISION 23 HEATING, VENTILATION & AIR CONDITIONING



MICHAEL S. MIDDLETON, P.E.
MECHANICAL ENGINEER – LA LICENSE 27979

SPECIFICATION DIVISIONS/SECTIONS PREPARED UNDER MY RESPONSIBLE SUPERVISION:

DIVISION 26 ELECTRICAL

DIVISION 27 COMMUNICATIONS

DIVISION 28 ELECTRONIC SAFETY AND SECURITY



J. PATRICK FOREMAN, P.E.
ELECTRICAL ENGINEER – LA LICENSE 22378

SECTION 22 01 00

BASIC MECHANICAL MATERIALS AND METHODS FOR PLUMBING AND HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems
 - 2. Dielectric fittings
 - 3. Flexible connectors
 - 4. Sleeves
 - 5. Escutcheons
 - 6. Grout
 - 7. Mechanical demolition
 - 8. Equipment installation requirements common to equipment sections
 - 9. Painting and finishing
 - 10. Concrete bases
 - 11. Supports and anchorages
 - 12. Access panels

1.3 DEFINITIONS

- A. **Finished Spaces:** Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspace, and tunnels.
- B. **Exposed, Interior Installations:** Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. **Exposed, Exterior Installations:** Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. **Concealed, Interior Installations:** Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. **Concealed, Exterior Installations:** Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. **"Furnish":** Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. **"Install":** Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. **"Provide":** Except as otherwise defined in greater detail, the term "provide" means furnish and install, complete in every respect and ready for the intended use, as applicable in each instance.

- I. "Inspect": The term "inspect" or "inspection: when used to describe observation of the Contractor's Work by the Engineer shall mean an endeavor to guard the Owner against defects and deficiencies in the Work and to determine, in general, if the Work is being performed in a manner such that, when completed, it will be in accordance with the Contract Documents.
- J. Wiring: the term "wiring" shall include providing raceway, conductors, and cable in accordance with the requirements of Division 26.
- K. The following are industry abbreviations for plastic materials:
 - 1. ABS: Acrylonitrile-butadiene-styrene plastic.
 - 2. PVC: Polyvinyl chloride plastic.
- L. The following are industry abbreviations for rubber materials:
 - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - 2. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Dielectric fittings.
 - 2. Escutcheons.
- B. Shop Drawings: Detail fabrication and installation for metal supports and anchorage for mechanical materials and equipment.

1.5 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code-Steel."
- B. Equipment Selection: Equipment of higher electrical characteristics, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are appropriately modified. The Contractor will be responsible for any added costs for such modifications. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.
- C. Drawings: The Mechanical Drawings show the general arrangement of piping, equipment, and appurtenances, and shall be followed as closely as actual building construction and the work of other trades will permit. The Mechanical work shall conform to the requirements shown on all the Drawings. Because of the small scale of the Mechanical Drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. The Contractor shall investigate the structural and finish conditions and other building components affecting the work and shall arrange his work accordingly, providing such offsets, fittings, and accessories as may be required to meet such conditions. No extras will be approved for required additional offsets and fittings. Any offsets or additional fittings required to coordinate mechanical systems with existing conditions and other trades, or that are necessary for the complete installation of the system, including modifications to shop or off-site fabricated piping and/or ductwork, all shall be provided by the Contractor at no additional cost to the Owner.
- D. Codes and Standards: comply with the following codes. Comply with the latest edition except where indicated otherwise or a specific edition is required by the authority having jurisdiction:

1. International Building Code
2. International Mechanical Code
3. Louisiana State Plumbing Code
4. Louisiana State Energy Code
5. NFPA 70, 72, 90A, 90B, 96, and 101
6. All applicable local codes

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.
- B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.
- C. Protect flanges, fittings, and piping specialties from moisture and dirt.

1.7 COORDINATION

- A. Coordinate mechanical equipment installation with other building components and existing conditions.
- B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
- C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.
- D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.
- E. Coordinate connection of mechanical systems with exterior underground utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Costs for all utility connections shall be the Contractor's responsibility, including any connections made by the utility company.
- F. Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces.
- G. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and other concealment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by firms regularly engaged in the manufacture of products required, whose products have been in satisfactory use in similar service.

2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 22 Piping Sections and "Pipe and Fitting Material Schedule" on the Drawings for pipe, tube, and fitting materials and joining methods.**
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.**

2.3 JOINING MATERIALS

- A. Refer to individual Division 22 Piping Sections and "Pipe and Fitting Material Schedule" on the Drawings for special joining materials not listed below.**
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.**
 - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.**
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.**
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.**
 - 2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.**
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.**
- D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.**
- E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.**
- F. Brazing Filler Metals: AWS A5.8, BAg1, silver alloy.**
- G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.**
- H. Solvent Cements for Joining Plastic Piping:**
 - 1. ABS Piping: ASTM D 2235.**
 - 2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.**
 - 3. PVC to ABS Piping Transition: ASTM D 3138.**
- I. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.**

2.4 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, flanged, solder-joint, plain, or weld-neck end connections that match piping system materials and isolate joined dissimilar metals to prevent galvanic action and stop corrosion.**

- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 degrees F (107 degrees C).

2.5 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

2.6 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
 - 1. Finish: Polished chrome-plated.
- D. Split-Plate, Stamped-Steel Type: With concealed hinge, spring clips, and chrome-plated finish.
- E. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.7 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

2.8 ACCESS PANELS

- A. Access Panels (Toilet and Bath Rooms): Flush stainless steel, 180 degrees door with concealed hinges, key-actuated lock, frame and flexible anchor straps.
- B. Access Panels: (Elsewhere): Flush metal hinged access panel and frame (type as required for surface encountered), prime coat finish, and key actuated cylinder lock.
- C. Access Panels: Minimum size 12 inch x 12 inch. Locate over device to be serviced.

PART 3 - EXECUTION

3.1 MECHANICAL DEMOLITION

- A. Refer to Division 1 Sections, "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.

- B. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.
 - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - 2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.
- B. Install components with pressure rating equal to or greater than system operating pressure.
- C. Install piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.
- D. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.
- E. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- F. Install couplings according to manufacturer's written instructions.
- G. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- H. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- I. Install all buried water piping, regardless of content, a minimum of 12 inches below and 12 inches laterally from any buried electrical line. Whether in conduit or direct buried cable, this requirement shall apply regardless of voltage of the electrical line.
- J. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- K. Install piping to permit valve servicing.
- L. Install piping at indicated slopes.
- M. Install piping free of sags and bends.
- N. Install fittings for changes in direction and branch connections.
- O. Pulled-tee, extruded-tee, thread-o-let, weld-o-let, and mitered elbow connections are not acceptable, unless specifically indicated otherwise. Provide manufactured tee and elbow fittings.
- P. Install tees with removable threaded cleanout plugs at each change in direction in all condensate drain piping.

- Q. Select system components with pressure rating equal to or greater than system operating pressure.
- R. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - 1. New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: Cast-brass type with chrome-plated finish, split-casing for existing piping, and one-piece for new piping.
 - c. Insulated and Bare Piping: Split-plate, stamped-steel type with concealed hinge and spring clips.
 - d. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.
- S. Sleeves are not required for core-drilled holes.
- T. Permanent sleeves are not required for holes formed by removable PE sleeves.
- U. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - 3. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than NPS 6 (DN 150).
 - b. Steel Sheet Sleeves: For pipes NPS 6 (DN 150) and larger, penetrating interior walls.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level. Refer to Division 7 Section, "Sheet Metal Flashing and Trim" for flashing.
 - 1) Seal space outside of sleeve fittings with grout.
 - 4. Seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.
- V. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 7 Section, "Through-Penetration Firestop Systems" for materials.
- W. Verify final equipment locations for roughing-in.

3.3 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements, Division 22 Sections, and Schedules on the Drawings, specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
 - 3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - 4. PVC Nonpressure Piping: Join according to ASTM D 2855.
 - 5. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.
- J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- K. Plastic Non-Pressure Piping Gasketed Joints: Join according to ASTM D 3212.

3.4 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 - 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
 - 4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. **Manufacturer's Installation and Operating Instructions:** All equipment and material shall be installed and operated in strict accord with manufacturer's "Installation and Operating Instructions." The manufacturer's installation instructions shall become part of this Specification, and shall take precedence over and/or supplement any Specification herein and as shown and/or described on plans. All individual items of equipment and components thereof shall be 100 percent accessible for repair, removal, or replacement without functional impairment or dismantling of any adjoining major surfaces or assemblies.
- B. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- D. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- E. Install equipment to allow right of way for piping installed at required slope.
- F. Cut and drill floors, roofs, walls, partitions, ceilings, and other surfaces as required to permit installation of mechanical piping, ducts, and equipment. Perform cutting by skilled mechanics of trades involved.
- G. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.
- H. **Electrical Work:** Wherever equipment requiring electrical power connection is specified, all wiring shall be furnished and installed under Division 26 of the Specifications. Starting switches, protective devices, and other means for the operation and control of equipment shall be furnished under the various Division 22 and 23 Sections, and installed and electrically connected complete under Division 26 unless otherwise specifically noted, except that control devices that are installed in or on ducts, piping, or mechanical equipment shall be mounted under Divisions 22 and 23. If equipment is furnished requiring power wiring different from that indicated on the Electrical Drawings, the Contractor furnishing the equipment shall be responsible for any required revisions and pay any additional costs connected therewith. Wiring revisions shall be submitted to the Architect for approval prior to installation.
 - 1. Contractors furnishing items to be wired shall provide adequate wiring diagrams.
 - 2. Temperature control wiring shall be furnished and installed in raceway under Division 23 according to the requirements of Division 26, specifically Section 26 05 19, "Conductors and Cables," and Section 26 05 33, "Raceways and Boxes."

3.6 EARTHWORK

- A. Refer to Division 2 Section, "Earthwork" for excavation, trenching and backfilling.

3.7 PAINTING

- A. **Touching Up:** Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).
- B. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 Section, "Painting."
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.8 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
 2. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 3. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in Division 3.

3.9 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 5 Section, "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

3.10 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor mechanical materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

3.11 GROUTING

- A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.

- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

3.12 MISCELLANEOUS

- A. Services: Provide gas, water, sanitary sewer, and services as indicated.
- B. The Contractor shall, before submitting a proposal, verify the location, depth, size, and pressure or grade of existing main gas, water and sewer lines to which he is to make connections for services to the building and shall include in his bid the cost of any required revisions. If for any reason conditions appear that will adversely affect the proper installation and operation of the systems, such conditions shall be reported to the Architect in writing for his decision ten days prior to bid date. All connection charges, cutting and patching of paving, etc. required for connection to utility lines, including those provided by the utility company, shall be paid for or provided by the Contractor. Make provisions for metering as indicated and as required by the serving utilities. Locations of plumbing lines and point of service entrance are shown in accordance with data provided by various departments of city and/or utility companies involved. The points of connection to the utility lines are approximate only and shall be verified by each bidder. Each bidder shall include adequate funds in his bid price to cover all cost of connections to utility lines regardless of exact location, or those who make the connection, and shall hold the Owner harmless as to additional costs or extras regarding utility connections.
- C. Sewage Backwater Valves: Where the flood level rims of plumbing fixtures are below the elevation of the manhole cover of the next upstream manhole in the public sewer, such fixtures shall be protected by a backwater valve installed in the building drain, branch of the building drain or horizontal branch serving such fixtures, regardless of whether indicated on the Drawings or not. Plumbing fixtures that have flood level rims above the elevation of the manhole cover of the next upstream manhole in the public sewer shall not discharge through a backwater valve. Where such conditions are found to exist, revise piping as required to install backwater valves. Submit proposed revisions to the Architect for approval. Use of floor drains with integral backwater valves is acceptable where flood level elevations involve only floor drains and do not involve fixtures with flood level rims above the finished floor. Backwater valves shall be accessible.
- D. Access Panels: Provide access panels as indicated. In addition, provide access panels for each concealed item requiring service or adjustment that would otherwise be inaccessible whether shown or not. Access panel locations shown on drawings are approximate. Exact location shall be verified with the Architect prior to installation. Deliver access panels to trade responsible for finish surfaces in which access panels are to be installed.

END OF SECTION 22 01 00

SECTION 22 02 00

MOTORS FOR PLUMBING AND HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes basic requirements for factory-installed and field-installed motors.
- B. Related Sections include the following:
 - 1. Division 22 and 23 Sections for application of motors and reference to specific motor requirements for motor-driven equipment.

1.3 SUBMITTALS

- A. Product Data for Field-Installed Motors: For each type and size of motor, provide nameplate data and ratings; mounting arrangements; size, type, and location of winding terminations; conduit entry and ground lug locations; and information on coatings or finishes.
- B. Operation and Maintenance Data: For field-installed motors to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

1.5 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices. Provide motors that are:
 - 1. Designed and labeled for use with variable frequency controllers, and suitable for use throughout speed range without overheating.
 - 2. Matched to torque and horsepower requirements of the load.
 - 3. Matched to ratings and characteristics of supply circuit and required control sequence.

PART 2 - PRODUCTS

2.1 MOTOR CHARACTERISTICS

- A. Motors 1/2 HP and Larger: Three phase.
- B. Motors Smaller Than 1/2 HP: Single phase.
- C. Frequency Rating: 60 Hz.

- D. Voltage Rating: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.
- E. Duty: Continuous duty at ambient temperature of 105 degrees F (40 degrees C) and at altitude of 3300 feet (1005 meters) above sea level.
- F. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
- G. Enclosure: Open drip-proof, unless otherwise indicated.

2.2 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Energy-Efficient Design: All motors.
 - 1. Comply with Louisiana Energy Code.
 - 2. Comply with EPACKT.
- C. Stator: Copper windings, unless otherwise indicated.
 - 1. Multispeed motors shall have separate winding for each speed.
- D. Rotor: Squirrel cage, unless otherwise indicated.
- E. Bearings: Double-shielded, prelubricated ball bearings suitable for radial and thrust loading.
- F. Temperature Rise: Match insulation rating, unless otherwise indicated.
- G. Insulation: Class F, unless otherwise indicated.

2.3 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
 - 1. Designed with critical vibration frequencies outside operating range of controller output.
 - 2. Temperature Rise: Matched to rating for Class B insulation.
 - 3. Insulation: Class H.
 - 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
 - 5. Comply with MG1-31.

2.4 SINGLE-PHASE MOTORS

- A. Type: One of the following, to suit starting torque and requirements of specific motor application:
 - 1. Permanent-split capacitor.
- B. Shaded-Pole Motors: For motors 1/20 hp and smaller only.
- C. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

- D. Bearings: Ball type for belt-connected motors and other motors with high radial forces on motor shaft; sealed, prelubricated-sleeve type for other single-phase motors.

PART 3 - EXECUTION

3.1 MOTOR INSTALLATION

- A. Anchor each motor assembly to base, adjustable rails, or other support, arranged and sized according to manufacturer's written instructions. Attach by bolting. Level and align with load transfer link.

3.2 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
 - 1. Run each motor with its controller. Demonstrate correct rotation, alignment, and speed at motor design load.
 - 2. Test interlocks and control features for proper operation.
 - 3. Verify that current in each phase is within nameplate rating.

3.3 CLEANING

- A. After completing equipment installation, inspect unit components. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
- B. Clean motors, on completion of installation, according to manufacturer's written instructions.

END OF SECTION 22 02 00

SECTION 22 05 00

HANGERS AND SUPPORTS FOR PLUMBING AND HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes hangers and supports for mechanical system piping and equipment.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.
- B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 SUBMITTALS

- A. Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.
- B. Welding Certificates: Copies of certificates for welding procedures and operators.

1.5 QUALITY ASSURANCE

- A. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Firms regularly engaged in manufacture of supports and hangers, of types and sizes required, whose products have been in satisfactory use in similar service.

2.2 MANUFACTURED UNITS

- A. Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.
 - 1. Nonmetallic Coatings: On hangers for electrolytic protection where hangers are in direct contact with copper tubing.

2.3 MISCELLANEOUS MATERIALS

- A. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

- B. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger requirements are specified in Sections specifying equipment and systems.
- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.
- C. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30 (DN15 to DN750).
- D. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20 (DN20 to DN500).
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20 (DN20 to DN500), if longer ends are required for riser clamps.
- E. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450 degrees F (49 to 232 degrees C) piping installations.
 3. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
- F. Building Attachments: Except as otherwise indicated, provide factory-fabricated building attachments complying with ANSI/MSS SP-58, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods.
- G. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.
- H. Thermal-Hanger Shield Inserts:
1. Description: 100 psig (690 kPa) minimum, compressive-strength insulation insert encased in sheet metal shield.
 2. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with vapor barrier.
 3. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass.
 4. For Hangers and Clamped Systems: Insert and shield shall cover entire circumference of pipe.
 5. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

3.2 HANGER AND SUPPORT INSTALLATION

- A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure. All hangers for equipment and piping are to be supported from building structure even if structural enhancements to roof support is required.
- B. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping.
- C. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- D. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- E. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- F. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- G. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.
- H. Do not use wire or perforated metal to support piping, and do not support piping from other piping.
- I. Support vertical piping at each floor and roof.
- J. Insulated Piping: Comply with the following:
 - 1. All hangers and supports shall be external of insulation.
 - 2. Install MSS SP-58, Type 40 protective shields on all insulated piping. Shields shall span arc of 180 degrees.
 - 3. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2 (DN8 to DN90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
 - b. NPS 4 (DN100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
 - c. NPS 5 and NPS 6 (DN125 and DN150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
 - d. NPS 8 to NPS 14 (DN200 to DN350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.

3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor.

3.4 METAL FABRICATION

- A. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.

- B. **Field Welding:** Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and 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. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.
- C. Any vertical structural members required to form overhead attachments for hangers or equipment supports shall be located adjacent to walls and any horizontal members be adjacent to the roof structure.

3.5 ADJUSTING

- A. **Hanger Adjustment:** Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 PAINTING

- A. **Touching Up:** Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 Sections.
- B. **Galvanized Surfaces:** Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint.

END OF SECTION 22 05 00

SECTION 22 05 53

MECHANICAL IDENTIFICATION FOR PLUMBING AND HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes mechanical identification materials and devices.

1.3 SUBMITTALS

- A. Product Data: For identification materials and devices.
- B. Samples: Of color, lettering style, and graphic representation required for each identification material and device.

1.4 QUALITY ASSURANCE

- A. Comply with ASME A13.1, "Scheme for the Identification of Piping Systems" for lettering size, length of color field, colors, and viewing angles of identification devices.

1.5 SEQUENCING AND SCHEDULING

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

PART 2 - PRODUCTS

2.1 IDENTIFYING DEVICES AND LABELS

- A. General: Products specified are for applications referenced in other Division 15 Sections. If more than single type is specified for listed applications, selection is Installer's option.
- B. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.
 - 1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
 - 2. Location: Accessible and visible.
- C. Snap-On Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap-on type. Include color-coding according to ASME A13.1, unless otherwise indicated.
- D. Pipes with OD, Including Insulation, Less Than 6 Inches (150 mm): Full-band pipe markers, extending 360 degrees around pipe at each location.
- E. Pipes with OD, Including Insulation, 6 Inches (150 mm) and Larger: Either full-band or strip-type pipe markers, at least 3 times letter height and of length required for label.

- F. Lettering: Manufacturer's standard preprinted captions as selected by Engineer.
1. Arrows: Either integrally with piping system service lettering, to accommodate both directions, or as separate unit, on each pipe marker to indicate direction of flow.
- G. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive, vinyl tape, at least 3 mils (0.08 mm) thick.
1. Width: 1-1/2 inches (40 mm) on pipes with OD, including insulation, less than 6 inches (150 mm); 2-1/2 inches (65 mm) for larger pipes.
 2. Color: Comply with ASME A13.1, unless otherwise indicated.
- H. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
1. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.
 2. Thickness: 1/16 inch (2 mm), for units up to 20 sq. in. (130 sq. cm) or 8 inches (200 mm) in length, and 1/8 inch (3 mm) for larger units.
 3. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.
- I. Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:
1. Green: Cooling equipment and components.
 2. Yellow: Heating equipment and components.
 3. Brown: Energy reclamation equipment and components.
 4. Blue: Equipment and components that do not meet criteria above.
 5. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.
 6. Terminology: Match schedules as closely as possible. Include the following:
 - a. Name and plan number.
 - b. Equipment service.
 - c. Design capacity.
 - d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
 7. Size: 2-1/2 by 4 inches (65 by 100 mm) for control devices and valves; 4-1/2 by 6 inches (115 by 150 mm) for equipment.
- J. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of mechanical systems and equipment.
1. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.

PART 3 - EXECUTION

3.1 LABELING AND IDENTIFYING PIPING SYSTEMS

- A. Install pipe markers on each system. Include arrows showing normal direction of flow.
- B. Marker Type: Plastic markers, with application systems.
- C. Fasten markers on pipes and insulated pipes smaller than 6 inches (150 mm) OD by one of following methods:
 - 1. Snap-on application of pre-tensioned, semi-rigid plastic pipe marker.
- D. Fasten markers on pipes and insulated pipes 6 inches (150 mm) in diameter and larger by one of following methods:
 - 1. Laminated or bonded application of pipe marker to pipe or insulation.
 - 2. Taped to pipe or insulation with color-coded plastic adhesive tape, not less than 1-1/2 inches (40 mm) wide, lapped a minimum of 3 inches (75 mm) at both ends of pipe marker, and covering full circumference of pipe.
 - 3. Strapped to pipe or insulation with manufacturer's standard stainless-steel bands.
- E. Locate pipe markers and color bands where piping is exposed; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations according to the following:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs. Mark each pipe at branch, where flow pattern is not obvious.
 - 3. Near penetrations through walls, floors, ceilings, or nonaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced at a maximum of 50-foot (15-meters) intervals along each run. Reduce intervals to 25 feet (7.5 meters) in areas of congested piping and equipment.

3.2 EQUIPMENT SIGNS AND MARKERS

- A. Install engraved plastic-laminate signs or equipment markers on or near each major item of mechanical equipment. Include signs for the following general categories of equipment:
 - 1. Split system air conditioning units (inside and outside units)
 - 2. Packaged terminal air conditioning units
 - 3. Fans

3.3 ADJUSTING AND CLEANING

- A. Relocate mechanical identification materials and devices that have become visually blocked by work of this or other Divisions.
- B. Clean faces of identification devices and glass frames of valve charts.

END OF SECTION 22 05 53

SECTION 22 07 19

PIPE INSULATION FOR PLUMBING AND HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes preformed, rigid and flexible pipe insulation; insulating cements; field-applied jackets; accessories and attachments; and sealing compounds.
- B. Related Sections include the following:
 - 1. Division 23 Section, "Duct Insulation" for insulation for ducts and plenums.
 - 2. Division 22 Section, "Hangers and Supports" for pipe insulation shields and protection saddles.

1.3 SUBMITTALS

- A. Product Data: Identify thermal conductivity, thickness, and jackets, for each type of product indicated.
- B. Installer Certificates: Signed by the Contractor certifying that installers comply with requirements.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the U.S. Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

1.6 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 22 Section, "Hangers and Supports for Plumbing and HVAC."
- B. Coordinate clearance requirements with piping Installer for insulation application.
- C. Coordinate installation and testing of steam or electric heat tracing.

1.7 SCHEDULING

- A. Schedule insulation application after testing piping systems. Insulation application may begin on segments of piping that have satisfactory test results.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Manufacturers:** Subject to compliance with requirements, manufacturers regularly engaged in the manufacture of piping insulation products of the types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

2.2 INSULATION MATERIALS

- A. **Mineral-Fiber Insulation:** Glass fibers bonded with a thermosetting resin complying with the following:
 - 1. **Preformed Pipe Insulation:** Comply with ASTM C 547, Type 1, with factory-applied, all-purpose, vapor-retarder jacket.
 - 2. **Blanket Insulation:** Comply with ASTM C 553, Type II, without facing.
 - 3. **Fire-Resistant Adhesive:** Comply with MIL-A-3316C in the following classes and grades:
 - a. Class 1, Grade A for bonding glass cloth and tape to unfaced glass-fiber insulation, for sealing edges of glass-fiber insulation, and for bonding lagging cloth to unfaced glass-fiber insulation.
 - b. Class 2, Grade A for bonding glass-fiber insulation to metal surfaces.
 - 4. **Vapor-Retarder Mastics:** Fire- and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.
 - 5. **Mineral-Fiber Insulating Cements:** Comply with ASTM C 195.
 - 6. **Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement:** Comply with ASTM C 449/C 449M.
- B. **Flexible Elastomeric Thermal Insulation:** Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
 - 1. **Adhesive:** As recommended by insulation material manufacturer.
 - 2. **Ultraviolet-Protective Coating:** As recommended by insulation manufacturer.

2.3 FIELD-APPLIED JACKETS

- A. **PVC Jacket:** High-impact, ultraviolet-resistant PVC; 20 mils (0.5 mm) thick; pre-curved ready for shop or field cutting and installing.
 - 1. **Adhesive:** As recommended by insulation material manufacturer.
 - 2. **PVC Jacket Color:** White or gray.
- B. **Standard PVC Fitting Covers:** Factory-fabricated fitting covers manufactured from 20-mil- (0.5 mm-) thick, high-impact, ultraviolet-resistant PVC.
 - 1. **Shapes:** 45 and 90 degree, short- and long-radius elbows, tees, valves, flanges, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories for the disabled.
 - 2. **Adhesive:** As recommended by insulation material manufacturer.

2.4 ACCESSORIES AND ATTACHMENTS

- A. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, pre-sized a minimum of 8 oz./sq. yd. (270 g/sq. m).
 - 1. Tape Width: 4 inches (100 mm).
- B. Bands: 3/4 inch (19 mm) wide, in one of the following materials compatible with jacket:
 - 1. Stainless Steel: ASTM A 666, Type 304; 0.020 inch (0.5 mm) thick.
- C. Wire: 0.080 inch (2.0 mm), nickel-copper alloy; 0.062 inch (1.6 mm), soft-annealed, stainless steel; or 0.062 inch (1.6 mm), soft-annealed, galvanized steel.

2.5 VAPOR RETARDERS

- A. Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry pipe and fitting surfaces. Remove materials that will adversely affect insulation application.

3.3 GENERAL APPLICATION REQUIREMENTS

- A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.
- B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each piping system.
- C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Apply insulation with longitudinal seams at top and bottom of horizontal pipe runs.
- E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- F. Seal joints and seams with vapor-retarder mastic.
- G. Keep insulation materials dry during application and finishing.
- H. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.

- I. Apply insulation with the least number of joints practical.
- J. Apply insulation over fittings, valves, and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated. Refer to special instructions for applying insulation over fittings, valves, and specialties.
- K. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic.
 - 1. Apply insulation continuously through hangers and around anchor attachments.
 - 2. Install insert materials and apply insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by the insulation material manufacturer.
 - 3. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect the jacket from tear or puncture by the hanger, support, and shield.
- L. Insulation Terminations: For insulation application where vapor retarders are indicated, taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
- M. Apply adhesives and mastics at the manufacturer's recommended coverage rate.
- N. Apply insulation with integral jackets as follows:
 - 1. Pull jacket tight and smooth.
 - 2. Circumferential Joints: Cover with 3 inch- (75 mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip and spaced 4 inches (100 mm) o.c.
 - 3. Longitudinal Seams: Overlap jacket seams at least 1-1/2 inches (40 mm). Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches (100 mm) o.c.
 - a. Exception: Do not staple longitudinal laps on insulation having a vapor retarder.
 - 4. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to flanges, unions, valves, and fittings.
 - 5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor-retarder mastic.
- O. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and floors.
- P. Fire-Rated Wall and Partition Penetrations: Apply insulation continuously through penetrations of fire-rated walls and partitions.

3.4 MINERAL-FIBER INSULATION APPLICATION

- A. Apply insulation to straight pipes and tubes as follows:
 - 1. Secure each layer of preformed pipe insulation to pipe with wire, tape, or bands without deforming insulation materials.
 - 2. Where vapor retarders are indicated, seal longitudinal seams and end joints with vapor-retarder mastic. Apply vapor retarder to ends of insulation at intervals of 15 to 20 feet (4.5 to 6 m) to form a vapor retarder between pipe insulation segments.

3. For insulation with factory-applied jackets with vapor retarders, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by the insulation material manufacturer and seal with vapor-retarder mastic.

B. Apply insulation to flanges as follows:

1. Apply preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation segment the same as overall width of the flange and bolts, plus twice the thickness of the pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Apply canvas jacket material with manufacturer's recommended adhesive, overlapping seams at least 1 inch (25 mm), and seal joints with vapor-retarder mastic.

C. Apply insulation to fittings and elbows as follows:

1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When premolded insulation elbows and fittings are not available, apply mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire, tape, or bands.
3. Apply canvas jacket material with manufacturer's recommended adhesive, overlapping seams at least 1 inch (25 mm), and seal joints with vapor-retarder mastic.

D. Apply insulation to valves and specialties as follows:

1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When premolded insulation sections are not available, apply glass-fiber blanket insulation to valve body to thickness equal to adjoining pipe insulation. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to stainer basket without disturbing insulation.
3. Apply insulation to flanges as specified for flange insulation application.
4. Apply canvas jacket material with manufacturer's recommended adhesive, overlapping seams at least 1 inch (25 mm), and seal joints with vapor-retarder mastic.

3.5 FLEXIBLE ELASTOMERIC THERMAL INSULATION APPLICATION

A. Apply insulation to straight pipes and tubes as follows:

1. Follow manufacturer's written instructions for applying insulation.
2. Seal longitudinal seams and end joints with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

B. Apply insulation to fittings and elbows as follows:

1. Apply mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

3.6 FIELD-APPLIED JACKET APPLICATION

- A. Apply PVC jacket over all piping, fittings, valves, flanges, etc. located in equipment rooms and mechanical rooms, up to an elevation of 6'-0" above the finished floor of the space. Apply with 1 inch (25 mm) overlap at longitudinal seams and end joints. Seal with manufacturers' recommended adhesive.**

3.7 PIPING SYSTEM APPLICATIONS

- A.** Insulation materials and thicknesses are specified in schedules at the end of this Section.
- B.** Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:
 - 1.** Flexible connectors.
 - 2.** Vibration-control devices.

3.8 FIELD QUALITY CONTROL

- A.** Insulation applications will be considered defective if sample inspection reveals noncompliance with requirements. Remove defective Work and replace with new materials according to these Specifications.
- B.** Reinstall insulation and covers on fittings and valves if required to be uncovered for inspection according to these Specifications.

3.9 INSULATION APPLICATION SCHEDULE, GENERAL

- A.** Refer to insulation application schedules for required insulation materials, vapor retarders, and field-applied jackets.
- B.** Application schedules identify piping system and indicate pipe size ranges and material, thickness, and jacket requirements.

3.10 INTERIOR INSULATION APPLICATION SCHEDULE

- A.** This application schedule is for interior insulation inside both the main building and the equipment building on the roof.
- B.** Service: Domestic cold water.
 - 1.** Operating Temperature: 35 to 60 deg F (2 to 15 deg C).
 - 2.** Insulation Material: Mineral fiber.
 - 3.** Insulation Thickness: Apply the following insulation thicknesses:
 - a.** Copper Pipe, 1 Inch and Smaller: 1/2 inch.
 - b.** Copper Pipe, 1-1/4 Inches and Larger: 1 inch.
 - 4.** Field-Applied Jacket: PVC for exposed piping in Equipment Rooms.
 - 5.** Vapor Retarder Required: Yes.
 - 6.** Finish: None.
- C.** Service: Domestic hot water and hot water return.
 - 1.** Operating Temperature: 60 to 140 deg F (15 to 60 deg C).
 - 2.** Insulation Material: Mineral fiber.
 - 3.** Insulation Thickness: Apply the following thicknesses:
 - a.** Runouts up to 2 Inches and less than 12 Foot length: 1/2 inch.
 - b.** 2 Inches size and less: 1 inch.
 - c.** 2-1/2 Inches size and larger: 1-1/2 inches.

4. Field-Applied Jacket: PVC for exposed piping in Mechanical Rooms.
5. Vapor Retarder Required: No.
6. Finish: None.

D. Service: Condensate drain piping.

1. Operating Temperature: 35 to 75 deg F (2 to 24 deg C).
2. Insulation Material: Flexible elastomeric.
3. Insulation Thickness: 3/4 inch.
4. Field-Applied Jacket: None.
5. Vapor Retarder Required: Yes.
6. Finish: None.

E. Service: Refrigerant suction and vapor piping.

1. Operating Temperature: 35 to 50 deg F (2 to 10 deg C).
2. Insulation Material: Flexible elastomeric.
3. Insulation Thickness: 3/4 inch.
4. Finish: None.

3.11 EXTERIOR INSULATION APPLICATION SCHEDULE

A. This application schedule is for aboveground insulation outside the building.

B. Service: Refrigerant suction.

1. Operating Temperature: 35 to 50 deg F (2 to 10 deg C).
2. Insulation Material: Flexible elastomeric.
3. Insulation Thickness: 3/4 inch.
4. Finish: Painted with two coats of ultraviolet-protective coating.

END OF SECTION 22 07 19

SECTION 22 11 16

DOMESTIC WATER PIPING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 DESCRIPTION OF WORK

- A. Extent of domestic water piping systems work is indicated on the Drawings and schedules and by requirements of this Section.
- B. Applications for domestic water piping systems include the following:
 - 1. Domestic cold-water piping.
 - 2. Domestic hot-water piping.
- C. Refer to appropriate Division 22 Sections for insulation required in connection with domestic water piping; not work of this Section.
- D. Trenching and backfill required in conjunction with exterior water piping is specified in applicable Division 2 Sections and is included as work of this Section.

1.3 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of domestic water piping systems products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service.
- B. Plumbing Code Compliance: Comply with applicable portions of governing Plumbing Code pertaining to plumbing materials, construction, and installation of products.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's data for domestic water piping systems, materials, and products.

PART 2 - PRODUCTS

2.1 DOMESTIC WATER PIPING MATERIALS AND PRODUCTS

- A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated and scheduled. Where not indicated or scheduled, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in domestic water piping systems. Where more than one type of material or product is indicated, selection is Installer's option.

2.2 BASIC IDENTIFICATION

- A. General: Provide identification complying with Division 22 Section 22 01 00, "Basic Mechanical Materials and Methods for Plumbing and HVAC," in accordance with the following listing:

1. Water Service: Underground-type plastic line markers.

2.3 BASIC PIPE, TUBE, AND FITTINGS

- A. General: Provide pipe, tube, and fittings complying with Division 22 Section 22 01 00, "Basic Mechanical Materials and Methods for Plumbing and HVAC," in accordance with the schedule on the Drawings.

2.4 BASIC HANGERS AND SUPPORTS

- A. General: Provide hangers and supports complying with Division 22 Section 22 05 00, "Hangers and Supports for Plumbing and HVAC."

2.5 BASIC VALVES

- A. Ball Valves – 2 Inches (DN50) and Smaller: MSS SP-110, Class 150, 600 psi (4140 kPa) CWP, ASTM B 584 bronze body and bonnet, 2-piece construction; chrome-plated brass ball, standard port for 1/2 inch (DN15) valves and smaller and conventional port for 3/4 inch (DN20) valves and larger; blowout proof; bronze or brass stem; teflon seats and seals; threaded end connections.

1. Operator: Vinyl-covered steel lever handle.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equivalent:

- a. Milwaukee, BA100.
- b. Appollo, #70-100.
- c. Hammond, #8501.
- d. Nibco, #585.

- B. Gate Valves 2-1/2 Inches and Larger:

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

- a. Crane #461.
- b. Jenkins #7326.
- c. Nibco #F-619.
- d. Hammond #1R1138.

2.6 SPECIAL VALVES

- A. General: Special valves required for domestic water piping systems include the following types:

1. Interior Hose Bibb: 3/4 inch angle sill faucet, polished chrome plated, fixed wheel handle, and with vacuum breaker.
2. Exterior Sillcocks: 3/4 inch size, non-freeze type with anti-siphon backflow preventer and brass casing:

- a. Wade: Model 8600.
- b. Josam: Model Z-1321.

3. Exterior Sillcocks: For locations where wall thickness will not permit non-freeze sillcock and piping to be fully concealed, provide mild climate type with integral backflow preventer.

- a. Wade: Model 8600MT.
- b. Zurn: Model Z-1333.

2.7 TRAP SEAL PRIMER VALVES

- A. Supply-Type Trap Seal Primer Valves: ASSE 1018, water-supply-fed type, with the following characteristics. Provide where a trap primer is required by code or is shown on the Drawings.
 - 1. Manufacturers:
 - a. Precision Plumbing Products, Inc.
 - 2. 125-psig (860-kPa) minimum working pressure.
 - 3. Bronze body with atmospheric-vented drain chamber.
 - 4. Inlet and Outlet Connections: NPS 1/2 (DN 15) threaded, union, or solder joint.
 - 5. Gravity Drain Outlet Connection: NPS 1/2 (DN 15) threaded or solder joint.
 - 6. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.8 DRAIN VALVES

- A. Hose-End Drain Valves: MSS SP-110, NPS 3/4 (DN 20) ball valve, rated for 400-psig (2760-kPa) minimum CWP. Include two-piece, copper-alloy body with standard port, chrome-plated brass ball, replaceable seats and seals, blowout-proof stem, and vinyl-covered steel handle.
 - 1. Inlet: Threaded or solder joint.
 - 2. Outlet: Short-threaded nipple with ASME B1.20.7, garden-hose threads and cap.

2.9 WATER HAMMER ARRESTERS

- A. General: ASSE 1010 or PDI-WH 201, piston type with pressurized metal-tube cushioning chamber. Sizes indicated are based on ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.
 - 1. Manufacturers:
 - a. Josam Co.
 - b. Precision Plumbing Products, Inc.
 - c. Sioux Chief Manufacturing Co., Inc.
 - d. Zurn Industries, Inc.; Wilkins Div.

2.10 BACKFLOW PREVENTERS

- A. General: Provide reduced pressure, principle backflow preventers consisting of assembly, including shutoff valves on inlet and outlet and strainer on inlet. Backflow preventers shall include test cocks and pressure-differential relief valve located between two positive seating check valves and drain. Construct in accordance with ASSE Standard 1013. Include air gap and elbow for drain.
- B. Manufacturer: Subject to compliance with requirements, provide backflow preventers of one of the following:
 - 1. Febco, 825 Series
 - 2. Hersey, "Aergap" Series
 - 3. Orion, BRP
 - 4. Watts, 009 Series

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Excavating, trenching, and backfilling are specified in Division 2 Section, "Earthwork."

3.2 INSTALLATION OF DOMESTIC WATER PIPING

- A. General: Install water distribution piping in accordance with Division 22 Section 22 01 00, "Basic Mechanical Materials and Methods for Plumbing and HVAC Systems."

3.3 INSTALLATION OF PIPING SPECIALTIES

- A. Water Hammer Arresters: Install in upright position, in locations and of sizes in accordance with PDI Standard WH-201, and elsewhere as indicated.
- B. Trap Seal Primer Valves: Install trap seal primer valves with outlet pitched down toward drain tap a minimum of 1 percent and connect to floor drain, trap or inlet fitting. Adjust valve for proper flow.
- C. Install wood blocking reinforcement for wall mounting and recessed type plumbing specialties.
- D. Install individual ball type shutoff valve in water supply to trap seal primer valve and install minimum 12 inches x 12 inches access panel over valve and trap primer.

3.4 INSTALLATION OF HANGERS AND SUPPORTS

- A. Install hangers and supports in accordance with Division 22 Section 22 05 00, "Hangers and Supports."

3.5 EQUIPMENT CONNECTIONS

- A. Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes indicated, but in no case smaller than required by governing Plumbing Code.
- B. Rough-in and connect all equipment, including kitchen equipment, including any interconnecting piping. Provide stops at each item. Rough-in in accord with equipment suppliers rough-in drawings. Provide all water piping work required for equipment installation, adjust, and leave in operation according to manufacturer's recommendations.

3.6 INSTALLATION OF BACKFLOW PREVENTERS

- A. Install backflow preventers where indicated and where required by 2013 Louisiana State Plumbing Code. Locate in same room as equipment being protected. Pipe relief outlet to nearest floor drain. Include (soft disc) check valve ahead of the installation to lock in the downstream pressure as not to affect the operation pressure differential between the supply and downstream of the first check in the backflow preventer. Provide aboveground insulated enclosure where indicated.

3.7 FIELD QUALITY CONTROL

- A. Test water and hot water piping throughout hydrostatically at 150 p.s.i.g. (four hours).
- B. Repair or replace domestic water piping as required to eliminate leaks and retest as specified to demonstrate compliance.

- C. **Sterilization:** Sterilize all water lines in strict accordance with State Board of Health requirements. After flushing out, obtain approval of water sample analysis from State Board of Health and submit to Architect.

END OF SECTION 22 11 16

SECTION 22 13 16

SOIL, WASTE, AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 DESCRIPTION OF WORK

- A. Extent of soil, waste, and vent piping system work is indicated on Drawings and Schedules, and by requirements of this Section.
- B. Trenching and backfilling required in conjunction with underground drain piping is specified in applicable Division 2 Sections and is included as work of this Section.

1.3 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of piping products of types, materials, and sizes required, whose products have been in satisfactory use in similar service.
- B. Plumbing Code Compliance: Comply with applicable portions of governing Plumbing Code pertaining to plumbing materials, construction, and installation of products.
- C. ANSI Compliance: Comply with applicable American National Standards pertaining to products and installation of soil, waste, and vent piping systems.
- D. PDI Compliance: Comply with applicable Plumbing and Drainage Institute Standards pertaining to products and installation of soil, waste, and vent piping systems.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's data for soil, waste, and vent piping systems materials and products.

PART 2 - PRODUCTS

2.1 SOIL, WASTE AND VENT PIPING MATERIALS AND PRODUCTS

- A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in soil, waste, and vent piping systems. Where more than one type of materials or product is indicated, selection is Installer's option.

2.2 BASIC PIPE, TUBE AND FITTINGS

- A. General: Provide pipe, tube, and fittings complying with Division 22 Section 22 01 00, "Basic Mechanical Materials and Methods for Plumbing and HVAC," in accordance with the Schedule on the Drawings.

2.3 BASIC HANGERS AND SUPPORTS

- A. General: Provide hangers and supports complying with Division 22 Section 22 05 00, "Hangers and Supports for Plumbing and HVAC."

2.4 DRAINAGE PIPING PRODUCTS

- A. General: Provide factory-fabricated drainage piping products of size and type indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements and governing regulations.
- B. Cleanout Plugs: Cast-bronze or brass, threaded, countersunk head.
- C. Floor Cleanouts: Cast-iron body and frame; cleanout plug; adjustable round top as follows:
 - 1. Nickel-Bronze Top: Manufacturers standard cast unit of the pattern indicated:
 - a. Pattern: Exposed rim type, with recess to receive 1/8 inch thick resilient floor finish where applicable.
 - b. Pattern: Exposed rim type, with recess to receive 1 inch thick terrazzo floor finish where applicable.
 - c. Pattern: Exposed flush type, standard non-slip scored or abrasive finish.
 - d. Carpet Marker: Include approximately 1-1/4 inches diameter carpet marker for cleanouts that occur in carpeted areas.
- D. Wall Cleanouts: Cast-iron body adaptable to pipe with cast-bronze or brass cleanout plug; stainless steel cover including screws.
- E. Flashing: As approved by metal roof manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION OF SOIL, WASTE AND VENT ABOVE GROUND PIPING

- A. General: Install soil, waste, and vent piping in accordance with Division 22 Section 22 01 00, "Basic Mechanical Materials and Methods for Plumbing and HVAC," and with governing Plumbing Code.
- B. Flashing: Flash all vent penetrations through roofs as approved by roof manufacturer. Offset vents where necessary to provide 2 feet - 0 inches minimum clearance from other flashing such as outside walls, curbs, etc. All flashing shall be as approved by roofing manufacturer.

3.2 INSTALLATION OF BUILDING DRAIN PIPING

- A. General: Install underground building drains as indicated and in accordance with governing Plumbing Code. Lay underground building drains beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clean interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag-in-line and pull past each joint as it is completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops.
- B. Install soil, waste and vent piping pitched to drain at minimum slope of 1/4 inch per foot (2 percent) for piping 3 inches and smaller, and 1/8 inch per foot (1 percent) for piping 4 inches and larger.

3.3 INSTALLATION OF HANGERS AND SUPPORTS

- A. Install hangers and supports in accordance with Division 22 Section 22 05 00, "Hangers and Supports for Plumbing and HVAC."

3.4 INSTALLATION OF DRAINAGE PIPING PRODUCTS

- A. Cleanouts: Install in sanitary aboveground piping and sanitary building drain piping as indicated, as required by governing Plumbing Code; and at each change in direction of piping greater than 45 degrees; at minimum intervals of 50 feet for piping 4 inches and smaller and 100 feet for larger piping; and at base of each vertical soil or waste stack. Install floor and wall cleanout covers for concealed piping, select type to match adjacent building finish. Cleanouts shall be same size as pipe up to 4 inches and not less than 4 inches for larger pipe. All cleanouts shall be accessible. All cleanouts shall be opened, cleaned, and greased after all concrete work is completed.
- B. Outside cleanouts shall be brought up flush with finish grade or paving. Where at grade, they shall be set in 14 inches x 14 inches x 5 inches concrete pads.
- C. Inside cleanouts shall be brought up flush with floors and provided with cleanout covers or in wall with wall cleanout cover.

3.5 EQUIPMENT CONNECTIONS

- A. Piping Runouts to Fixtures: Provide soil and waste piping runouts to equipment, plumbing fixtures, and drains with approved trap of sizes indicated; but in no case smaller than required by governing Plumbing Code. Comply with equipment manufacturer's instructions where not indicated otherwise.
- B. Rough-in and connect all kitchen equipment, including any interconnecting piping. Provide waste piping to drains and any required traps or fittings. Rough-in in accord with equipment suppliers rough-in drawings. Provide all waste and vent piping work required for equipment installation, adjust, and leave in operation according to manufacturer's recommendation.

3.6 PIPING TESTS

- A. Test soil, waste, and vent piping system in accordance with requirements of governing Plumbing Code, but not less than 10 foot head water test.

END OF SECTION 22 13 16

PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 DESCRIPTION OF WORK

- A. Extent of plumbing fixtures and trim work is indicated by Drawings and Schedules, and by requirements of this Section.
- B. Types of plumbing fixtures required for the project are indicated by the Drawings and Schedules.
- C. Refer to Division 22 Sections for domestic water piping systems used in conjunction with plumbing fixtures; not work of this Section.
- D. Refer to Division 22 Sections for soil and waste piping systems used in conjunction with plumbing fixtures; not work of this Section.

1.3 QUALITY ASSURANCE

- A. Manufacturers: Provide products by one of the manufacturers listed in the Schedule on the Drawings or approved equivalent.
- B. Plumbing Fixture Standards: Comply with applicable portions of governing Plumbing Code pertaining to materials and installation of plumbing fixtures.
- C. Regulatory Requirements: Comply with requirements of CABO A117.1, "Accessible and Usable Buildings and Facilities;" Public Law 90-480, "Architectural Barriers Act;" and Public Law 101-336, "Americans with Disabilities Act;" regarding plumbing fixtures for physically handicapped people.
- D. PDI Compliance: Comply with standards established by Plumbing and Drainage Institute pertaining to plumbing fixture supports.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications for plumbing fixtures and trim, including catalog cut of each fixture type and trim item furnished, roughing-in dimensioned drawings, templates for cutting substrates, fixture carriers, and installation instructions.
- B. Maintenance Data: Submit maintenance data and parts lists for each fixture type and trim item, including instructions for care of finishes. Include this data in maintenance manual.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver plumbing fixtures individually wrapped in factory-fabricated containers.
- B. Handle plumbing fixtures carefully to prevent breakage, chipping, and scoring the fixture finish. Do not install damaged plumbing fixtures; replace and return damaged units to equipment manufacturer.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES

- A. General: Provide factory-fabricated fixtures of type, style, and material indicated. For each type fixture, provide fixture manufacturer's standard trim, carrier, seats, and valves as indicated by their published product information; either as designed and constructed, or as recommended by the manufacturer, and as required for a complete installation. Where more than one type is indicated, selection is Installer's option; but, all fixtures of same type must be furnished by single manufacturer. Where type is not otherwise indicated, provide fixtures complying with governing regulations.

2.2 MATERIALS

- A. General: Provide materials which have been selected for their surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, foundry sand holes, stains, discoloration, or other surface imperfections on finished units are not acceptable.
- B. Where fittings, trim and accessories are exposed or semi-exposed, provide bright chrome-plated or polished stainless steel units. Provide copper or brass where not exposed.
- C. Stainless Steel Sheets: Type 302/304, hardest workable temper.
 - 1. Finishes: No. 4, bright, directional polish on exposed surfaces.
- D. Vitreous China: High quality, free from fire cracks, spots, blisters, pinholes, and specks; glaze exposed surfaces.

2.3 PLUMBING FITTINGS, TRIM AND ACCESSORIES

- A. P-Traps: Include removable P-traps where drains are indicated for direct connection to drainage system.
- B. Escutcheons: Where fixture supplies and drains penetrate walls in exposed locations and within cabinets, provide chrome plated cast-brass escutcheons with set screw.
- C. Aerators: Provide aerators of types approved by Health Departments having jurisdiction.
- D. Comply with additional fixture requirements contained in fixture schedule on drawings.
- E. Floor Drains: Provide drains equivalent to that scheduled on drawings. Provide minimum top size of 5 inches for 2 inches size, 6 inches for 3 inches size, and 10 inches for 4 inches size. Include clamping ring for drains in waterproofed membrane floors. Provide drains with water passage size not smaller than outlet size.
- F. Trap Primer Valves: Refer to Division 22 Section 22 11 16, "Domestic Water Piping Systems."

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION

- A. Examine roughing-in work of domestic water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected.

- B. Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of the governing Plumbing Code pertaining to installation of plumbing fixtures.
- C. Fasten plumbing fixtures securely to indicated supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies behind or within all construction so as to be rigid and not subject to pull or push movement. Secure with bolts full size of hanger drilling, through-wall where practicable, with back plates.
- D. Provide deep seal P-trap at each floor drain. In waterproofed, membrane floors, secure waterproofing with clamping ring.

3.2 CLEAN AND PROTECT

- A. Clean plumbing fixtures of dirt and debris upon completion of installation.
- B. Protect installed fixtures from damage during the remainder of the construction period.

3.3 FIELD QUALITY CONTROL

- A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. Test floor drains for free flow. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
- B. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect. Remove cracked or dented units and replace with new units.

END OF SECTION 22 42 13

DIVISION 23
HEATING, VENTILATION, AND AIR CONDITIONING

CONTENTS

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TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 DESCRIPTION OF WORK

- A. The extent of test-adjust-balance (TAB) work is indicated by the requirements of this Section, and also by Drawings and Schedules, and is defined to include, but is not necessarily limited to, air distribution systems, and associated equipment and apparatus of HVAC work. The work consists of setting speed and volume (flow) adjusting facilities provided for the systems, recording data, conducting tests, preparing and submitting reports, and recommending modifications to the work as required by the Contract Documents.
- B. The component types of testing, adjusting and balancing specified in this Section includes the following as applied to HVAC equipment:
 - 1. Mini split system heat pump units
 - 2. Fans
 - 3. Ductwork systems
 - 4. Grilles, registers, and diffusers
 - 5. Temperature Controls
 - 6. Rooftop air conditioning units

1.3 QUALITY ASSURANCE

- A. Installer: A TAB firm with at least 3 years of successful test-adjust-balance experience on projects with testing and balancing requirements similar to those required for this project who is not the Installer of system to be tested and is otherwise independent of the project.
- B. NEBB Compliance (Option): Comply with NEBB's "Procedural Standards for Testing-Adjusting-Balancing of Environmental Systems" as applicable to HVAC air distribution systems and associated equipment and apparatus.
- C. AABC Compliance (Option): Comply with AABC's Pub. No. 12173, "National Standards for Field Measurements and Instrumentation, Total System Balanced", as applicable to HVAC air and hydronic distribution system and associated equipment and apparatus.
- D. Industry Standards: Comply with ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.) recommendations pertaining to measurements, instruments and testing, adjusting, and balancing, except as otherwise indicated.

1.4 SUBMITTALS

- A. Submit certified test report signed by the Test and Balance Supervisor who performed the TAB work.
- B. Include identification and types of instruments used and their most recent calibration date with submission of final test report.

1.5 JOB CONDITIONS

- A. Do not proceed with testing, adjusting, and balancing work until the work to be TAB'ed has been completed and is operable. Ensure that there is no latent residual work still to be completed.
- B. Do not proceed until the work scheduled for TAB'ing is clean and free from debris, dirt, and discarded building materials.

PART 2 - PRODUCTS

2.1 PATCHING MATERIALS

- A. Except as otherwise indicated, use same products as used by original Installer for patching holes in insulation, ductwork and housing which have been cut or drilled for test purposes, including access for test instruments, attaching jigs, and similar purposes.
- B. At Tester's option, plastic plugs with retainers may be used to patch drilled holes in ductwork and housings.

2.2 TEST INSTRUMENTS

- A. Utilize test instruments and equipment for the TAB work required, of the type, precision, and capacity as recommended in the following TAB standards:
 - 1. NEBB's Procedural Standards for Testing-Adjusting-Balancing of Environmental Systems.
 - 2. AABC's National Standards for Field Measurements and Instrumentation, Total Balance System.

PART 3 - EXECUTION

3.1 GENERAL

- A. Tester must examine the installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned and is operable. Notify the Contractor in writing of conditions detrimental to the proper completion of the test-adjust-balance work.
- B. Do not proceed with the TAB work until unsatisfactory conditions have been corrected in a manner acceptable to the Tester.
- C. Test, adjust and balance the environmental systems and components, as indicated, in accordance with the procedures outlined in applicable standards. In addition perform the following:
 - 1. Test all safety devices for proper operation.
 - 2. Adjust gas burners and gas inputs per manufacturer's recommendations.
 - 3. Calibrate temperature control systems and adjust heat anticipators per manufacturer's recommendations.
 - 4. Test smoke detector as recommended by manufacturer.
- D. Test, adjust and balance system during the summer for air conditioning systems and during winter for heating systems, including at least a period of operation at outside conditions within 5 degrees F wet bulb temperature of maximum summer design condition, and within 10 degrees F dry bulb temperature of minimum winter design condition. When seasonal operation does not permit measuring the final temperatures then take the final temperature readings when the seasonal operation does permit.

- E. Prepare report of test results, including instrumentation calibration reports, in format recommended by the applicable standards. In addition certify that safety devices have been checked and are operating properly, that gas inputs and gas burners have been adjusted in accord with manufacturer's recommendations, that temperature control systems have been calibrated and are operating properly, that smoke detector is operating properly, and that heat anticipators have been adjusted in accord with manufacturer's recommendations.
- F. Patch holes in insulation, ductwork, and housings, which have been cut or drilled for test purposes, in a manner recommended by the original Installer.
- G. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings at completion of TAB work. Provide markings with paint or other suitable permanent identification materials.
- H. Prepare a report of recommendations for correcting unsatisfactory HVAC performances when system cannot be successfully balanced.
- I. Retest, adjust, and balance system subsequent to significant system modifications or if report is unsatisfactory, and resubmit test results. Repeat until satisfactory results are obtained.

END OF SECTION 23 05 93

DUCT INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes semi-rigid and flexible duct, and plenum insulation; insulating cements; accessories and attachments; and sealing compounds.
- B. Related Sections include the following:
 - 1. Division 22 - Section 22 07 19, "Pipe Insulation for HVAC and Plumbing," for insulation for piping systems.

1.3 SUBMITTALS

- A. Product Data: Identify thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.
- B. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

1.6 COORDINATION

- A. Coordinate clearance requirements with duct Installer for insulation application.

1.7 SCHEDULING

- A. Schedule insulation application after testing duct systems. Insulation application may begin on segments of ducts that have satisfactory test results.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Mineral-Fiber Insulation:
 - a. CertainTeed Manson.
 - b. Knauf FiberGlass GmbH.
 - c. Owens-Corning Fiberglas Corp.

2.2 INSULATION MATERIALS

- A. Mineral-Fiber Board Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IB, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.
- B. Mineral-Fiber Blanket Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.
- C. Ceramic Fiber or Silicate Wool Flexible Fireproofing Wrap: Foil encapsulated, non-combustible 2000 degrees F (1093 degrees C) rated, low biopersistence flexible fireproofing wrap specifically tested to provide 2 hour fire rated enclosure for horizontal and vertical commercial kitchen grease and air ventilation ducts. Core blanket chemistry of alkaline-earth silicate wool free of binders and lubricants. Comply with OPL FS 587F, UL C-AJ-7098, ASTM #84/UL 723.

2.3 ACCESSORIES AND ATTACHMENTS

- A. Weld-Attached Anchor Pins and Washers: Copper-coated steel pin for capacitor-discharge welding and galvanized speed washer. Pin length sufficient for insulation thickness indicated.
 1. Welded Pin Holding Capacity: 100 lb (45 kg) for direct pull perpendicular to the attached surface.
- B. Adhesive-Attached Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.
 1. Adhesive: Recommended by the anchor pin manufacturer as appropriate for surface temperatures of ducts, plenums, and breechings; and to achieve a holding capacity of 100 lb (45 kg) for direct pull perpendicular to the adhered surface.
- C. Self-Adhesive Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.

2.4 VAPOR RETARDERS

- A. Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL APPLICATION REQUIREMENTS

- A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of ducts and fittings.
- B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each duct system.
- C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.
- E. Keep insulation materials dry during application and finishing.
- F. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.
- G. Apply insulation with the least number of joints practical.
- H. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
- I. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments.
- J. Insulation Terminations: For insulation application where vapor retarders are indicated, seal ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
- K. Apply insulation with integral jackets as follows:
 - 1. Pull jacket tight and smooth.
 - 2. Joints and Seams: Cover with tape and vapor retarder as recommended by insulation material manufacturer to maintain vapor seal.
 - 3. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- L. Cut insulation according to manufacturer's written instructions to prevent compressing insulation to less than 75 percent of its nominal thickness.
- M. Install vapor-retarder mastic on ducts and plenums scheduled to receive vapor retarders.
 - 1. Ducts with Vapor Retarders: Overlap insulation facing at seams and seal with vapor-retarder mastic and pressure-sensitive tape having same facing as insulation. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-retarder seal.
 - 2. Ducts without Vapor Retarders: Overlap insulation facing at seams and secure with outward clinching staples and pressure-sensitive tape having same facing as insulation.

- N. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions.

3.4 MINERAL-FIBER INSULATION APPLICATION

- A. Blanket Applications for Ducts and Plenums: Secure blanket insulation with anchor pins and speed washers.

1. Install anchor pins and speed washers on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On the underside of ducts over 24 inches wide spaced 3 inches maximum from the butt joint.
 - b. Do not over-compress insulation during installation.
2. Impale insulation over anchors and attach speed washers.
3. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation segment with 1/2 inch (13 mm) staples, 1 inch (25 mm) o.c., and cover with pressure-sensitive tape having same facing as insulation.
5. Overlap unfaced blankets a minimum of 2 inches (50 mm) on longitudinal seams and end joints. Secure with steel band at end joints and spaced a maximum of 18 inches (450 mm) o.c.
6. Apply insulation on rectangular duct elbows and transitions with a full insulation segment for each surface. Apply insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond the insulation surface with 6 inch (150 mm) wide strips of the same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with anchor pins spaced 6 inches (150 mm) o.c.
8. Apply vapor-retarder mastic to open joints, breaks, and punctures for insulation indicated to receive vapor retarder.

- B. Board Applications for Ducts and Plenums: Secure board insulation with adhesive and anchor pins and speed washers.

1. Apply adhesive according to manufacturer's recommended coverage rates per square foot, spotted to assist installation.
2. Space anchor pins as required to secure insulation starting 3 inches maximum from the butt joints.
3. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation segment with 1/2 inch (13 mm) staples, 1 inch (25 mm) o.c., and cover with pressure-sensitive tape having same facing as insulation.
5. Apply insulation on rectangular duct elbows and transitions with a full insulation segment for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Apply insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond the insulation surface with 6 inch (150 mm) wide strips of the same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with anchor pins spaced 6 inches (150 mm) o.c.
7. Apply vapor-retarder mastic to open joints, breaks, and punctures for insulation indicated to receive vapor retarder.

3.5 DUCT SYSTEM APPLICATIONS

- A. Insulation materials and thicknesses are specified in schedules at the end of this Section.
- B. Materials and thicknesses for systems listed below are specified in Schedules at the end of this Section.
- C. Insulate the following plenums and duct systems:
 - 1. Indoor concealed supply-, return-, and outside-air ductwork.
 - 2. Indoor exposed supply-, return-, and outside-air ductwork.

3.6 INDOOR DUCT AND PLENUM APPLICATION SCHEDULE

- A. Service: Supply-air, return-air, and outside-air ducts, concealed.
 - 1. Material: Mineral-fiber blanket.
 - 2. Thickness: 2 inches (50 mm).
 - 3. Number of Layers: One.
 - 4. Vapor Retarder Required: Yes.
- B. Service: Supply-air, return-air, and outside-air ducts, exposed.
 - 1. Material: Mineral-fiber board.
 - 2. Thickness: 1-1/2 inch.
 - 3. Number of Layers: One.
 - 4. Vapor Retarder Required: Yes.

END OF SECTION 23 07 13

CONDENSATE DRAIN PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes piping for drain lines and condensate drain piping.
- B. Related Sections include the following:
 - 1. Division 22 Section 22 01 00, "Basic Mechanical Materials and Methods for Plumbing and HVAC," for general piping materials and installation requirements.
 - 2. Division 22 Section 22 05 00, "Hangers and Supports for Plumbing and HVAC," for pipe supports, product descriptions, and installation requirements. Hanger and support spacing is specified in this Section.

1.3 COORDINATION

- A. Coordinate layout and installation of drain piping and suspension system components with other construction, including natural gas piping system.
- B. Coordinate piping installation with roof curbs, equipment supports, and roof penetrations.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. General: Refer to Piping and Fitting Material Schedule on the Drawings for applications of pipe and fitting materials.

PART 3 - EXECUTION

3.1 PIPING INSTALLATIONS

- A. Refer to Division 22 Section 22 01 00, "Basic Mechanical Materials and Methods for Plumbing and HVAC," for basic piping installation requirements.
- B. Install drains, consisting of a tee fitting, threaded nipple with threaded cap for system cleanout. Provide cleanout at each change in direction and at connection to unit.
- C. Install piping at a uniform grade of 0.2 percent downward in direction of flow.
- D. Increase/reduce pipe sizes using eccentric reducer fitting installed with level side down.
- E. Unless otherwise indicated, install branch connections to mains using tee fittings in main pipe.

3.2 HANGERS AND SUPPORTS

- A. Supports are specified in Division 22 Section 22 05 00, "Hangers and Supports for Plumbing and HVAC."
- B. Install supports for steel piping with the following maximum spacing and with continuous slope from unit connection to drain line termination.
 - 1. NPS 3/4 (DN 20): Maximum span, 5 feet (1.5 meters).
 - 2. NPS 1 (DN 25): Maximum span, 6 feet (1.8 meters).
 - 3. NPS 1-1/2 (DN 40): Maximum span, 8 feet (2.4 meters).
 - 4. NPS 2 (DN 50): Maximum span, 8 feet (2.4 meters).
 - 5. NPS 2-1/2 (DN 65): Maximum span, 9 feet (2.7 meters).
 - 6. NPS 3 (DN 80): Maximum span, 10 feet (3 meters).

3.3 PIPE JOINT CONSTRUCTION

- A. Refer to Division 22 Section 22 01 00, "Basic Mechanical Materials and Methods for Plumbing and HVAC," and schedule on the Drawings for joint construction requirements for soldered and brazed joints in copper tubing.

3.4 TERMINAL EQUIPMENT CONNECTIONS

- A. Size for piping connections shall be same as for equipment connections. Increase pipe size at connection as indicated on Drawings.

3.5 CLEANING

- A. Flush drain piping systems with clean water.

END OF SECTION 23 17 16

23 23 00

REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 23 63 13 "Split System Air Conditioning Units."

1.2 SUMMARY

- A. This Section includes refrigerant piping used for air-conditioning applications.

1.3 PERFORMANCE REQUIREMENTS

- A. Line Test Pressure for Refrigerant R-410A:
 - 1. Suction Lines for Air-Conditioning Applications: 300 psig (2068 kPa).
 - 2. Liquid Lines: 535 psig (3689 kPa).

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data, for the following:
 - 1. Thermostatic expansion valves.
 - 2. Solenoid valves.
 - 3. Filter dryers.
 - 4. Strainers.
 - 5. Pressure-regulating valves.
- B. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment.
 - 1. Shop Drawing Scale: 1/4 inch equals 1 foot (1:50).
 - 2. Refrigerant piping indicated on Drawings is schematic only. Size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
- B. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."
- C. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.8 PRODUCT STORAGE AND HANDLING

- A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

1.9 COORDINATION

- A. Coordinate size and location of concrete pads and, equipment supports.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

- A. Copper Tube: ASTM B 88, Type K or L.
- B. Wrought-Copper Fittings: ASME B16.22.
- C. Wrought-Copper Unions: ASME B16.22.
- D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.
- E. Brazing Filler Metals: AWS A5.8.
- F. Flexible Connectors:
 - 1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
 - 2. End Connections: Socket ends.
 - 3. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7-inch- (180-mm-) long assembly.
 - 4. Pressure Rating: Factory test at minimum 500 psig (3450 kPa).
 - 5. Maximum Operating Temperature: 250 deg F (121 deg C).
- G. Flexible Connectors:
 - 1. Body: Stainless-steel bellows with woven, flexible, stainless-steel-wire-reinforced protective jacket
 - 2. End Connections:
 - a. NPS 2 (DN 50) and Smaller: With threaded-end connections.
 - b. NPS 2-1/2 (DN 65) and Larger: With flanged-end connections.
 - 3. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7-inch- (180-mm-) long assembly.
 - 4. Pressure Rating: Factory test at minimum 500 psig (3450 kPa).
 - 5. Maximum Operating Temperature: 250 deg F (121 deg C).

2.2 VALVES AND SPECIALTIES

- A. Service Valves:
 - 1. Body: Forged brass with brass cap including key end to remove core.

2. Core: Removable ball-type check valve with stainless-steel spring.
 3. Seat: Polytetrafluoroethylene.
 4. End Connections: Copper spring.
 5. Working Pressure Rating: 500 psig (3450 kPa).
- B. Solenoid Valves: Comply with ARI 760 and UL 429; listed and labeled by an NRTL.
1. Body and Bonnet: Plated steel.
 2. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
 3. Seat: Polytetrafluoroethylene.
 4. End Connections: Threaded.
 5. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch (16-GRC) conduit adapter, and 24-V ac coil.
 6. Working Pressure Rating: 400 psig (2760 kPa).
 7. Maximum Operating Temperature: 240 deg F (116 deg C).
 8. Manual operator.
- C. Straight-Type Strainers:
1. Body: Welded steel with corrosion-resistant coating.
 2. Screen: 100-mesh stainless steel.
 3. End Connections: Socket or flare.
 4. Working Pressure Rating: 500 psig (3450 kPa).
 5. Maximum Operating Temperature: 275 deg F (135 deg C).
- D. Moisture/Liquid Indicators:
1. Body: Forged brass.
 2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
 3. Indicator: Color coded to show moisture content in ppm.
 4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
 5. End Connections: Socket or flare.
 6. Working Pressure Rating: 500 psig (3450 kPa).
 7. Maximum Operating Temperature: 240 deg F (116 deg C).
- E. Replaceable-Core Filter Dryers: Comply with ARI 730.
1. Body and Cover: Painted-steel shell with ductile-iron cover, stainless-steel screws, and neoprene gaskets.
 2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
 3. Desiccant Media: Activated alumina.
 4. Designed for reverse flow (for heat-pump applications).
 5. End Connections: Socket.
 6. Access Ports: NPS 1/4 (DN 8) connections at entering and leaving sides for pressure differential measurement.
 7. Maximum Pressure Loss: 2 psig (14 kPa).
 8. Working Pressure Rating: 500 psig (3450 kPa).
 9. Maximum Operating Temperature: 240 deg F (116 deg C).
 10. Locking mechanism to prevent huffing.

2.3 REFRIGERANTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Atofina Chemicals, Inc.
 2. DuPont Company; Fluorochemicals Div.
 3. Honeywell, Inc.; Genetron Refrigerants.
 4. INEOS Fluor Americas LLC.
- B. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-410A

- A. Suction Lines NPS 4 (DN 100) and Smaller for Conventional Air-Conditioning Applications: Copper, Type L, drawn-temper tubing and wrought-copper fittings with soldered joints.
- B. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications: Copper, Type L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed.
- C. Safety-Relief-Valve Discharge Piping: Copper, Type L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed joints.

3.2 VALVE AND SPECIALTY APPLICATIONS

- A. Install service valves for gage taps at inlet and outlet of hot-gas bypass valves and strainers if they are not an integral part of valves and strainers.
- B. Install solenoid valves upstream from each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at top.
- C. Install thermostatic expansion valves as close as possible to distributors on evaporators.
 - 1. Install valve so diaphragm case is warmer than bulb.
 - 2. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.
 - 3. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.
- D. Install safety relief valves where required by ASME Boiler and Pressure Vessel Code. Pipe safety-relief-valve discharge line to outside according to ASHRAE 15.
- E. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.
- F. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for device being protected:
 - 1. Solenoid valves.
 - 2. Thermostatic expansion valves.
 - 3. Hot-gas bypass valves.
 - 4. Compressor.
- G. Install filter dryers in liquid line between compressor and thermostatic expansion valve, and in the suction line at the compressor.
- H. Install flexible connectors at compressors.

3.3 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.
- B. Install refrigerant piping according to ASHRAE 15.
- C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping adjacent to machines to allow service and maintenance.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Select system components with pressure rating equal to or greater than system operating pressure.
- J. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- K. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Section 08311 "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.
- L. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.
- M. Slope refrigerant piping as follows:
 - 1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
 - 2. Install horizontal suction lines with a uniform slope downward to compressor.
 - 3. Install traps and double risers to entrain oil in vertical runs.
 - 4. Liquid lines may be installed level.
- N. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.
- O. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.
- P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 15050 - Basic Mechanical Material and Methods.

3.4 PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.
- D. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 - 1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
 - 2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.
- F. Steel pipe can be threaded, but threaded joints must be seal brazed or seal welded.
- G. Welded Joints: Construct joints according to AWS D10.12/D10.12M.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.5 HANGERS AND SUPPORTS

- A. Hanger, support, and anchor products are specified in Section 23 05 05 "Hangers and Supports for HVAC Piping and Equipment."

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet (6 m) long.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet (6 m) or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 1/2 (DN 15): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
2. NPS 5/8 (DN 18): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
3. NPS 1 (DN 25): Maximum span, 72 inches (1800 mm); minimum rod size, 1/4 inch (6.4 mm).
4. NPS 1-1/4 (DN 32): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
5. NPS 1-1/2 (DN 40): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
6. NPS 2 (DN 50): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
7. NPS 2-1/2 (DN 65): Maximum span, 108 inches (2700 mm); minimum rod size, 3/8 inch (9.5 mm).
8. NPS 3 (DN 80): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (9.5 mm).
9. NPS 4 (DN 100): Maximum span, 12 feet (3.7 m); minimum rod size, 1/2 inch (13 mm).

D. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 2 (DN 50): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (9.5 mm).
2. NPS 2-1/2 (DN 65): Maximum span, 11 feet (3.4 m); minimum rod size, 3/8 inch (9.5 mm).
3. NPS 3 (DN 80): Maximum span, 12 feet (3.7 m); minimum rod size, 3/8 inch (9.5 mm).
4. NPS 4 (DN 100): Maximum span, 14 feet (4.3 m); minimum rod size, 1/2 inch (13 mm).

E. Support multifloor vertical runs at least at each floor.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.
 - a. Fill system with nitrogen to the required test pressure.
 - b. System shall maintain test pressure at the manifold gage throughout duration of test.
 - c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
 - d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.7 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers (67 Pa). If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig (14 kPa).
4. Charge system with a new filter-dryer core in charging line.

3.8 ADJUSTING

- A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.
- B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.
- C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.
- D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:
 1. Open shutoff valves in condenser water circuit.
 2. Verify that compressor oil level is correct.
 3. Open compressor suction and discharge valves.
 4. Open refrigerant valves except bypass valves that are used for other purposes.
 5. Check open compressor-motor alignment and verify lubrication for motors and bearings.
- E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION 23 23 00

METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes metal ducts for supply, return, outside, and exhaust air-distribution systems in pressure classes from minus 1- to plus 2-inch wg (minus 500 to plus 2500 Pa). Metal ducts include the following:
 - 1. Single-wall rectangular ducts and fittings.
 - 2. Single-wall, round, longitudinal seams and fittings.
- B. Related Sections include the following:
 - 1. Division 23 Section 23 33 00, "Ductwork Accessories," for dampers, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 SYSTEM DESCRIPTION

- A. Duct system design, as indicated, has been used to select size and type of air-moving and -distribution equipment and other air system components. Changes to layout or configuration of duct system must be specifically approved in writing by Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

1.4 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code–Steel," for hangers and supports and AWS D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- B. Codes and Standards:
 - 1. SMACNA Standards: "HVAC Duct Construction Standards, Metal and Flexible."
 - 2. International Mechanical Code.
 - 3. International Building Code.
- C. NFPA Compliance:
 - 1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
 - 2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- D. Comply with NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations," for range hood ducts, unless otherwise indicated.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

- A. Comply with SMACNA's, "HVAC Duct Construction Standards–Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 (Z180) coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.
- C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.
- D. Tie Rods: Galvanized steel, 1/4 inch (6 mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8 inch (10 mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.2 SEALANT MATERIALS

- A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.
- B. Joint and Seam Tape: 2 inches (50 mm) wide; glass-fiber-reinforced fabric.
- C. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.
- D. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

2.3 HANGERS AND SUPPORTS

- A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.
 - 2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.
- B. Hanger Materials: Galvanized sheet steel or threaded steel rod.
 - 1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
 - 2. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards–Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.
 - 3. Galvanized-steel straps attached to aluminum ducts shall have contact surfaces painted with zinc-chromate primer.
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.
 - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

2. Supports for Stainless-Steel Ducts: Stainless-steel support materials.

2.4 RECTANGULAR DUCT FABRICATION

- A. Fabricate ducts, elbows, joints, transitions, offsets, branch connections, and other construction according to SMACNA's, "HVAC Duct Construction Standards–Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
 1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
 2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards–Metal and Flexible."
- B. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches (480 mm) and larger and 0.0359 inch (0.9 mm) thick or less, with more than 10 sq. ft. (0.93 sq. m) of nonbraced panel area unless ducts are lined.

2.5 ROUND DUCT AND FITTING FABRICATION

- A. Round, Longitudinal-Seam Ducts: Fabricate supply ducts of galvanized steel according to SMACNA's, "HVAC Duct Construction Standards–Metal and Flexible."

PART 3 - EXECUTION

3.1 DUCT APPLICATIONS

- A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:
 1. Supply Ducts: 2-inch wg (500 Pa).
 2. Return Ducts (Negative Pressure): 1-inch wg (125 Pa).
 3. Exhaust Ducts (Negative Pressure): 1-inch wg (1000 Pa).
- B. All ducts shall be galvanized steel.

3.2 DUCT INSTALLATION

- A. Construct and install ducts according to SMACNA's, "HVAC Duct Construction Standards–Metal and Flexible," unless otherwise indicated.
- B. Install round ducts in lengths not less than 12 feet (3.7 meters) unless interrupted by fittings.
- C. Install ducts with fewest possible joints.
- D. Install fabricated fittings for changes in directions, size, and shape and for connections. Branch duct connections "tapped" into round mains will not be acceptable.
- E. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches (300 mm), with a minimum of 3 screws in each coupling.
- F. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs unless indicated on the Drawings.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

- H. Install ducts with a minimum clearance of 1 inch (25 mm), plus allowance for insulation thickness.
- I. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.
- J. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.
- K. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.
- L. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures. Route ducts to avoid passing over electrical panelboards and switchboards.
- M. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches (38 mm).
- N. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and firestopping sealant. Fire and smoke dampers are specified in Division 23 Section 23 33 00, "Ductwork Accessories." Firestopping materials and installation methods are specified in Division 7 Section "Through-Penetration Firestop Systems."
- O. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's "Duct Cleanliness for New Construction."
- P. All branch connections shall be provided with a volume control damper. Provide opposed blade or splitter damper as indicated at each branch duct connection for supply air, return air, outside air, and exhaust air. Provide opposed blade damper where damper is not indicated.

3.3 SEAM AND JOINT SEALING

- A. Seal duct seams and joints according to SMACNA's, "HVAC Duct Construction Standards—Metal and Flexible" for duct pressure class indicated.
 - 1. For pressure classes lower than 2-inch wg (500 Pa), seal transverse joints.
- B. Seal ducts before external insulation is applied.

3.4 HANGING AND SUPPORTING

- A. Support horizontal ducts within 24 inches (600 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.
- B. Support vertical ducts at maximum intervals of 16 feet (5 meters) and at each floor.
- C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.
- D. Install concrete inserts before placing concrete.
- E. Install powder-actuated concrete fasteners after concrete is placed and completely cured.

1. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.

3.5 CONNECTIONS

- A. Make connections to equipment with flexible connectors according to Division 23 Section 23 33 00, "Ductwork Accessories."
- B. Comply with SMACNA's, "HVAC Duct Construction Standards–Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections according to SMACNA's, "HVAC Air Duct Leakage Test Manual" and prepare test reports:
 1. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
 2. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If pressure classes are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.
 3. Maximum Allowable Leakage: Comply with requirements for Leakage Class 3 for round ducts, Leakage Class 12 for rectangular ducts in pressure classes lower than and equal to 2-inch wg (500 Pa) (both positive and negative pressures), and Leakage Class 6 for pressure classes from 2- to 10-inch wg (500 to 2500 Pa).
 4. Remake leaking joints and retest until leakage is equal to or less than maximum allowable.

3.7 CLEANING NEW SYSTEMS

- A. Mark position of dampers and air-directional mechanical devices before cleaning, and perform cleaning before air balancing.
- B. Use service openings, as required, for physical and mechanical entry and for inspection.
 1. Create other openings to comply with duct standards.
 2. Disconnect flexible ducts as needed for cleaning and inspection.
 3. Remove and reinstall ceiling sections to gain access during the cleaning process.
- C. Vent vacuuming system to the outside. Include filtration to contain debris removed from HVAC systems, and locate exhaust down wind and away from air intakes and other points of entry into building.
- D. Clean the following metal duct systems by removing surface contaminants and deposits:
 1. Air outlets and inlets (registers, grilles, and diffusers).
 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
 4. Coils and related components.
 5. Return-air ducts, dampers, and actuators except in ceiling plenums and mechanical equipment rooms.
 6. Supply-air ducts, dampers, actuators, and turning vanes.

E. Mechanical Cleaning Methodology:

- 1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.**
- 2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.**
- 3. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.**

F. Cleanliness Verification:

- 1. Visually inspect metal ducts for contaminants.**
- 2. Where contaminants are discovered, re-clean and re-inspect ducts.**

END OF SECTION 23 31 13

23 33 00

DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 DESCRIPTION OF WORK

- A. Extent of ductwork accessories work is indicated on Drawings and in Schedules and by requirements of this Section.
- B. Types of ductwork accessories required for project include the following:
 - 1. Low pressure manual dampers.
 - 2. Fire dampers.
 - 3. Turning vanes.
 - 4. Duct hardware.
 - 5. Duct access doors.
 - 6. Flexible connections.
- C. Refer to other Division 23 Sections for testing, adjusting, and balancing of ductwork accessories; not work of this Section.

1.3 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. SMACNA Compliance: Comply with applicable portions of SMACNA "HVAC Duct Construction Standards, Metal and Flexible."
 - 2. UL Compliance: Construct, test, and label fire dampers in accordance with UL Standard 555 "Fire Dampers and Ceiling Dampers."
 - 3. NFPA Compliance: Comply with applicable provisions of NFPA 90A "Air Conditioning and Ventilating Systems" pertaining to installation of ductwork accessories.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction and installation instructions.
- B. Maintenance Data: Submit manufacturer's maintenance data including parts lists for each type of duct accessory. Include this data and product data in maintenance manual; in accordance with requirements of Division 1 and Division 22 Section 22 01 00, "Basic Mechanical Materials and Methods."

PART 2 - PRODUCTS

2.1 DAMPERS

- A. Low Pressure Manual Dampers: Provide manual volume dampers constructed of galvanized steel.

1. **Square and Rectangular Dampers:** Dampers shall have minimum 16 gauge frames and minimum 16 gauge roll formed blades. Multi-blade dampers shall have interlocking corrugated edges. Damper linkage shall be concealed in the damper frame. Dampers for ducts smaller than 10 inches by 10 inches may be single blade dampers, all other dampers shall have multiple blades. Provide opposed blade type unless indicated otherwise.
2. **Round Dampers:** Dampers shall be minimum 20 gauge frame and 20 gauge blade. Blade shall be secured to 3/8 inch square or 1/2 inch diameter galvanized or plated axle/shaft that extends beyond frame through bearings and locking hand quadrant.
3. Dampers shall include permanently lubricated oilite bronze bearings pressed securely into damper frame.
4. Dampers shall include factory furnished locking quadrants with 2 inches elevated dial and "OPEN" and "CLOSED" indicators.

B. **Manufacturer:** Subject to compliance with requirements, provide balancing dampers of one of the following or approved equivalent:

		Single Blade	Opposed Blade	Parallel Blade	Round Blade
1.	Ruskin	MD35	MD35	MD35	MDRS25
2.	Air Balance, Inc.	AC-1	AC-2	AC-1	AC-530
3.	Greenheck	MBD-15	MBD-15	MBD-15	MBDR-50
4.	American Warming and Ventilating	VC-1	VC-2	VC-2	VC-25
5.	Safe-Air	612	610	611	BDR
6.	Pottorf	CD10	CD425	CD10	CD10R

2.2 DYNAMIC CLOSURE FIRE DAMPERS

A. **Dynamic Fire Dampers:** Provide fire dampers of the dynamic closure type where indicated. Construct casings of minimum 18 gage galvanized steel with mil finish. Provide fusible link rated at 160 to 165 degrees F (71 to 74 degrees C) unless otherwise indicated. Dampers in high velocity ducts shall be designed for high velocity duct installation. Provide damper with positive lock in closed position, and with the following additional features:

1. Provide a factory installed galvanized steel sleeve for each fire damper as required by the UL listing of the damper. The minimum sleeve thickness and length shall be determined in accordance with the UL listing for the damper size, duct connection type and wall thickness.
2. **UL Listing:** Fire dampers shall be UL listed and labeled.
3. **Damper Blade Assembly:** Curtain type, clear of air stream.
4. **Blade Material:** Steel, match casing.
5. Provide a hinged access panel for each fire damper. Access panel size shall be 18 inch x 20 inch for ducts 22 inches wide and larger. For duct width less than 22 inches, panel size shall be 18 inch x (duct width minus 2 inches). Locate access panels where door can be fully opened to access and service fire damper. Provide one access panel for each 36 inches of damper width. Provide label for each access panel entitled "FIRE DAMPER" in 1 inch high red letters located on face of door.
6. **Manufacturer:** Subject to compliance with requirements, provide fire dampers of one of the following or approved equivalent:
 - a. Ruskin, Model DIBD2.
 - b. NCA Manufacturing, Inc., Model DFD.
 - c. Greenheck, Model DFD.
 - d. Air Balance, Inc., Model D19B.
 - e. Pottorf, Model VFD.

2.3 CEILING RADIATION FIRE DAMPERS

- A. Manufacturers:** Subject to compliance with requirements provide ceiling radiation fire dampers of one of the following or approved equivalent:
 - 1. Pottorf, CFD-521-BT.**
- B. General Description:** Labeled according to UL 555C; comply with construction details for tested floor- and roof-ceiling assemblies as indicated in UL's "Fire Resistance Directory."
- C. Frame:** Galvanized sheet steel, round or rectangular, style to suit ceiling construction.
- D. Blades:** Galvanized sheet steel with refractory insulation.
- E. Fusible Links:** Replaceable 165 degrees F (74 degrees C) rated.

2.4 TURNING VANES

- A. Fabricated Turning Vanes:** Provide fabricated turning vanes and vane runners, constructed in accordance with SMACNA "HVAC Duct Construction Standards."

2.5 DUCT HARDWARE

- A. General:** Provide duct hardware, manufactured by one manufacturer for all items on project, for the following:
 - 1. Test Holes:** Provide in ductwork at fan inlet and outlet and elsewhere as indicated, duct test holes, consisting of slot and cover, for instrument tests.
 - 2. Quadrant Locks:** Provide quadrant lock device on one end of shaft and end bearing plate on other end for damper lengths over 12 inches. Provide 2 inches extended quadrant locks and 2 inches end extended bearing plates for externally insulated ductwork.
 - a. Duro-dyne, Model 8021.**
 - b. Young, Model 443B/404B.**
 - 3. Concealed dampers that are not accessible shall be controlled by a concealed regulator, type as indicated. Where type is not indicated, provide type as recommended by manufacturer for application. Include flush chrome plated access panel for each.**
 - a. Duro-dyne, Model 8009.**
 - b. Young, Model 301/315.**
 - 4. Spin-In Fittings:**
 - a. Flexmaster U.S.A., Inc., Model CB.**
 - b. Sheet Metal Connectors, Inc., Model G.**
 - c. M & M Manufacturing, Model 50.**
 - 5. High Efficiency Takeoffs (Rectangular Tap with Transition to Round Branch):**
 - a. Sheet Metal Connectors, Inc., Model HET (24 gage.).**
 - b. Field fabricated as detailed on the drawings.**
 - c. Dace, Model STO.**

2.6 DUCT ACCESS DOORS

- A. General:** Provide where indicated, duct access doors of size indicated.
- B. Construction:** Construct of same or greater gage as ductwork served; provide insulated doors for insulated ductwork with minimum 1 inch insulation (k -value = 0.26 at 75 degrees F mean temperature sandwiched between sheetmetal panels. Provide flush frames for uninsulated ductwork; extended frames for externally insulated duct. Provide one side hinged, other side with one handle-type latch for doors 12 inches high and smaller, 2 handle-type latches for larger doors. Screwdriver operated latches are not acceptable.

2.7 FLEXIBLE CONNECTIONS

- A.** Provide flexible duct connections wherever ductwork connects to HVAC equipment, fans or other vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment.

2.8 FLEXIBLE DUCTS

- A. Manufacturers:**
 - 1. Flexmaster U.S.A., Inc.
 - 2. Hart & Cooley, Inc.
 - 3. McGill AirFlow Corporation.
 - 4. Thermaflex.
- B. Insulated-Duct Connectors:** UL 181, Class 1, liner of multiple layers of aluminum laminate supported by helically wound, galvanized or coated spring-steel wire; fibrous-glass insulation; aluminized vapor barrier film.
 - 1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
 - 2. Rated Air Velocity: 4000 fpm (20.3 m/s).
 - 3. Temperature Range: Minus 20 to plus 210 degrees F (Minus 28 to plus 99 degrees C).
 - 4. Flame Spread: Less than 25.
 - 5. Smoke Developed: Less than 50.
 - 6. Thermal Conductance: C Factor not more than 0.23.
- C. Flexible Duct Clamps:** Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes to suit duct size.

PART - EXECUTION

3.1 INSPECTION

- A.** Examine areas and conditions under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF DUCTWORK ACCESSORIES

- A.** Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.

- B. Where ducts take off mains, and where ducts divide, install splitter dampers or volume dampers, each with adjustable locking quadrant control. Provide volume damper unless splitter damper is indicated. Provide adjustable pivoting splitter with locking quadrant control for all splitter dampers. Provide a volume damper after each splitter damper, located in the branch with the lowest resistance.
- C. Concealed dampers that are not accessible shall be controlled by a concealed regulator, type as indicated. Where type is not indicated, provide type as recommended by manufacturer for application. Include flush chrome plated access panel for each.
- D. Install turning vanes in all square or rectangular 90° elbows in supply, return, and exhaust air systems, and elsewhere as indicated.
- E. Install access doors to open against system air pressure, with latches operable from either side, except outside only where duct is too small for person to enter.
- F. Install flexible ducts only where indicated and only in extended straight lengths not to exceed 36 inches; bend, sags, or elbows will not be permitted.
- G. Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

3.3 FIELD QUALITY CONTROL

- A. Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories, as required to obtain proper operation and leakproof performance.

3.4 ADJUSTING AND CLEANING

- A. Adjusting: Adjust ductwork accessories for proper settings, install fusible links in fire dampers, and adjust for proper action.
- B. Final positioning of manual dampers is specified in Division 23 Section 23 05 93, "Testing, Adjusting, and Balancing."
- C. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION 23 33 00

POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Ceiling-mounting ventilators

1.3 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:
 - 1. Certified fan performance curves with system operating conditions indicated.
 - 2. Certified fan sound-power ratings.
 - 3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 4. Dampers, including housings, linkages, and operators.
- B. Maintenance Data: For power ventilators to include in maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.
- C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.
- D. UL Standard: Power ventilators shall comply with UL 705.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fans as factory-assembled unit, to the extent allowable by shipping limitations, with protective crating and covering.

1.6 COORDINATION

- A. Coordinate size and location of structural-steel support members.
- B. Coordinate installation of ceiling components, equipment supports, and wall penetrations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Ceiling-Mounting Ventilators:

- a. Cook, Model GC
- b. Greenheck, Model SP.

2.2 CEILING-MOUNTING VENTILATORS

- A. Description: Centrifugal fans designed for installing in ceiling or wall or for concealed in-line applications.
- B. Housing: Steel, lined with acoustical insulation.
- C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.
- D. Grille: Painted steel or aluminum, louvered or egg-crate grille with flange on intake and thumbscrew attachment to fan housing.
- E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.
- F. Accessories:
- 1. Variable-Speed Controller: Solid-state control mounted on fan housing to reduce speed from 100 percent to less than 50 percent
 - 2. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light
 - 3. Motion Sensor: Motion detector with adjustable shutoff timer
 - 4. Isolation: Rubber-in-shear vibration isolators
 - 5. Manufacturer's standard roof jack or wall cap and transition fittings
 - 6. Ceiling radiation damper where required.

2.3 SOURCE QUALITY CONTROL

- A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

2.4 MOTORS

- A. Manufacturer's standard

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install power ventilators level and plumb.
- B. Ceiling Units: Suspend units from structure; use metal straps or hanger rods.
- C. Install units with clearances for service and maintenance.
- D. Secure roof-mounted fans to roof curbs with cadmium-plated hardware.

3.2 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 23 Section 23 33 00, "Ductwork Accessories."
- B. Install ducts adjacent to power ventilators to allow service and maintenance.
- C. Ground equipment.
- D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

- A. Equipment Startup Checks:
 - 1. Verify that shipping, blocking, and bracing are removed.
 - 2. Verify that unit is secure on supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - 3. Verify that cleaning and adjusting are complete.
 - 4. Verify that dampers in connected ductwork systems are in fully open position.
- B. Starting Procedures:
 - 1. Energize motor and adjust fan to indicated rpm.
- C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Shut unit down and reconnect automatic temperature-control operators.
- E. Refer to Division 23 Section 23 05 93, "Testing, Adjusting, and Balancing," for testing, adjusting, and balancing procedures.
- F. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

END OF SECTION 23 34 23

DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes ceiling- and wall-mounted diffusers, registers, and grilles.

1.3 SUBMITTALS

- A. Product Data: For each product indicated, include the following:
 - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
 - 2. Diffuser, Register, and Grille Schedule: Indicate model number and accessories furnished.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. The following requirements apply to product selection:
 - 1. Products: Subject to compliance with requirements, provide one of the products scheduled on the drawings.

2.2 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the

center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 37 13

MINI SPLIT-SYSTEM AIR-CONDITIONING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes split-system air-conditioning and heat pump units consisting of separate evaporator-fan and compressor-condenser components. Units are designed for exposed wall and are not connected to ducts.

1.3 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Operation and Maintenance Data: For ductless split-system air-conditioning units to include in emergency, operation, and maintenance manuals.
- D. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated. Refer to Division 1 Sections.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- D. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- E. Units shall be designed to operate with HCFC-free refrigerants.

1.5 COORDINATION

- A. Coordinate size and location of concrete bases for units. Concrete, reinforcement, and formwork are specified in Division 3 Sections.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Filters: One set of filters for each unit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:

	<u>Indoor Unit</u>	<u>Outdoor Unit</u>
1. Daikin: Model	FFQ/FAQ Series	RX Series

2.2 WALL-MOUNTING, EVAPORATOR-FAN COMPONENTS

- A. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.
- B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
- C. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.
- D. Fan: Direct drive, centrifugal fan.
- E. Fan Motors: Comply with requirements in Division 22 Section 22 02 00, "Motors."
 - 1. Special Motor Features: Multi-tapped, multi-speed with internal thermal protection and permanent lubrication.
- F. Filters: Permanent, cleanable.

2.3 AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS

- A. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
- B. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - 1. Compressor Type: Reciprocating or scroll.
 - 2. Refrigerant: Pre-charged.

- C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
- D. Heat Pump Components: Reversing valve and low-temperature air cut-off thermostat.
- E. Fan: Aluminum-propeller type, directly connected to motor.
- F. Motor: Permanently lubricated, with integral thermal-overload protection.
- G. Low Ambient Kit: Permits operation down to 45 degrees F (7 degrees C).

2.4 ACCESSORIES

- A. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:
 - 1. Compressor time delay.
 - 2. 24-hour time control of system stop and start.
 - 3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
 - 4. Fan-speed selection, including auto setting.
- B. Automatic-reset timer to prevent rapid cycling of compressor.
- C. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units level and plumb.
- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Install ground-mounting, compressor-condenser components on 4 inch (100 mm) thick, reinforced concrete base; 4 inches (100 mm) larger on each side than unit. Concrete, reinforcement, and formwork are specified in Division 3 Sections. Coordinate anchor installation with concrete base.
- D. Install ground-mounting, compressor-condenser components on polyethylene mounting base.
- E. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to unit to allow service and maintenance.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service:** Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:**
 - 1. Leak Test:** After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test:** After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 3. Test and adjust controls and safeties.** Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace malfunctioning units and retest as specified above.**

3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.**
 - 1. Complete installation and startup checks according to manufacturer's written instructions.**

3.5 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain units. Refer to Division 1.**

END OF SECTION

PACKAGED ROOFTOP UNITS

PART 1 - GENERAL

1.1 Section Includes:

- A. Packaged rooftop air conditioners designed for cooling and heating.

1.2 REFERENCES

- A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. AMCA 99 - Standards Handbook
- C. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes
- D. AMCA 500 - Test Methods for Louver, Dampers, and Shutters.
- E. ASHRAE 62.1 - Ventilation for Acceptable Indoor Air Quality
- F. ASHRAE 90.1 - Energy Standard for Buildings Except Low Rise Residential
- G. IBC – International Building Code
- H. IMC – International Mechanical Code
- I. IFGC – International Fuel Gas Code
- J. NEMA MG1 - Motors and Generators
- K. NFPA 70 - National Electric Code.
- L. NFPA 72 – National Fire Alarm and Signaling Code
- M. NFPA 90A – Standard for the Installation of Air Conditioning and Ventilating Systems
- N. UL 900 - Test Performance of Air Filter Units.

1.3 RELATED DOCUMENTS

- A. Section 23 17 11 - Condensate Drain Piping
- B. Section 23 31 13 - Metal Ducts
- C. Section 23 05 93 - Testing, Adjusting and Balancing

1.4 SUBMITTALS

- A. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, electrical characteristics and connection requirements.
- B. Product Data:

1. Provide literature that indicates dimensions, weights, capacities, ratings, fan performance, and electrical characteristics and connection requirements.
2. Provide computer generated fan curves with specified operating point clearly plotted.
3. Manufacturer's Installation Instructions.
4. BACnet Testing Laboratories Listing and Certification documents for DDC controllers or interface modules.

C. Factory Tests

1. Provide copies of factory tests as follows;
 - a. Refrigerant circuit leak and run tests.
 - b. Fan assembly run tests.
 - c. Operation of unit controls.
 - d. Final Inspection Report.

D. Startup Reports:

1. Provide startup report for each unit. Use manufacturer's standard Startup Form. The installing contractor shall perform the manufacturer's recommended pre-startup checks and a factory authorized service representative shall perform the startup.

1.5 OPERATION AND MAINTANENCE DATA

- A. Maintenance Data: Provide instructions for installation, maintenance and service
- B. Warranty Certificates

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience, who issues complete catalog data on total product.
- B. Startup must be done by factory authorized service representative.
- C. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters and remote controls are in place, bearings lubricated, and manufacturers' installation instructions have been followed.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site.
- B. Accept products on site and inspect for damage.
- C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Daikin

B. Suppliers of equipment other than the “basis of design” shall provide a complete description of equipment including; model numbers, performance data, dimensions, weights, clearances, power requirements, etc., to all bidders.

C. Bidders utilizing equipment other than the basis of design shall include all modifications necessary to incorporate the equipment furnished into the project at no additional cost to the owner. Modifications shall include but are not limited to the following; electrical work, structural framing, condensate piping, fuel gas piping, unit location and orientation due to equipment dimensions, ductwork connections or service clearances.

D. Packaged rooftop units 2000 CFM and smaller.

1. Trane THC Series
2. Daikin DRC Series

2.2 Warranty: The manufacturer shall provide the following warranties which shall commence at project substantial completion.

A. Parts only warranties

1. Entire unit – 1 year.
2. Compressors – 5 years
3. Control boards – 3 years
4. BMCS interface module – 3 years
5. Roof curbs – 5 years

B. Labor warranties

1. Compressors – 5 years
2. Control boards – 3 years
3. BMCS interface module – 3 years

2.3 ROOFTOP UNITS

A. Provide as shown on drawings. Unit performance and electrical characteristics shall be per the schedule.

B. Configuration: Fabricate as detailed on drawings:

1. Return plenum
2. Filter section
3. Cooling coil section
4. Supply fan section
5. Heating section.
6. Condensing unit section

C. The complete unit shall be UL or cETLus listed.

D. The unit shall be ASHRAE 90.1-2016 compliant and labeled.

E. Each unit shall be specifically designed for outdoor rooftop application and include a weatherproof cabinet. Each unit shall be completely factory assembled and shipped in one piece. Packaged units shall be shipped fully charged with R-410 Refrigerant and oil.

F. The unit shall undergo a complete factory run test prior to shipment. The factory test shall include a refrigeration circuit run test, a unit control system operations checkout, a unit refrigerant leak test and a final unit inspection.

G. All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.

H. Performance: All scheduled EER, IEER, capacities and face areas are minimum accepted values. All scheduled amps, kW, and HP are maximum accepted values that allow scheduled capacity to be met.

2.4 CABINET, CASING, AND FRAME

A. Panel construction shall be single-wall construction for all panels. All floor panels shall have a solid galvanized steel inner liner on the air stream side of the unit to protect insulation during service and maintenance. Insulation shall be foil faced with a minimum R-value of 4. Panel design shall include no exposed insulation edges. Unit cabinet shall be designed to operate at total static pressures up to 2.0 inches w.g.

B. Exterior surfaces shall be constructed of pre-painted galvanized steel for aesthetics and long term durability. Paint finish to include a base primer with a high quality, polyester resin topcoat of a neutral beige color. Finished panel surfaces to withstand a minimum 1000-hour salt spray test in accordance with ASTM B117 standard for salt spray resistance.

C. Service doors shall be provided on the fan section, filter section, control panel section, and heating vestibule in order to provide user access to unit components. All service access doors shall be mounted on multiple, stainless steel hinges and shall be secured by a latch system. Removable service panels secured by multiple mechanical fasteners are not acceptable.

D. The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weathertight seal. Lifting brackets shall be provided on the unit base to accept cable or chain hooks for rigging the equipment.

2.5 OUTDOOR/RETURN AIR SECTION

A. Unit shall be provided with an outdoor air hood. The outdoor air hood shall allow outdoor air to enter from the back of the unit, at the draw-through filter section. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the same durable paint finish as the main unit. The hood shall include a bird screen to prevent infiltration of foreign materials and a rain lip to drain water away from the entering air stream. Outdoor air hood shall be design for 0-25% of unit airflow.

B. Low leakage dampers shall be provided. Damper blades shall be fully gasketed and side sealed and arranged vertically in the hood. Damper leakage shall be less than 1.5 CFM/Sq. Ft. of damper area at 1.0 inch static pressure differential. Leakage rate to be tested in accordance with AMCA Standard 500. Damper blades shall be operated from multiple sets of linkages mounted on the leaving face of the dampers. Control of the dampers shall be from a factory installed actuator.

C. Control of the outdoor dampers shall be by a factory installed actuator. Damper actuator shall be of the two position type. Damper to open when the supply fan starts, and close when supply fan stops.

2.6 FILTERS

A. Unit shall be provided with a draw-through filter section. The filter rack shall be designed to accept a 2" filter. The unit design shall have a hinged access door for the filter section. The manufacturer shall ship the rooftop unit with 2" MERV 8 construction filters. The contractor shall furnish and install, additional sets of filters as required by this section.

2.7 COOLING COIL

A. The indoor coil section shall be installed in a draw through configuration, upstream of the supply air fan. The coil section shall be complete with a factory piped cooling coil and an ASHRAE 62.1 compliant double sloped drain pan.

B. The direct expansion (DX) cooling coils shall be fabricated of seamless high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 3 rows. All cooling coils shall have an interlaced coil circuiting that keeps the full coil face active at all load conditions. All coils shall be factory leak tested with high pressure air under water.

C. The cooling coil shall have an electronic or thermostatically controlled expansion valve. The unit controller shall control the expansion valve to maintain liquid sub-cooling and the superheat of the refrigerant system.

D. The refrigerant suction lines shall be fully insulated from the expansion valve to the compressors.

E. The drain pan shall be non-corrosive and positively sloped. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1. The drain pan shall have a minimum slope of 1/8" per foot to provide positive draining. The drain pan shall extend beyond the leaving side of the coil. The drain pan shall have a threaded drain connection extending through the unit.

2.8 SUPPLY FAN

A. The fan wheel shall be Class II construction with fan blades that are continuously welded to the hub plate and end rim. The supply fan shall be direct drive fan mounted to the motor shaft where available. Belts and sheaves are acceptable only when direct drive is not available due to the additional maintenance.

B. Supply fan shall be one of the following, designed for airflow range of 60-100% of design airflow;

1. Single width, single inlet (SWSI) airfoil centrifugal fan.
2. Double width, double inlet (DWDI) forward curved.
3. Plenum fan.

C. All fan assemblies shall be statically and dynamically balanced at the factory, including a final trim balance, prior to shipment.

D. Supply fan and motor assembly combinations larger than 8 hp or 22" diameter shall be internally isolated on 1" deflection, spring isolators and include removable shipping tie downs.

E. The fan motor shall be a totally enclosed Electronically Commutated motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.

F. The supply fan shall be capable of airflow modulation from 30% to 100% of the scheduled designed airflow. The fan shall not operate in a state of surge at any point within the modulation range.

2.9 ELECTRIC GAS HEATING SECTION

A. The rooftop unit shall include an electric heating section. The design shall be one heating module factory installed downstream of the supply air fan in the heat section. The heating module shall be a manufacturer's standards.

B. The module shall be complete with controller of a minimum 2 stage operation.

C. The factory-installed DDC unit control system shall control the heat module. Field installed heating modules shall require a field ETL certification. The manufacturer's rooftop unit ETL certification shall cover the complete unit including the heating modules.

2.10 CONDENSING SECTION

A. Outdoor coils shall have seamless copper tubes, mechanically bonded into aluminum plate-type fins. The fins shall have full drawn collars to completely cover the tubes. A sub-cooling coil shall be an integral part of the main outdoor air coil. Each outdoor air coil shall be factory leak tested with high-pressure air under water.

B. Fan motors shall be an ECM type motor for proportional control. The unit controller shall proportionally control the speed of the condenser fan motors to maintain the head pressure of the refrigerant circuit from ambient condition of 25~120°F. Mechanical cooling shall be provided to 25° F. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase.

C. The condenser fan shall be low noise blade design. Fan blade design shall be a dynamic profile for low tip speed. Fan blade shall be of a composite material.

D. Provide hail guards for condenser coils.

2.11 COMPRESSORS

A. The unit shall have scroll compressors. One of the compressors shall be an inverter driven or a digital scroll compressor providing proportional control. The unit controller shall control the speed of the compressor (inverter driven) or loaded/unloaded time periods (digital scroll) to maintain the discharge air temperature. Each compressor shall have a separate oil pump and an oil separator for each compressor that routes oil back to the compressor instead of through the discharge line.

B. Pressure transducers shall be provided for the suction pressure and head pressure. Temperature sensor shall be provided for the suction temperature and the refrigerant discharge temperature of the compressors. All of the above devices shall be an input to the unit controller and the values be displayed at the unit controller.

C. Refrigerant circuit shall have a bypass valve between the suction and discharge refrigerant lines for low head pressure compressor starting and increased compressor reliability. When there is a call for mechanical cooling the bypass valve shall open to equalizing the suction and discharge pressures. When pressures are equalized the bypass valve shall close and the compressor shall be allowed to start.

D. Each circuit shall be dehydrated and factory charged with R-410A Refrigerant and oil.

E. Provide locking, tamper resistant caps for refrigerant circuit access ports.

2.12 ELECTRICAL

A. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a single point power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch short circuit protection, 115-volt control circuit transformer and fuse, system switches, and a high temperature sensor shall also be provided with the unit. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply fan

motors shall have contactors and external overload protection. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance.

B. A single non-fused disconnect switch shall be provided for disconnecting electrical power at the unit. Disconnect switches shall be mounted internally to the control panel and operated by an externally mounted handle.

C. Provide integral 115 volt, NEMA 3R duplex receptacle.

2.13 ROOF CURBS

A. A prefabricated galvanized steel, mounting curb shall be provided for field assembly on the roof decking prior to unit shipment. The roof curb shall be designed for complete support of the entire unit and all accessories, without any additional equipment supports. The curb shall be a minimum of 14" high or taller if noted on the drawings. Curbs shall include a nominal 2" x 4" wood nailing strip and minimum 1 1/2" thick 3# density rigid fiberglass insulation (minimum R value 6.5) on curb interior. Gasket shall be provided for field mounting between the unit base and roof curb.

B. Provide limp mass sound barrier on top of two (2) layers of 6" un-faced fiberglass BATT insulation. Install BATTs and sound blanket on top of roof deck inside the curb perimeter of each unit. Omit BATTs and sound barrier only where required for down flow ductwork.

1. Sound barrier shall be one of the following or approved equal;

- a. Acoustics First Corp. – Blockaid VSB
- b. Kinetics Noise Control - KNM-100AL

2. Sound barrier shall have the following minimum sound transmission loss performance by frequency band;

<u>125Hz</u>	<u>250Hz</u>	<u>500Hz</u>	<u>1000Hz</u>	<u>2000Hz</u>	<u>4000Hz</u>
13	17	21	28	33	37

2.14 CONTROLS

A. Provide a complete, factory installed, integrated microprocessor based Direct Digital Control (DDC) system to control all unit functions including airflow, temperature control, scheduling, monitoring, unit safety protection, including compressor minimum run and minimum off times, and diagnostics. This system shall consist of all required temperature sensors, pressure sensors, controller and keypad/display operator interface. All MCBs and sensors shall be factory mounted, wired and tested.

B. The stand-alone DDC controllers shall not be dependent on communications with any on-site or remote PC or master control panel for proper unit operation. The microprocessor shall maintain existing set points and operate stand alone if the unit loses either direct connect or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. All factory and user set schedules and control points shall be maintained in nonvolatile memory. No settings shall be lost, even during extended power shutdowns.

C. The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.

D. All digital inputs and outputs shall be protected against damage from transients or incorrect voltages. All field wiring shall be terminated at a separate, clearly marked terminal strip.

E. The DDC controller shall have a built-in time schedule. The schedule shall be programmable from the unit keypad interface. The schedule shall be maintained in nonvolatile memory to ensure that it is not lost during a power failure. There shall be one start/stop per day and a separate holiday schedule. The controller shall accept up to sixteen holidays each with up to a 5-day duration. Each unit shall also have the ability to accept a time schedule via BAS network communications.

F. The keypad interface shall allow convenient navigation and access to all control functions. The unit keypad/display character format shall be 4 lines x 20 characters. All control settings shall be password protected against unauthorized changes. For ease of service, the display format shall be English language readout. Coded formats with look-up tables will not be accepted. The user interaction with the display shall provide the following information as a minimum:

1. Return air temperature
2. Discharge air temperature
3. Outdoor air temperature
4. Space air temp
5. Dirty filter indication
6. Airflow verification
7. Cooling status
8. Control temperature (Changeover)
9. VAV box output status
10. Cooling status/capacity
11. Unit status
12. All time schedules
13. Active alarms w/time and date
14. Previous alarms with time and date
15. Optimal start
16. System operating hours
 - a. Fan
 - b. Exhaust fan
 - c. Cooling
 - d. Individual compressor
 - e. Heating
 - f. Economizer
 - g. Tenant override

G. The user interaction with the keypad shall provide the following setpoints as a minimum:

1. Controls mode
 - a. Off manual
 - b. Auto
 - c. Heat/cool
 - d. Cool only
 - e. Heat only
 - f. Fan only
2. Occupancy mode
 - a. Auto
 - b. Occupied
 - c. Unoccupied
 - d. Tenant override
3. Unit operation changeover control

- a. Return air temperature
 - b. Space temperature
 - c. Network signal
- 4. Cooling and heating change-over temperature with deadband
- 5. Cooling discharge air temperature (DAT)
- 6. Supply reset options
 - a. Return air temperature
 - b. Outdoor air temperature
 - c. Space temperature
 - d. Airflow (VAV)
 - e. Network signal
 - f. External (0-10 vdc)
 - g. External (0-20mA)
- 7. Temperature alarm limits
 - a. High supply air temperature
 - b. Low supply air temperature
 - c. High return air temperature
- 8. Lockout control for compressors
- 9. Compressor interstage timers
- 10. Night setback and setup space temperature
- 11. Building static pressure
- 12. Economizer changeover
 - a. Enthalpy
 - b. Dry bulb temperature
- 13. Current time and date
- 14. Tenant override time
- 15. Occupied/unoccupied time schedule
- 16. One event schedule
- 17. Holiday dates and duration
- 18. Service mode
 - a. Timers normal (all time delays normal)
 - b. Timers fast (all time delays 20 sec)

H. If the unit is to be programmed with a night setback or setup function, an optional space sensor shall be provided. Space sensors shall be available to support field selectable features. Sensor options shall include:

- 1. Zone sensor with tenant override switch
- 2. Zone sensor with tenant override switch plus heating and cooling set point adjustment. (Space Comfort Control systems only)

I. To increase the efficiency of the cooling system the DDC controller shall include a discharge air temperature reset program for part load operating conditions. The discharge air temperature shall be controlled between a minimum and a maximum discharge air temperature (DAT) based on one of the following inputs:

- 1. Airflow
- 2. Outside air temperature

3. Space Temperature
4. Return air temperature
5. External signal of 1-5 VDC
6. External signal of 0-20 mA
7. Network signal

J. DDC controller shall be BACnet compatible or provide interface module to connect the factory installed DDC unit controller to the Building Management and Control System provided in other sections of these specification. Assist the BMCS contractor in connecting to the control network and mapping all points.

1. Interface module shall connect to the BMCS using BACnet and shall be factory installed in the controls compartment adjacent to the DDC controller.

K. Provide UL listed duct smoke detectors in the supply and return ducts per NFPA 90A.

1. Interlock unit control system to shut down the unit upon detections of smoke in the ductwork
2. Provide audible and visual signal in a normally occupied area to notify building occupants of detector alarm.
3. Provide remote test station with audible or visual signal in a normally occupied area to notify building occupants of detector trouble.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of RTUs.

B. Examine roughing-in for RTUs to verify actual locations of piping and duct connections before equipment installation.

C. Examine areas for suitable conditions where RTUs will be installed.

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

3.2 INSTALLATION

A. Unit Support on roofs: Install units level on roof curbs or supports as indicated in accordance with manufacturer's instructions. Refer to structural drawings for support framing required for curbs.

3.3 CONNECTIONS

A. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.

B. Install piping adjacent to RTUs to allow service and maintenance.

C. Duct installation requirements are specified in other HVAC Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

1. Install ducts to termination at horizontal unit connections.
2. Connect supply ducts to RTUs with flexible duct connectors specified in Section "Ductwork Accessories."

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. RTU will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Complete installation and startup checks according to manufacturer's written instructions.

1. Inspect for visible damage to unit casing.
2. Inspect for visible damage to compressor, coils, and fans.
3. Inspect internal insulation.
4. Verify that labels are clearly visible.
5. Verify that clearances have been provided for servicing.
6. Verify that controls are connected and operable.
7. Verify that filters are installed.
8. Clean condenser coil and inspect for construction debris.
9. Verify lubrication on fan and motor bearings.
10. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
11. Adjust fan belts to proper alignment and tension.
12. Start unit according to manufacturer's written instructions.
 - a. Start refrigeration system.
 - b. Do not operate below recommended low-ambient temperature.
 - c. Complete startup sheets and attach copy with Contractor's startup report.
13. Inspect and record performance of interlocks and protective devices; verify sequences.
14. Operate unit for an initial period as recommended or required by manufacturer.
15. Calibrate thermostats.
16. Adjust and inspect high-temperature limits.
17. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
18. Start refrigeration system and measure and record the following when ambient is a minimum of 15 deg F (8 deg C) above return-air temperature:
 - a. Coil leaving-air, dry- and wet-bulb temperatures.
 - b. Coil entering-air, dry- and wet-bulb temperatures.
 - c. Outdoor-air, dry-bulb temperature.
 - d. Outdoor-air-coil, discharge-air, dry-bulb temperature.

19. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
20. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.
 - a. Supply-air volume.
 - b. Return-air volume.
 - c. Outdoor-air intake volume.
21. Simulate maximum cooling demand and inspect the following:
 - a. Compressor refrigerant suction and hot-gas pressures.
 - b. Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.
22. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:
 - a. Low-temperature safety operation.
 - b. Filter high-pressure differential alarm.
 - c. Smoke and firestat alarms.
23. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.6 CLEANING AND ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

B. After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain RTUs.

3.8 EXTRA MATERIALS

A. Provide the following extra materials for each unit at substantial completion or as noted below. The contractor shall obtain a written receipt (signed by owner's personnel) for all items turned over to the owner.

1. Belts: Provide 1 complete set of belts for each unit with a belt drive motor.
2. Filters: Furnish four (4) complete sets.
 - a. Install initial set of filters and install prior to equipment startup.
 - b. Install second set of filters prior to Test Adjust and Balance work.
 - c. Furnish two (2) complete sets of filters to the owner and obtain receipt.

END OF SECTION 24 74 16

DIVISION 25
INTEGRATED AUTOMATION

CONTENTS

(None in this Project Manual)

**DIVISION 26
ELECTRICAL**

CONTENTS

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BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Codes and Standards: Where indicated, the referenced edition shall govern. Where not indicated, the latest edition shall govern.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Supporting devices for electrical components.
 - 2. Electrical identification.
 - 3. Electricity-metering components.
 - 4. Concrete equipment bases.
 - 5. Control wiring.
 - 6. Electrical demolition.
 - 7. Cutting and patching for electrical construction.
 - 8. Touchup painting.

1.3 SUBMITTALS

- A. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.4 DEFINITIONS

- A. General Explanation: A substantial amount of the Contract Document Specification language constitutes specific definitions for terms found in other Contract Documents, including the Drawings which must be recognized as diagrammatic in nature and not completely descriptive of the requirements indicated thereon. Certain terms used repetitiously in the Contract Documents are defined generally in this Article.
- B. General Requirements: The provisions or requirements of the Division 1 Sections. The General Requirements apply to the entire work of the Contract, and where so indicated, to other elements of work which are included in the project.
- C. Indicated: The term "Indicated" is a cross reference to details, notes or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar means of recording requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used in lieu of "indicated," it is for the purpose of helping the reader locate the cross reference, and no limitation of location is intended except as specifically noted.
- D. Directed, Requested, Etc.: Where not otherwise explained, terms such as "directed," "requested," "authorized," "selected," "approved," "required," "accepted," and "permitted" mean "directed by the Architect," "requested by the Architect," etc. However, no such implied meaning will be interpreted to extend the Architect's responsibility into the Contractor's area of construction supervision.

- E. Refer: Used to indicate that the subject is defined or specified in further detail at another location in the Contract Documents, or elsewhere as indicated. Except as otherwise noted, "refer" does not imply that the Contractor must purchase or subcontract the subject work in any special manner.
- F. Approve: Where used in conjunction with the Architect's response to submittals, requests, applications, inquiries, reports and claims by the Contractor, the meaning of the term "approved" will be held to the limitations of the Architect's responsibilities and duties as specified in the General and Supplementary Conditions. In no case will "approval" by the Architect be interpreted as a release of the Contractor from responsibilities to fulfill the requirements of the Contract Documents.
- G. Project Site: The space available to the Contractor for the performance of the work, either exclusively or in conjunction with others performing other work as part of the project. The extent of the project site may or may not be identical with the description of the land upon which the project is to be built.
- H. Furnish: Except as otherwise defined in greater detail, the term "furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.
- I. Install: Except as otherwise defined in greater detail, the term "install" is used to describe operations of the project site including unloading, unpacking, assembly, erection, placing, anchoring, connecting utilities, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.
- J. Provide: Except as otherwise defined in greater detail, the term "provide" means furnish and install, complete and ready for the intended use, as applicable in each instance.
- K. Installer: The entity (person or firm) engaged by the Contractor or its subcontractor or sub-subcontractor for the performance of a particular unit of work at the project site, including installation, erection, application and similar required operations. It is a general requirement that such entities (Installers) be expert in the operations they are engaged to perform.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70 (2014).

1.6 HAZARDOUS MATERIALS

- A. Asbestos: No asbestos-containing materials have been identified on items that are indicated to be disturbed. If asbestos-containing materials are encountered, comply with the following:

Upon encountering any previously unidentified materials which he suspects may contain asbestos, the Contractor shall immediately cease all work in the immediate vicinity of the suspected materials and notify the Designer and the Owner. The Owner shall retain consultants to identify the suspected materials. Upon identification, the Owner reserves the right to contract separately for the removal, or require the Contractor to remove said materials in accordance with the following provision. In any case, the work shall be performed by a licensed and certified Abatement Contractor.

The Louisiana Department of Environmental Quality (D.E.Q.) has issued the Louisiana Emission Standards for Hazardous Air Pollutants. Where asbestos is encountered in a project, the

Contractor shall comply with all laws and ordinances pertaining to asbestos handling and abatement, including the latest revision of LAC 33:111, Chapter 25, Subchapter F, Emission Standards for Hazardous Air Pollutants, LAC 33:111, Chapter 27, Asbestos Containing Materials in Schools and Public Buildings and LAC 33:111, Chapter 51, Subchapter M, Section 5151, Emission Standards for Asbestos.

Notification should be addressed to:

Asbestos Coordinator
Louisiana Department of Environmental Quality
Air Quality Division
Post Office Box 82135
Baton Rouge, Louisiana 70884-2135

If the Owner chooses to remove any previously unidentified materials by utilizing different Contractors, the Contractor shall cooperate fully with the Owner's consultants and asbestos abatement Contractor permitting them full access to the project, and shall not resume work in the vicinity of the suspected materials until advised by the Designer and the Owner that it is safe to do so.

1.7 COORDINATION

- A. The electrical Plans and Specifications are a portion of the entire project. Other portions of the project contain information and requirements that will affect the electrical work. It is the responsibility of the Electrical Contractor to review all of the Contract Documents and to include those requirements in the bid.
- B. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.
- C. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the work.
- D. Coordinate electrical service connections to components furnished by utility companies.
 - 1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components.
 - 2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.
- E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.
- F. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.

PART 2 - PRODUCTS

2.1 SUPPORTING DEVICES

- A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.
- B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.

- C. **Slotted-Steel Channel Supports:** Flange edges turned toward web, and 9/16 inch (14 mm) diameter slotted holes at a maximum of 2 inches (50 mm) o.c., in webs.
- D. **Raceway and Cable Supports:** Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
- E. **Expansion Anchors:** Carbon-steel wedge or sleeve type.
- F. **Toggle Bolts:** All-steel springhead type.
- G. **Powder-Driven Threaded Studs:** Heat-treated steel.

2.2 ELECTRICAL IDENTIFICATION

- A. **Identification Devices:** A single type of identification product for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.
- B. **Cable Labels:** Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each cable size.
 - 1. **Type:** Preprinted, flexible, self-adhesive, vinyl. Legend is overlaminated with a clear, weather- and chemical-resistant coating.
- C. **Colored Adhesive Marking Tape for Wires, and Cables:** Self-adhesive vinyl tape, not less than 3/4 inch wide by 3 mils thick (18 mm wide by 0.08 mm thick).
- D. **Underground Warning Tape:** Permanent, bright-colored, continuous-printed, vinyl tape with the following features:
 - 1. Not less than 6 inches wide by 4 mils thick (150 mm wide by 0.102 mm thick).
 - 2. Compounded for permanent direct-burial service.
 - 3. Embedded continuous metallic strip or core.
 - 4. Printed legend that indicates type of underground line.
- E. **Tape Markers for Wire:** Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
- F. **Engraved-Plastic Labels, Signs, and Instruction Plates:** Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16 inch (1.6 mm) minimum thickness for signs up to 20 sq. inch (129 sq. cm) and 1/8 inch (3.2 mm) minimum thickness for larger sizes. Engraved legend in black letters on white background.
- G. **Interior Warning and Caution Signs:** Comply with 29 CFR, Chapter XVII, Part 1910.145. Preprinted, aluminum, baked-enamel-finish signs, punched or drilled for mechanical fasteners, with colors, legend, and size appropriate to the application.
- H. **Exterior Warning and Caution Signs:** Comply with 29 CFR, Chapter XVII, Part 1910.145. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396 inch (1 mm), galvanized-steel backing, with colors, legend, and size appropriate to the application. 1/4 inch (6 mm) grommets in corners for mounting.
- I. **Fasteners for Nameplates and Signs:** Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

2.3 EQUIPMENT FOR UTILITY COMPANY'S ELECTRICITY METERING

- A. Meter Sockets: Comply with requirements of electrical power utility company.

2.4 CONCRETE BASES

- A. Concrete: 3000 psi (20.7 MPa), 28-day compressive strength as specified in *Division 3 Section "Cast-in-Place Concrete."*

2.5 TOUCHUP PAINT

- A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
- B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom, but no less than that required by NEC.
- B. Clearances: Coordinate with other trades and/or existing conditions to maintain code required clearances above, below and around electrical equipment.
- C. Materials and Components: Install level, plumb, and square to other building systems and components, unless otherwise indicated.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

3.2 ELECTRICAL SUPPORTING DEVICE APPLICATION

- A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.
- B. Dry Locations: Steel materials.
- C. Selection of Supports: Comply with manufacturer's written instructions.
- D. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200 lb (90 kg) design load.

3.3 SUPPORT INSTALLATION

- A. Install support devices to securely and permanently fasten and support electrical components.
- B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
- C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.

- D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.
- E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps. Clamps less than 7 feet above the floor shall be one-piece without protruding edges or bolts.
- F. Install 1/4 inch (6 mm) diameter or larger threaded steel hanger rods, unless otherwise indicated.
- G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2 inch (38 mm) and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports. Support wires shall be dedicated to the support of electrical materials and equipment. Ceiling support equipment and wires are not to be used for the support of electrical equipment. Identify electrical support wires as required by 2011 NFPA 70 300.11(A)(2).
- H. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches (610 mm) from the box.
- I. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, and other devices unless components are mounted directly to structural elements of adequate strength. Field galvanize galvanized members that have been field cut.
- J. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:
 - 1. Wood: Fasten with wood screws or screw-type nails.
 - 2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
 - 3. New Concrete: Concrete inserts with machine screws and bolts.
 - 4. Existing Concrete: Expansion bolts. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete.
 - 5. Steel: Welded threaded studs or spring-tension clamps on steel. No field welding of supports to structural members will be allowed.
 - 6. Light Steel: Sheet-metal screws. Do not penetrate outer skin of building from within.
 - 7. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.4 IDENTIFICATION MATERIALS AND DEVICES

- A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout project.
- C. Self-Adhesive Identification Products: Clean surfaces before applying.
- D. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.

- E. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches (150 to 200 mm) below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches (400 mm), overall, use a single line marker.
- F. Color-code 120/240-V single phase system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:
 - 1. Phase A: Black.
 - 2. Phase B: Red.
- G. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.
- H. Install engraved-laminated signs with black letters on white background with minimum 3/8 inch (9 mm) high lettering for equipment designations for switchgear or description of load being fed or controlled in the case of disconnects or contactors.

3.5 UTILITY COMPANY ELECTRICITY-METERING EQUIPMENT

- A. Verify and provide equipment according to utility company's written requirements. Provide grounding and empty conduits as required by utility company.

3.6 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 3000 psi (20.7 MPa), 28-day compressive-strength concrete and reinforcement.

3.7 EQUIPMENT AND CONTROL WIRING

- A. Wire in and connect every motor and item of equipment furnished as a part of this contract, including those furnished under other Divisions. Provide all required disconnecting means, boxes, conduit, conductors, etc. Motors and equipment furnished under other Divisions will be installed under that Division.
- B. Motor starters will be furnished under the division that the motors being controlled are furnished, and will be installed under Division 26 by the Electrical Contractor unless controllers are integral to the equipment. Installation includes mounting, connection to power and grounding.
- C. Control Wiring: All control wiring and interlock wiring is included in Division 22.

3.8 DEMOLITION

- A. Protect existing electrical equipment and installations not indicated to be removed. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, appearance and functionality.
- B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.

- C. **Abandoned Work:** Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches (50 mm) below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.
- D. **Existing Work to Remain:** Maintain feed, or provide new feed to equipment and devices that are not being removed.
- E. Remove demolished material from project site.
- F. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

3.9 SEQUENCING AND SCHEDULING

- A. Electrical power and system interruptions shall be held to a minimum and will be permitted only at times approved by the Owner. The Owner may require that any interruptions be during nights, weekends, holidays, etc. Provide any required overtime work at no additional cost to Owner.
- B. Do not interrupt feed to any service, feeder or branch circuit feeding facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to make temporary provisions where required according to requirements indicated:
 - 1. Notify Owner no fewer than seven (7) days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Owner's written permission.
 - 3. Provide all temporary facilities and services, including fire watch, required to maintain operation, security, and life safety.

3.10 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.11 FIELD QUALITY CONTROL

- A. Inspect installed components for damage and faulty work, including the following:
 - 1. Supporting devices for electrical components.
 - 2. Electrical identification.
 - 3. Electricity-metering components.
 - 4. Concrete bases.
 - 5. Electrical demolition.
 - 6. Cutting and patching for electrical construction.
 - 7. Touchup painting.

3.12 REFINISHING AND TOUCHUP PAINTING

- A. Refinish and touch up paint:
 - 1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
 - 2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.

3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.13 CLEANING AND PROTECTION

- A. Upon completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
- B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION

26 05 19

CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.3 SUBMITTALS

- A. Field Quality-Control Test Reports: From Contractor.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70 (2014).

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Manufacturers:
 - 1. American Insulated Wire Corp.; a Leviton Company.
 - 2. General Cable Corporation.
 - 3. Senator Wire & Cable Company.
 - 4. Southwire Company.
- B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.
- C. Conductor Material: Copper complying with NEMA WC 5 or 7; stranded or solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.
- D. Conductor Insulation Types: Type THHN-THWN or XHHW complying with NEMA WC 5 or 7 as applicable.

2.2 CONNECTORS AND SPLICES

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc.
 - 2. AMP Incorporated/Tyco International.
 - 3. Hubbell/Anderson.

4. O-Z/Gedney; EGS Electrical Group LLC.
5. 3M Company; Electrical Products Division.
6. Ideal

- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated. Push in splice and insulation displacement type connectors shall not be used.

PART 3 - EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

- A. Service Entrance, Feeders and Branch Circuits: Type THHN-THWN or XHHW single conductors in raceway. Minimum size #12 AWG or larger where required for voltage drop. Where branch circuits exceed 100 feet in length, use minimum #10 AWG.
- B. Class 1 Control Circuits: Type THHN-THWN, in raceway. Minimum size #14 AWG.
- C. Class 2 Control Circuits: Type THHN-THWN, in raceway or Power-limited cable in raceways. Size as recommended by equipment manufacturer.

3.2 INSTALLATION

- A. Run all conductors in raceways unless specifically indicated otherwise.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Identify and color-code conductors and cables according to Division 26 Section "Basic Electrical Materials and Methods."
- E. No more than three current carrying phase conductors (excluding switch legs and grounding conductors), and one grounded conductor, may be installed in any raceway.

3.3 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.4 FIELD QUALITY CONTROL

- A. Testing: Perform the following field quality-control testing:
 1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.

2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.
- B. Test Reports: Prepare a written report to record the following:
1. Test procedures used.
 2. Test results that comply with requirements.
 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION 26 05 19

GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- C. Field Test Reports: Submit written test reports to include the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 (2014), Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - 1. Comply with UL 467.
 - 2. Comply with NFPA 70(2014).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Grounding Conductors, Cables, Connections, and Rods:
 - a. Apache Grounding/Erco Inc.
 - b. Chance/Hubbell
 - c. Copperweld Corp.
 - d. Erco Inc.; Electrical Products Group
 - e. Ideal Industries, Inc.
 - f. ILSCO
 - g. Kearney/Cooper Power Systems
 - h. O-Z/Gedney Co.; a business of the EGS Electrical Group

- i. Raco, Inc.; Division of Hubbell
- j. Thomas and Betts, Electrical

2.2 GROUNDING CONDUCTORS

- A. For insulated conductors, comply with Division 16 Section 16120, "Conductors and Cables."
- B. Material: Copper.
- C. Equipment Grounding Conductors: Insulated with green-colored insulation.
- D. Bare Copper Conductors: Comply with the following:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B8.

2.3 CONNECTOR PRODUCTS

- A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.
- B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.
- C. Twist-on Connectors: Plastic body with coiled copper alloy wire forming threads.
- D. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.
- E. Underground Mechanical Connectors: Bolted-pressure type or compression type, listed for underground application.

2.4 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel, 3/4" dia. by 120 inches long.
- B. Ground Rods: Sectional type; copper-clad steel.
 - 1. Size: 3/4 by 120 inches (19 by 3000 mm) in diameter.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.
- B. In raceways, use insulated equipment grounding conductors.
- C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections except those at test wells.
- D. Equipment Grounding Conductor Terminations: Use bolted clamp type or compression connectors for conductors larger than 10 AWG. Use Plastic body twist-on connectors for 10AWG and smaller.

3.2 EQUIPMENT GROUNDING CONDUCTORS

- A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.
- B. Install equipment grounding conductors in all feeders and circuits.

3.3 INSTALLATION

- A. Ground Rods:
 - 1. Drive ground rods until tops are 2 inches (50 mm) below finished floor or final grade, unless otherwise indicated.
 - 2. Electrical Service Grounding Electrode Applications: Install at least three (3) rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes; install in as straight line as conditions permit. Interconnect ground rods with grounding electrode conductors. Use exothermic welds. Make connections without exposing steel or damaging copper coating.
- B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

3.4 CONNECTIONS

- A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.
 - 3. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
- C. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.
- D. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.
- E. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.
- F. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

- G. **Moisture Protection:** If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.5 FIELD QUALITY CONTROL

- A. **Testing:** Perform the following field quality-control testing:
 - 1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.
 - 2. Test completed grounding system at each location where a maximum ground-resistance level is specified and at service disconnect enclosure grounding terminal. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81.
 - 3. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes, identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
 - a. Equipment Rated 500 kVA and Less: 10 ohms.
 - 4. **Excessive Ground Resistance:** If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following:
 - 1. Division 26 Section "Basic Electrical Materials and Methods," for supports, anchors, and identification products.
 - 2. Division 26 Section "Wiring Devices," for devices installed in boxes.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. FMC: Flexible metal conduit.
- C. IMC: Intermediate metal conduit.
- D. LFMC: Liquidtight flexible metal conduit.
- E. RNC: Rigid nonmetallic conduit.
- F. Fixture Whip: Flexible wiring as specified from box to individual lighting fixture.

1.4 SUBMITTALS

- A. Product Data: For raceways, and fittings, floor boxes enclosures, and cabinets.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70 (2014).

1.6 COORDINATION

- A. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING AND RACEWAY SYSTEMS

A. Manufacturers:

1. Anamet Electrical, Inc.; Anaconda Metal Hose.
2. Electri-Flex Co.
3. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
4. LTV Steel Tubular Products Company.
5. Manhattan/CDT/Cole-Flex.
6. O-Z Gedney; Unit of General Signal.
7. Wheatland Tube Co.

B. Rigid Steel Conduit: ANSI C80.1. U. L. 6. Threaded with threaded fittings.

C. IMC: ANSI C80.6. U.L. 1242.

D. Plastic-Coated Steel Conduit and Fittings: NEMA RN 1.

E. Plastic-Coated IMC and Fittings: NEMA RN 1.

F. EMT and Fittings: ANSI C80.3. U.L. 797.

1. Fittings, 2 Inch Diameter and Larger: Steel (not die cast) set-screw or compression type.
2. Fittings, Smaller than 2 Inches Diameter: Compression type.

G. FMC: Zinc-coated steel.

H. LFMC: Flexible steel conduit with PVC jacket.

I. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

2.2 NONMETALLIC CONDUIT AND TUBING

A. Manufacturers:

1. American International.
2. Anamet Electrical, Inc.; Anaconda Metal Hose.
3. Arnco Corp.
4. Cantex Inc.
5. Certainteed Corp.; Pipe & Plastics Group.
6. Condux International.
7. ElecSYS, Inc.
8. Lamson & Sessions; Carlon Electrical Products.
9. Manhattan/CDT/Cole-Flex.
10. RACO; Division of Hubbell, Inc.
11. Thomas & Betts Corporation.

B. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.

C. RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.

2.3 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Finish with manufacturer's standard prime coating.
 - 1. Manufacturers:
 - a. Airey-Thompson Sentinel Lighting; Wiremold Company (The).
 - b. Thomas & Betts Corporation.
 - c. Walker Systems, Inc.; Wiremold Company (The).
 - d. Wiremold Company (The); Electrical Sales Division.

2.4 BOXES

- A. Manufacturers:
 - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 - 2. Emerson/General Signal; Appleton Electric Company.
 - 3. Erickson Electrical Equipment Co.
 - 4. Hoffman.
 - 5. Hubbell, Inc.; Killark Electric Manufacturing Co.
 - 6. O-Z/Gedney; Unit of General Signal.
 - 7. RACO; Division of Hubbell, Inc.
 - 8. Robroy Industries, Inc.; Enclosure Division.
 - 9. Scott Fetzer Co.; Adalet-PLM Division.
 - 10. Spring City Electrical Manufacturing Co.
 - 11. Thomas & Betts Corporation.
 - 12. Walker Systems, Inc.; Wiremold Company (The).
 - 13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.
- D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

2.5 FACTORY FINISHES

- A. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard paint applied to factory-assembled, enclosures, and cabinets before shipping.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Use the following raceways for outdoor installations:
 - 1. Exposed: IMC.
 - 2. Concealed: IMC.
 - 3. Underground, Single Run: RNC.
 - 4. Underground, Grouped: RNC.
 - 5. Connection to Vibrating Equipment: LFMC.
 - 6. Boxes and Enclosures: NEMA 250, Type 3R or Type 4.
- B. Use the following raceways for indoor installations:

1. Exposed in Unfinished Areas: EMT. Use IMC or Rigid Steel Conduit for locations subject to mechanical damage.
 2. Exposed in finished areas: Surface metal raceway where concealment is impossible. Limit use to the least possible. The impossibility of concealment is in the opinion of the Architect.
 3. Concealed: EMT.
 4. Connection to Vibrating Equipment: FMC; except in wet or damp locations, use LFMC.
 5. Damp or Wet Locations: IMC.
 6. Boxes and Enclosures: NEMA 250, Type 1, unless otherwise indicated.
- C. Minimum Raceway Size: 1/2-inch trade size (DN 14) unless noted. 3/8-inch factory assembled, flexible steel "fixture whips," a maximum of 60 inches long, may be used to feed individual lay-in LED lighting fixtures.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.

3.2 INSTALLATION

- A. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water piping.
- B. Do not support electrical equipment or raceways from ceiling grid or ceiling grid supports. Independently support all equipment and raceways directly from structural elements.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Basic Electrical Materials and Methods."
- E. Install temporary closures to prevent foreign matter from entering raceways.
- F. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above the finished slab.
- G. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated.
- H. Conceal raceways within finished walls and ceilings unless concealment is impossible or where otherwise indicated.
 1. Install concealed raceways with a minimum of bends in the shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.
- I. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
 1. Run parallel or banked raceways together on common supports.
 2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
- J. Join raceways with fittings designed and approved for that purpose and make joints tight.
 1. Use insulating bushings to protect conductors.

- K. Tighten set screws of threadless fittings with suitable tools.
- L. Terminations:
 - 1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
 - 2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.
- M. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200 lb (90 kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire.
- N. Telephone and Signal System Raceways, 2 Inch Trade Size (DN 53) and Smaller: In addition to above requirements, install raceways in maximum lengths of 150 feet (45 meters) and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.
- O. Flexible Connections: Use maximum of 60 inches (1725 mm) of flexible conduit for recessed and semirecessed lighting fixtures. Use maximum of 12 inches (35 mm) of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.
- P. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.
- Q. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

3.3 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.4 CLEANING

- A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes.

END OF SECTION 26 05 33

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LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following lighting control devices:

- 1. Time switches.
- 2. Outdoor photoelectric switches.
- 3. Multipole contactors.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show installation details for occupancy and light-level sensors.
 - 1. Lighting plan showing location, orientation, and coverage area of each sensor.
 - 2. Interconnection diagrams showing field-installed wiring.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70 (2014).

PART 2 - PRODUCTS

2.1 GENERAL LIGHTING CONTROL DEVICE REQUIREMENTS

- A. Line-Voltage Surge Protection: An integral part of the devices for 120- and 277-V solid-state equipment. For devices without integral line-voltage surge protection, field-mounting surge protection shall comply with IEEE C62.41 and with UL 1449.

2.2 TIME SWITCHES

- A. Manufacturers:
 - 1. Grasslin Controls Corporation.
 - 2. Intermatic, Inc.

3. **TORK.**

- B. **Digital Time Switches:** Electronic, solid-state programmable units with alphanumeric display complying with UL 917.

1. **Contact Configuration:** DPST.
2. **Contact Rating:** 30-A inductive or resistive, 240-V ac.
3. **Program:** Single channel, 2 on-off set points on a 24-hour schedule, allowing different set points for each day of the week and an annual holiday schedule that overrides the weekly operation on holidays.

2.3 OUTDOOR PHOTOELECTRIC SWITCHES

- A. **Manufacturers:**

1. Area Lighting Research, Inc.
2. Fisher Pierce.
3. Grasslin Controls Corporation.
4. Intermatic, Inc.
5. Paragon Electric Co.
6. TORK.

- B. **Description:** Solid state, with DPST dry contacts rated for 1800-VA tungsten or 1000-VA inductive, to operate connected relay, contactor coils, microprocessor input, and complying with UL 773A.

1. **Light-Level Monitoring Range:** 1.5 to 10 fc (16 to 108 lx), with an adjustment for turn-on and turn-off levels within that range.
2. **Time Delay:** 15-second minimum, to prevent false operation.
3. **Surge Protection:** Metal-oxide varistor type, complying with IEEE C62.41 for Category A1 locations.
4. **Mounting:** Twist lock complying with IEEE C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the North sky exposure.

2.4 MULTIPOLE CONTACTORS

- A. **Manufacturers:**

1. Allen-Bradley/Rockwell Automation.
2. Cutler-Hammer; Eaton Corporation.
3. GE Industrial Systems; Total Lighting Control.
4. Square-D Co.

- B. **Description:** Electrically operated and mechanically held, complying with NEMA ICS 2 and UL 508.

1. **Current Rating for Switching:** Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
2. **Control-Coil Voltage:** Match control power source.

2.5 SWITCH-BOX OCCUPANCY SENSORS

- A. **Manufacturers:**

1. Leviton Mfg. Company Inc.
2. Lightolier Controls; a Genlyte Company.
3. Lithonia Lighting.
4. Novitas, Inc.

5. Sensor Switch, Inc.
 6. Watt Stopper (The).
- B. Description: PIR type with integral power-switching contacts rated for 800 W at 120-V ac, suitable for incandescent light fixtures, fluorescent light fixtures with magnetic or electronic ballasts, or 1/6-hp motors; and rated for 1000 W at 277-V ac, suitable for incandescent light fixtures, fluorescent light fixtures with magnetic or electronic ballasts, or 1/3-hp motors, minimum.
1. Include ground wire.
 2. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
 4. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
 5. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted though a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 6. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
 7. Bypass Switch: Override the on function in case of sensor failure.
- C. Dual-Technology Type: Ceiling mounting; detect occupancy by using a combination of PIR and ultrasonic detection methods in area of coverage. Particular technology or combination of technologies that controls on and off functions shall be selectable in the field by operating controls on unit.
1. Sensitivity Adjustment: Separate for each sensing technology.
 2. Detector Sensitivity: Detect occurrences of 6-inch (150-mm) minimum movement of any portion of a human body that presents a target of at least 36 sq. in. (232 sq. cm), and detect a person of average size and weight moving at least 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
 3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. feet (93 sq. meters) when mounted on a 96-inch- (2440-mm-) high ceiling.

2.6 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG, complying with Division 26 Section, "Conductors and Cables."

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

- A. Install and aim sensors in locations to achieve at least 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.2 WIRING INSTALLATION

- A. Wiring Method:** Comply with Division 26 Section, "Conductors and Cables." Minimum conduit size shall be 1/2 inch (13 mm).
- B. Wiring within Enclosures:** Bundle, lace, and train conductors to terminal points. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Install field-mounting transient voltage suppressors for lighting control devices in Category A locations that do not have integral line-voltage surge protection.**
- D. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.**
- E. Splices, Taps, and Terminations:** Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.
- F. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.**

3.3 IDENTIFICATION

- A. Identify components and power and control wiring according to Division 26 Section, "Basic Electrical Materials and Methods."**
- B. Label time switches and contactors with a unique designation.**

3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:**
 - 1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.**
 - 2. Operational Test: Verify actuation of each sensor and adjust time delays.**
- B. Remove and replace lighting control devices where test results indicate that they do not comply with specified requirements.**
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.**

END OF SECTION

PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Lighting and appliance branch-circuit panelboards.
 - 2. Transient voltage suppression panelboards.

1.3 DEFINITIONS

- A. GFCI: Ground-fault circuit interrupter.

1.4 SUBMITTALS

- A. Product Data: For each type of panelboard, overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:
 - a. Enclosure types and details for types other than NEMA 250, Type 1.
 - b. Bus configuration, current, and voltage ratings.
 - c. Short-circuit current rating of panelboards and overcurrent protective devices.
 - d. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 2. Wiring Diagrams: Power, signal, and control wiring.
- C. Qualification Data: For testing agency.
- D. Field quality-control test reports including the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- E. Panelboard Schedules: For installation in panelboards.
- F. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1, include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device.

1.5 QUALITY ASSURANCE

- A. **Source Limitations:** Obtain panelboards, overcurrent protective devices, components, and accessories through one source from a single manufacturer.
- B. **Product Options:** Drawings indicate size, profiles, and dimensional requirements of panelboards and are based on the specific system indicated. Refer to Division 1 Section "Material and Equipment."
- C. **Electrical Components, Devices, and Accessories:** Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. **Comply with NEMA PB 1.**
- E. **Comply with NFPA 70 (2014).**

1.6 PROJECT CONDITIONS

- A. **Environmental Limitations:** Rate equipment for continuous operation under the following conditions, unless otherwise indicated:
 1. **Ambient Temperature:** Not exceeding 104 degrees F (40 degrees C).
 2. **Altitude:** Not exceeding 6600 feet (2000 meters).
- B. **Service Conditions:** NEMA PB 1, usual service conditions, as follows:
 1. **Ambient temperatures** within limits specified.
 2. **Altitude** not exceeding 6600 feet (2000 meters).
- C. **Interruption of Existing Electric Service:** Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 1. **Notify Owner** no fewer than seven days in advance of proposed interruption of electrical service.
 2. **Do not proceed** with interruption of electrical service without Owner's written permission.

1.7 COORDINATION

- A. **Coordinate layout and installation** of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

1.8 EXTRA MATERIALS

- A. **Furnish extra materials** described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. **Keys:** Six spares for each type of panelboard cabinet lock.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work."
- B. Enclosures: Surface-mounted cabinets. NEMA PB 1, Type 1.
 - 1. Rated for environmental conditions at installed location.
 - a. Outdoor Locations: NEMA 250, Type 3R.
 - b. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
 - 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions.
 - 3. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.
 - 4. Directory Card: With transparent protective cover, mounted in metal frame, inside panelboard door.
- C. Phase and Ground Buses:
 - 1. Material: Hard-drawn copper, 98 percent conductivity.
 - 2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.
- D. Conductor Connectors: Suitable for use with conductor material.
 - 1. Main and Neutral Lugs: Mechanical type.
 - 2. Ground Lugs and Bus Configured Terminators: Mechanical type.
- E. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.

2.2 PANELBOARD SHORT-CIRCUIT RATING

- A. Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Manufacturers: Products: Subject to compliance with requirements, provide one of the products specified.
 - 1. Cutler-Hammer: PRL1a (120/240V).
 - 2. General Electric: AQ Series (120/240V).
 - 3. Siemens: Sentron S1 (120/240V).
 - 4. Square-D: NQOD (120/240V).
- B. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- C. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.4 TRANSIENT VOLTAGE SUPPRESSION PANELBOARDS

- A. Manufacturers: Products: Subject to compliance with requirements, provide one of the products specified.
 - 1. Cutler-Hammer: As specified above with integral "Clipper" TVSS
 - 2. General Electric: As specified above with integral "ME" TVSS.
 - 3. Siemens: As specified above with integral "TPS" TVSS.
 - 4. Square-D: As specified above with integral "Surge Logic" TVSS.
- B. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
- C. Main Overcurrent Devices: Thermal-magnetic circuit breaker.
- D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers.
- E. Bus: Copper phase and neutral buses; 200 percent capacity neutral bus and lugs.
- F. Transient Voltage Suppression Device: IEEE C62.41, integrally mounted, plug-in-style, solid-state, parallel-connected, sine-wave tracking suppression and filtering modules.
 - 1. Minimum Single-Impulse Current Ratings:
 - a. Line to Neutral: 100,000 A.
 - b. Line to Ground: 100,000 A.
 - c. Neutral to Ground: 50,000 A.
 - 2. Protection modes shall be as follows:
 - a. Line to neutral.
 - b. Line to ground.
 - c. Neutral to ground.
 - 3. EMI/RFI Noise Attenuation Using 50-ohm Insertion Loss Test: 55 dB at 100 kHz.
 - 4. Maximum UL 1449 Clamping Levels: 400 V, line to neutral and line to ground on 120/208 V systems.
 - 5. Withstand Capabilities: 3000 Category C surges with less than 5 percent change in clamping voltage.
 - 6. Accessories:
 - a. Form-C contacts, one normally open and one normally closed, for remote monitoring of system operation. Contacts to reverse position on failure of any surge diversion module.
 - b. Audible alarm activated on failure of any surge diversion module.
 - c. Six-digit transient-counter set to total transient surges that deviate from the sine-wave envelope by more than 125 V.

2.5 OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker: UL 489, with interrupting capacity to meet available fault currents.
 - 1. Thermal-Magnetic Circuit Breakers: Full module, inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Tandem or "piggyback" breakers are not acceptable.

- B. **Molded-Case Circuit-Breaker Features and Accessories:** Standard frame sizes, trip ratings, and number of poles.
 - 1. **Lugs:** Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - 2. **Application Listing:** Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Mount top of trim 74 inches (1880 mm) above finished floor, unless otherwise indicated.
- C. Mount plumb and rigid without distortion of box.
- D. Install overcurrent protective devices and controllers.
- E. Install filler plates in unused spaces.
- F. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

3.2 IDENTIFICATION

- A. Create a directory to indicate installed circuit loads. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- B. **Panelboard Nameplates:** Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.3 CONNECTIONS

- A. Ground equipment according to Division 26 Section, "Grounding and Bonding."
- B. Connect wiring according to Division 26 Section, "Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.5 CLEANING

- A. Upon completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION

WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Duplex receptacles.
 - 2. Single receptacles.
 - 3. Ground-fault circuit interrupters.
 - 4. Single- pole switches.
 - 5. Three way switches.
 - 6. Double-pole switches.
 - 7. Dimmer switches.
 - 8. Device wall plates.

1.3 DEFINITIONS

- A. GFCI: Ground-fault circuit interrupter.
- B. TVSS: Transient voltage surge suppressor.
- C. EMI: Electromagnetic interference.
- D. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device through one source from a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70 (2014).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following (for each type of wiring device):

1. Single Pole Toggle Switch, 120-277V, 20A:
 - a. Hubbell #HBL1221.
 - b. Leviton #1221-2.
 - c. P & S #20-AC-1.
2. Two Pole Toggle Switch, 120-277V, 20A:
 - a. Hubbell #HBL1222.
 - b. Leviton #1222-2.
 - c. P & S #20-AC-2.
3. Three-Way Toggle Switch, 120-277V, 20A:
 - a. Hubbell #HBL1223.
 - b. Leviton #1223-2.
 - c. P & S #20-AC-3.
4. Four-Way Toggle Switch, 120-277V, 20A:
 - a. Hubbell #HBL1224.
 - b. Leviton #1224-2.
 - c. P & S #20-AC-4.
5. Duplex Receptacle, 125V-1 ϕ -20A:
 - a. Hubbell #HBL5362.
 - b. Leviton #5362.
 - c. P & S #5362A.
6. GFCI Receptacles, 125V-1 ϕ -20A:
 - a. Hubbell #HBL-GF-5362.
 - b. Leviton #8899.
 - c. P & S #2091-S.
7. Motor Rated Switches and Manual Motor Starters:
 - a. General Electric CR101 Series.
 - b. Square-D FG or KG Series.
 - c. P & S 78XX Series.

2.2 DEVICE PLATES

- A. Single and combination types to match corresponding wiring devices.
1. Plate-Securing Screws: Metal with head color to match plate finish.

2. Material for Finished Spaces: 0.035-inch- (1-mm-) thick, satin-finished stainless steel. Material for Unfinished Spaces: Galvanized steel.
3. Material for Wet Locations: Thermoplastic, with spring-loaded lift cover, and listed and labeled for use in "wet locations." For receptacles, listing shall apply with plug cap inserted.

2.3 FINISHES

A. Color:

1. Wiring Devices Connected to Normal Power System: White, unless otherwise indicated or required by NFPA 70.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install devices and assemblies level, plumb, and square with building lines.
- B. Install wall dimmers to achieve indicated rating after derating for ganging according to manufacturer's written instructions. Where switches are mounted adjacent to dimmers, switch shall be that dimmer manufacturer's companion device, matching dimmer style.
- C. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' written instructions.
- D. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates. Provide dimmer manufacturer's custom companion plates where dimmers and switches are mounted together.
- E. Remove wall plates and protect devices and assemblies during painting.

3.2 MOUNTING HEIGHTS

- A. Mount toggle switches at 48 inches above finished floor to center of toggle handle.
- B. Mount receptacles, telephone outlets and data outlets 18 inches above finished floor to center of receptacle unless specifically noted otherwise.
- C. Mount devices above counters at 2 inches from bottom of device to top of counter, or counter backsplash.

3.3 IDENTIFICATION

- A. Comply with Division 26 Section "Basic Electrical Materials and Methods".
 1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with [black] [white] [red]-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.4 CONNECTIONS

- A. Ground equipment according to Division 26 Section "Grounding and Bonding."
- B. Connect wiring according to Division 26 Section "Conductors and Cables."

- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- D. Do not connect stranded wire to devices using back wired push-in feature.
- E. When terminating stranded conductors on devices, ends of strands shall be contained by insulation so that all strands must be held by screw.

3.5 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.
 - 2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.
- B. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION 26 27 26

FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the cartridge fuses rated 600 V and less for use in switches.

1.3 SUBMITTALS

- A. Product Data: Include the following for each fuse type indicated:
 - 1. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
 - 2. Let-through current curves for fuses with current-limiting characteristics.
 - 3. Time-current curves, coordination charts and tables, and related data.
 - 4. Fuse size for elevator feeders and elevator disconnect switches.
- B. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.
 - 1. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
 - 2. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.
- C. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Division 1, include the following:
 - a. Let-through current curves for fuses with current-limiting characteristics.
 - b. Time-current curves, coordination charts and tables, and related data.
 - c. Ambient temperature adjustment information.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain fuses from a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NEMA FU 1.
- D. Comply with NFPA 70 (2014).

1.5 PROJECT CONDITIONS

- A. Where ambient temperature to which fuses are directly exposed is less than 40 degrees F (5 degrees C) or more than 100 degrees F (38 degrees C), apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.6 COORDINATION

- A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: Quantity equal to one complete set of each type and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper Bussman, Inc.
 - 2. Ferraz Shawmut, Inc.
 - 3. Tracor, Inc.; Littelfuse, Inc. Subsidiary.

2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class and current rating indicated; voltage rating consistent with circuit voltage.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- B. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

- A. Service Entrance: Class J, fast acting.
- B. Motor Branch Circuits: Dual element, time delay, current limiting, Class RK5.

3.3 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.4 IDENTIFICATION

- A. Install labels indicating fuse replacement information on inside door of each fused switch.**

END OF SECTION

ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes individually mounted enclosed switches used for the following:
 - 1. Service disconnecting means.
 - 2. Manual transfer switch with integral cam locks.
 - 3. Motor and equipment disconnecting means.
- B. Related Sections include the following:
 - 1. Division 26 Section "Fuses," for overcurrent protective devices installed in switches.

1.3 DEFINITIONS

- A. SPDT: Single pole, double throw.

1.4 SUBMITTALS

- A. Product Data: For each type of switch, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Field Test Reports: Submit written test reports and include the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- C. Maintenance Data: For enclosed switches and for components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Closeout Procedures," include the following:
 - 1. Routine maintenance requirements for components.
 - 2. Manufacturer's written instructions for testing and adjusting switches.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NEMA AB 1 and NEMA KS 1.

- C. Comply with NFPA 70 (2014).

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:
 - 1. Ambient Temperature: Not less than minus 22 degrees F (minus 30 degrees C) and not exceeding 104 degrees F (40 degrees C).
 - 2. Altitude: Not exceeding 6600 feet (2000 meters).

1.7 COORDINATION

- A. Coordinate layout and installation of switches and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Fusible Switches:
 - a. Eaton Corp.; Cutler-Hammer Products. DH Series
 - b. General Electric Co.; Electrical Distribution & Control Division. Type "TH"
 - c. Siemens Energy & Automation, Inc. "H" Series
 - d. Square D Co. "H" Series

2.2 ENCLOSED SWITCHES

- A. Enclosed, Nonfusible Switch: NEMA KS 1, Type HD, with lockable handle.
- B. Enclosed, Fusible Switch, 800 A and Smaller: NEMA KS 1, Type HD, with clips to accommodate specified fuses, lockable handle with two padlocks, and interlocked with cover in closed position.
- C. Type HD, Heavy Duty, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- D. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Receptacles: Cam-lock suitable for number, size, and conductor material.

2.3 ENCLOSURES

- A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.
 - 1. Outdoor Locations: NEMA 250, Type 3R.
 - 2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
 - 3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

2.4 FACTORY FINISHES

- A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested enclosures before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches for compliance with installation tolerances and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- B. Switches shall be mounted so that operating handle is up when switch is on and down when it is off.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Basic Electrical Materials and Methods."
- B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws. Indicate load designation.

3.4 CONNECTIONS

- A. Install equipment grounding connections for switches with ground continuity to main electrical ground bus.
- B. Connect lightning arresters.
- C. Install power wiring. Install wiring between switches and equipment.
- D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
 - 1. Test insulation resistance for each enclosed switch and component.
 - 2. Test continuity of each line- and load-side circuit.
- B. Testing: After installing enclosed switches and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
 - 1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.6 CLEANING

- A. Upon completion of installation, inspect interior and exterior of enclosures. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 26 28 16

SURGE PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes service entrance surge protective device and surge protective device at exterior HVAC equipment containing hermetic compressors.
- B. Related Sections include Division 26 Section, "Panelboards," for factory-installed TVSSs.

1.3 DEFINITIONS

- A. ATS: Acceptance Testing Specifications.
- B. SVR: Suppressed voltage rating.
- C. TVSS: Transient voltage surge suppressor.
- D. SPD: Surge Protective Devices (SPD's).

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating weights, operating characteristics, furnished specialties, and accessories.
- B. Product Certificates: For SPD's, signed by product manufacturer certifying compliance with the following standards:
 - 1. UL 1283.
 - 2. UL 1449.
- C. Operation and Maintenance Data: For SPD's to include in emergency, operation, and maintenance manuals.
- D. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain SPD's and accessories through one source from a single manufacturer.
- B. Product Options: Drawings indicate size, dimensional requirements, and electrical performance of SPD's and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

- D. Comply with NEMA LS 1, "Low Voltage Surge Protection Devices."
- E. Comply with NFPA 70 (2014).

1.6 PROJECT CONDITIONS

- A. Service Conditions: Rate surge protection devices for continuous operation under the following conditions, unless otherwise indicated:
 - 1. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage.
 - 2. Operating Temperature: 30 to 120 degrees F (0 to 50 degrees C).
 - 3. Humidity: 0 to 85 percent, noncondensing.
 - 4. Altitude: Less than 20,000 feet (6090 meters) above sea level.

1.7 COORDINATION

- A. Coordinate location of SPD's to allow adequate clearances for maintenance.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fail in materials or workmanship within one year from date of Final Inspection.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the specified.

2.2 SURGE PROTECTIVE DEVICES

- A. Surge Protection Device Description: Non-modular, sine-wave-tracking type with the following features and accessories:
 - 1. LED indicator lights for power and protection status.
 - 2. Knockout mounted.
- B. Peak Single-Impulse Surge Current Rating: 20 kA per phase.
- C. Connection Means: Permanently wired.
- D. Manufacturers:
 - 1. 120/208V, three phase
 - a. Cutler Hammer 2-CHSA01
 - b. General Electric 2-9L15FCB001
 - c. Joslyn 1455-21
 - d. Square-D 2-SDSA1175
 - 2. 120/240V, single phase
 - a. Cutler Hammer CHSA01

- b. General Electric 9L15FCB001
- c. Joslyn 1265-49
- d. Square-D SDSA1175

PART 3 - EXECUTION

3.1 INSTALLATION OF SURGE PROTECTION DEVICES

- A. Install devices at service entrance on line side, with ground lead bonded to service entrance ground.
- B. Install devices at each exterior item of mechanical equipment having a hermetic compressor. Connect on line side of local disconnect, with ground lead bonded to branch circuit ground.
- C. Make arrester leads as short as possible and keep radius of bends in wire as large as is practical.

3.2 PLACING SYSTEM INTO SERVICE

- A. Do not energize or connect service entrance or HVAC equipment to their sources until SPD's are installed and connected.

3.3 FIELD QUALITY CONTROL

- A. Testing: Perform the following field tests and inspections and prepare test reports:
 - 1. After installing surge protection devices, but before electrical circuitry has been energized, test for compliance with requirements.
 - 2. Complete startup checks according to manufacturer's written instructions.
 - 3. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, "Surge Arresters, Low-Voltage Surge Protection Devices" Section. Certify compliance with test parameters.
- B. Remove and replace malfunctioning units and retest as specified above.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to maintain SPD's. Refer to Division 1.

END OF SECTION

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INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

1. Interior lighting fixtures with LED arrays and drivers.
2. Lighting fixtures mounted on exterior building surfaces.
3. Emergency lighting units.
4. Exit signs.
5. Accessories.

- B. Related Sections include the following:

1. Division 26 Section "Wiring Devices," for manual wall-box dimmers for incandescent lamps.
2. Division 26 Section "Lighting Control Devices," for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.3 DEFINITIONS

- A. **BF:** Ballast factor. Ratio of light output of a given lamp(s) operated by the subject ballast to the light output of the same lamp(s) when operated on an ANSI reference circuit.
- B. **Correlated Color Temperature (CCT)** – a visible light characteristic of comparing a light source to a theoretical, heating black body radiator (measured in degrees kelvin).
- C. **CRI:** Color rendering index.
- D. **CU:** Coefficient of utilization.
- E. **Effective Projected Area (EPA)** – the wind loading of the fixture.
- F. **International Protection (IP) Rating** – delineates the level at which foreign objects and water can intrude inside a device.
- G. **Restriction of Hazardous Substances (RoHS)** – products that are RoHS-compliant do not contain any of the following materials: lead (Pb), mercury (Hg), cadmium (Cd), hexavalent
- H. **Useful Life** – the operating hours before reaching 70% of the initial rated lumen output point with no catastrophic failures under normal conditions.
- I. **LER:** Luminaire efficiency rating, which is calculated according to NEMA LE 5. This value can be estimated from photometric data using the following formula:

1. LER is equal to the product of total rated lamp lumens times BF times luminaire efficiency, divided by input watts.

J. RCR: Room cavity ratio.

K. Fixture Whip: Flexible wiring as specified from box to individual lighting fixture.

1.4 SUBMITTALS

A. Product Data: For each type of lighting fixture scheduled, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:

1. Physical description of fixture, including dimensions and verification of indicated parameters.
2. Emergency lighting unit battery and charger.
3. Fluorescent and high-intensity-discharge ballasts.
4. Lamps.

B. Wiring Diagrams: Power, signal, and control wiring.

C. IESNA LM-79 report on manufacturer's standard production model luminaire to include:

1. Testing agency, report number, date, manufacturer's name, catalog number, LED driver, drive current, ambient temperature.
2. Luminaire efficacy (lumens/watt), minimum light output, zonal lumen density.
3. Color qualities (CCT, CRI, chromaticity).
4. ANSI C78.377 Duv.
5. Electrical measurements (input voltage, input current, input power).
6. Spectral distribution over visible wavelengths (mW/nm).
7. Absolute intensity candlepower (cd) summary table.
8. Isocandela plot
9. Photometric file, including BUG rating.

D. IESNA LM-80 report on LED package, array, or module, to include:

1. Testing agency, report number, date, type of equipment, and LED light source being tested.
2. All data required by IESNA LM-80.

E. Field quality-control test reports.

F. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1, include the following:

1. Catalog data for each fixture. Include the diffuser, ballast, and lamps installed in that fixture.

G. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.

- B. **Luminaire Photometric Data Testing Laboratory Qualifications:** Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7.
- C. **Electrical Components, Devices, and Accessories:** Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. **Comply with NFPA 70 (2014).**
- E. **NFPA 101 Compliance:** Comply with visibility and luminance requirements for exit signs.

1.6 COORDINATION

- A. **Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.**

1.7 WARRANTY

- A. **Special Warranty for Emergency Lighting Unit Batteries:** Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
 - 1. **Warranty Period:** five years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining four years.
- B. **SPECIAL WARRANTY FOR LED LUMINAIRES**
 - 1. The LED manufacturer shall provide a written five-year on-site replacement "finish" warranty for luminaires. Finish warranty shall include warranty against failure or substantial deterioration such as blistering, cracking, peeling, chalking, or fading.
 - 2. The LED manufacturer shall provide a written five-year on-site replacement warranty for defective or non-starting power supply units and LED source assemblies, which include, but are not limited to, LED packages, LED arrays, LED modules, LED dies, encapsulates, and phosphors.
 - 3. The LED manufacturer shall provide a written five-year on-site replacement warranty for any LED source assembly, package, array, or module, which does not include the power supply, against 10% or more of the individual LEDs in that assembly, package, array, or module failing to illuminate.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. **As specified on the drawings or with approval prior to the bid. Approval granted prior to bid is subject, after the bid, to comparison with the specified equipment and to compliance with the plans, specifications and space limitation requirements.**

2.2 FIXTURES AND COMPONENTS, GENERAL

- A. **Recessed Fixtures:** Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. **LED Fixtures:** Comply with UL 1598. Where LER is specified, test according to NEMA LE 5A. Provide luminaires complete with LED light source and power supply unit. Details, shapes, and dimensions are indicative of the general type desired but are not intended to restrict selection to

luminaires of a particular manufacturer. Luminaires of similar design, light distribution and brightness characteristics, and of equal finish and quality will be acceptable.

1. Luminaires shall produce a minimum efficacy of 100 lumens per watt.
2. Luminaires shall incorporate modular electrical connections and be constructed to allow replacement of all or part of the optics, heat sinks, power supply units, and electrical components using only a simple tool, such as a screw driver.
3. Luminaires shall bear a nameplate inscribed with the manufacturer's name, address, model number, date of manufacture, and serial number, securely affixed in a conspicuous place. The nameplate of the distributing agent will not be acceptable.
4. Luminaires surge protection to meet "C low" waveforms as defined in ANSI/IEEE C62.41.2, scenario 1 Location C.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.
4. Laminated Silver Metallized Film: 90 percent.

G. Plastic Diffusers, Covers, and Globes:

1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - a. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless different thickness is scheduled.
 - b. UV stabilized.
2. Glass: Annealed crystal glass, unless otherwise indicated.

H. Electromagnetic-Interference Filters: A component of fixture assembly. Suppress conducted electromagnetic-interference as required by MIL-STD-461D. Fabricate lighting fixtures with one filter on each ballast indicated to require a filter.

2.3 LIGHTING FIXTURES

A. Fixtures: As scheduled on the Contract Drawings.

1. Suspended fixtures shall be balanced to hang straight and level.
2. Continuous rows of fixtures shall be run straight and level; fixture design shall not be susceptible to misalignment after incidental contact.

2.4 LED POWER SUPPLY UNITS

A. Efficiency: 85%.

- B. Maximum drive current: 525 mA.
- C. Operating temperature: -30°C to +40°C.
- D. Operating voltage: 120V to 277V nominal. Fluctuations in line voltage up to 15% shall have no visible effect on the luminous output.
- E. Operating frequency: 50/60 Hz.
- F. Power factor (PF) ≥ 0.90 .
- G. Total current harmonic distortion (THD) for current: $\leq 20\%$.
- H. Comply with FCC 47 CFR Section 15, Class B, non-consumer RFI/EMI standards.
- I. Reduction of hazardous substances- (RoHS-) compliant.
- J. Luminaires under a covered structure shall be UL-listed Class P with a sound rating of "A."
- K. Driver shall be dimmable and compatible with a standard dimming control circuits.
- L. Driver shall be protected against damage due to either an open-circuit or short-circuit fault condition on the driver output. The driver shall resume normal operation when the fault is removed.
- M. Over-temperature protection shall be provided to cut off output power if temperature limit is exceeded. The driver shall resume normal operation when within normal operating temperature.

2.5 LED LIGHT SOURCE

- A. Correlated color temperature (CCT) shall be in accordance with ANSI C78.377.
 - 1. Nominal CCT: 3000 K: 3045 ± 175 K.
 - 2. Nominal CCT: 4000 K: 3985 ± 275 K
 - 3. Nominal CCT: 5000 K: 5028 ± 283 K.
 - 4. Nominal CCT: 6500 K: 6530 ± 510 K.
- B. Color Rendering Index (CRI) shall be:
 - 1. ≥ 80 for 3000 K – 3500 K
 - 2. ≥ 70 for 4000 K – 6500 K
- C. Thermal management shall be passive by design and shall consist of heat sinks with no fans, pumps, or liquids.

2.6 EXIT SIGNS

- A. General: Comply with UL 924; for sign colors and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
 - 1. Lamps for AC Operation: Light-emitting diodes, 70,000 hours minimum of rated lamp life.
- C. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 - 1. Battery: Sealed, maintenance-free, nickel-cadmium type with special warranty.

2. Charger: Fully automatic, solid-state type with sealed transfer relay.
3. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.

2.7 LED EMERGENCY LIGHTING FIXTURES

- A. Internal Type: Self-contained, modular, battery-inverter unit factory mounted within fixture body. Comply with UL 924.
 1. Emergency Connection: Operate at reduced rating. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
 2. Test Switch and Light-Emitting-Diode Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
 3. Battery: Sealed, maintenance-free, nickel-cadmium type with minimum seven-year nominal life.
 4. Charger: Fully automatic, solid-state, constant-current type.

2.8 FIXTURE SUPPORT COMPONENTS

- A. Comply with Division 26 Section "Basic Electrical Materials and Methods," for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
- C. Twin-Stem Hangers: Two, 1/2-inch (13-mm) steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated, 12 gage (2.68 mm).
- E. Wires For Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage (2.68 mm) .

2.9 FINISHES

- A. Fixtures: Manufacturers' standard, unless otherwise indicated.
 1. Paint Finish: Applied over corrosion-resistant treatment or primer, free of defects.
 2. Metallic Finish: Corrosion resistant.

2.10 SOURCE QUALITY CONTROL

- A. Provide services of a qualified, independent testing and inspecting agency to factory test fixtures with ballasts and lamps; certify results for electrical ratings and photometric data.
- B. Factory test fixtures with ballasts and lamps; certify results for electrical ratings and photometric data.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

- B. Limit length of fixture whips to 60 inches from box to fixture. Do not run from fixture to fixture with flexible wiring.
- C. Support for Fixtures in or on Grid-Type Suspended Ceilings: Do not use ceiling grid or grid support wires for support. Support fixtures independently from structure.
 - 1. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
 - 2. Install at least two independent support rods or wires from structure to tabs on diagonal opposite ends of lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3. Do not use same wires or anchors used to support ceiling.
 - 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling tees and two independent support rods or wires from structure to lighting fixture.
- D. Suspended Fixture Support: As follows:
 - 1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
 - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
- E. Adjust aimable fixtures to provide required light intensities.

3.2 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Verify normal operation of each fixture after installation.
- C. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify normal transfer to battery power source and retransfer to normal.
- D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.
- E. Corroded Fixtures: During warranty period, replace fixtures that show any signs of corrosion.

END OF SECTION 26 51 00

**DIVISION 27
COMMUNICATIONS**

CONTENTS

27 51 00 SYSTEMS EQUIPMENT ROUGH-IN ONLY

27 51 00

COMMUNICATIONS SYSTEMS EQUIPMENT ROUGH-IN ONLY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes rough-in provisions for telephone/data system, being provided by others and/or systems being maintained by others.

1.3 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section "Raceways and Boxes."

1.4 QUALITY ASSURANCE

- A. Coordination: Coordinate requirements for the wiring method with the Owner's contractor for the equipment being provided and/or existing equipment being maintained.
- B. Comply with NFPA 70 (2014).

1.5 COORDINATION

- A. Coordinate layout and installation of wiring method components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 FUNCTIONAL DESCRIPTION OF SYSTEM

- A. System Functions: Systems will include indicated additions to existing systems and to new systems where equipment is furnished by the Owner or under another contract.

2.2 EQUIPMENT AND MATERIALS

- A. Work under this Section includes only rough-in for systems.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Wiring Method:
 - 1. Unless noted in new walls provide outlet boxes and raceway stub-outs into accessible attic spaces. Provide pull wire in raceways. Conceal raceways except in unfinished spaces.

2. In existing walls where possible provide low-voltage brackets and install cable inside well cavity without raceways. Cut and patch existing walls as required.
 3. In ceilings with accessible attic spaces immediately above, provide low-voltage mounting rings.
 4. In ceiling without accessible attic spaces immediately above, provide outlet boxes and raceways stub-outs into accessible attic spaces. Provide pull wire in raceways. Conceal raceways except in unfinished spaces.
- B. Separation of Wires: Each raceway installed shall be dedicated to a single system.
- C. Wall-Mounting and Ceiling- Mounted Outlets: Flush mounted.

END OF SECTION 27 51 00

DIVISION 28
ELECTRONIC SAFETY & SECURITY

CONTENTS

28 51 00	ELECTRONIC SAFETY AND SECURITY EQUIPMENT ROUGH-IN ONLY
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SECTION 28 51 00

ELECTRONIC SAFETY AND SECURITY SYSTEMS EQUIPMENT ROUGH-IN ONLY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes rough-in provisions for security/access control systems being provided by others and/or existing systems being maintained by others.

1.3 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section "Raceways and Boxes."

1.4 QUALITY ASSURANCE

- A. Coordination: Coordinate requirements for the wiring method with the Owner's contractor for the equipment being provided and/or equipment being maintained by others.
- B. Comply with NFPA 70 (2014).

1.5 COORDINATION

- A. Coordinate layout and installation of wiring method components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 FUNCTIONAL DESCRIPTION OF SYSTEM

- A. System Functions: Systems will include indicated additions to existing systems and to new systems where equipment is furnished by the Owner or under another contract.

2.2 EQUIPMENT AND MATERIALS

- A. Work under this Section includes only rough-in provisions for systems.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Wiring Method:
 - 1. Unless noted in new walls provide outlet boxes and raceway stub-outs into accessible attic spaces. Provide pull wire in raceways. Conceal raceways except in unfinished spaces.

2. In existing walls where possible provide low-voltage brackets and install cable inside well cavity without raceways. Cut and patch existing walls as required.
 3. In ceilings with accessible attic spaces immediately above, provide low-voltage mounting rings.
 4. In ceiling without accessible attic spaces immediately above, provide outlet boxes and raceways stub-outs into accessible attic spaces. Provide pull wire in raceways. Conceal raceways except in unfinished spaces.
- B. Separation of Wires: Each raceway installed shall be dedicated to a single system.
- C. Wall-Mounting and Ceiling- Mounted Outlets: Flush mounted.

END OF SECTION 28 51 00

**DIVISION 31
EARTHWORK**

Contents

31 10 00	Site Clearing
31 20 00	Earth Moving – Building Area Only
31 22 10	Excavation and Embankment
31 23 19	Dewatering
31 25 00	Erosion and Sediment Control (Storm Water Pollution Prevention Plan/SWPPP)
31 31 16	Termite Control
31 66 15	Helical Piles

SECTION 31 10 00

SITE CLEARING

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Clear and grub the site as shown on the Drawings and specified herein .
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. Section 31 20 00, Earthmoving

1.2 QUALITY ASSURANCE

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

1.3 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 66 00, Product Storage and Handling Requirements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide materials, not specifically described but required for proper completion of the work of this Section, as selected by the Contractor subject to the approval of the Architect.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PROTECTION

- A. Protect existing utilities indicated or made known. See Drawings for additional information regarding utilities.
- B. Protect existing fences by providing a 4' tall plastic fence of sufficient distance away so existing fences will not be damaged in any way as part of this Work.
- C. Protection of persons and property:
 - 1. Barricade open depressions and holes occurring as part of this Work, and post warning lights on property adjacent to or with public access.
 - 2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.

3. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by operations under this Section.
- D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors and to other work being performed on or near the site.
- E. Maintain access to the site at all times.

3.3 CLEARING

- A. Clean out roots 1" in diameter and larger to a depth of at least 12" below the existing ground surface or subgrade of new graded surface, whichever is lower. Treat roots remaining in the soil with a weed killer approved by the Architect.

3.4 CONSERVATION OF TOPSOIL

- A. After the area has been cleared of vegetation, strip the existing top soil to the depth necessary to provide at least 6" depth of topsoil in areas shown on the Drawings to be turfed or planted and to fill planters, without contamination with subsoils.
- B. Stockpile in an area clear of new construction.
- C. Maintain the stockpile in a manner which will not obstruct the natural flow of drainage.
 1. Maintain stockpile free from debris and trash.
 2. Keep the topsoil damp to prevent dust and drying out.

3.5 DISPOSAL

- A. General:
 1. Remove brush, grass, roots, trash and other material from clearing operations.
 2. Dispose of away from the site in a legal manner.
 3. Do not store or permit debris to accumulate on the job site.
 4. Do not burn debris at the site.

3.6 UTILITIES

- A. Coordinate with utility companies and agencies as required.
- B. Where utility cutting, capping or plugging is required, perform such work in accordance with requirements of the utility company or governmental agency having jurisdiction.

END OF SECTION

SECTION 31 20 00

EARTH MOVING – BUILDING AREA ONLY

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Work included: Excavate, backfill, compact and grade the site to the elevations shown on the Drawings, as specified herein, and as needed to meet the requirements of the construction shown in the Contract Documents.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. Soil Report and Soil Engineer. Contractor shall be familiar with geotechnical engineer's recommendations; discrepancies shall be immediately brought to the architect's attention.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use equipment adequate in size, capacity and numbers to accomplish the work of this Section in a timely manner.
- C. In addition to complying with requirements of governmental agencies having jurisdiction, comply with the directions of the soils report.

PART 2 – PRODUCTS

2.1 SOIL MATERIALS

- A. Fill and backfill materials:
 - 1. Provide sand in accordance with ASTM C-33 or other non-expansive material in accordance with soils report.
 - 2. Vapor barrier: 12 mil polyethylene film.
 - 3. Provide soil materials free from organic matter and deleterious substances, containing no rocks or lumps over 3" in greatest dimensions.
 - 4. Fill material is subject to the approval of the soil engineer, and is that material removed from excavations or imported from off-site borrow areas, predominantly granular, non-expansive soils free from roots and other deleterious matter.
 - 5. Fill material under building slab to be an inactive fill material, such as clayey sand or sandy clay, having a maximum liquid limit of forty (40) and plasticity index between five (8) and twenty (20). All subject to approval of the soils engineer.
 - 6. Do not permit rocks having a dimension greater than 1" in the upper 12" of fill or embankment.
 - 7. Cohesionless material used for structural backfill: Provide sand free from organic material and other foreign matter, and as approved by the soil engineer.
 - 8. Where granular base is called for under building slabs, provide aggregate complying with requirements of Section 03 30 00 of these Specifications.

2.2 WEED KILLER

- A. Provide a dry, free-flowing, dust-free chemical compound, soluble in water, capable of inhibiting growth of vegetation, and approved for use on this Work by governmental agencies having jurisdiction.

2.3 TOPSOIL

- A. Where and if shown on the Drawings or otherwise required, provide topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic matter normal to the region, capable of sustaining healthy plant life and reasonable free from subsoil, roots, heaving or still clay, stones larger than 2" in greatest dimension, noxious weeds, sticks, brush, litter and other deleterious matter.
- B. Obtain topsoil from sources within the project limits, or provide imported topsoil obtained from sources outside the project limits, or from both sources.

2.4 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 – EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PROCEDURES

A. Utilities:

1. Unless shown to be removed, protect active utility lines shown on the Drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.
2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Architect and secure his instructions.
5. Do not proceed with permanent relocation of utilities until written instructions are received from the Architect.

B. Protection of persons and property:

1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
3. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.

C. Dewatering:

1. Remove all water, including rain water, encountered during trench and sub-structure work to an approved location by pumps, drains and other approved methods.
2. Keep excavations and site construction area free from water.

D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.

E. Maintain access to adjacent areas at all times.

3.4 EXCAVATING

A. Perform excavating of every type of material encountered within the limits of the Work of the lines, grades and elevations indicated and specified herein.

B. Satisfactory excavated materials:

1. Transport to, and place in, fill or embankment areas within the limits of the Work.

C. Unsatisfactory excavated materials:

1. Excavate to a distance below grade as directed by the soil engineer, and replace with satisfactory materials.
2. Include excavation of unsatisfactory materials and replacement by satisfactory materials, as parts of the work of this Section.

D. Surplus materials:

1. Dispose of unsatisfactory excavated material and surplus satisfactory excavated material, away from the site of disposal area arranged and paid for by the Contractor.

E. Excavation of rock:

1. Where rocks, boulders, granite or similar material is encountered, and where such material cannot be removed or excavated by conventional earth moving or ripping equipment, take required steps to proceed with the general grading operations of the Work, and remove or excavate such material by means which will neither cause additional cost to the Owner nor endanger buildings or structures whether on or off the site.
2. Do not use explosives without written permission from the Architect.

F. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.

G. Borrow:

1. Obtain material required for fill or embankment in excess of that produced within the grading limits of the Work from borrow areas selected and paid for by the Contractor and approved by the soil engineer.

H. Ditches and gutters:

1. Cut accurately to the cross sections, grades and elevations shown.
2. Maintain excavations free from detrimental quantities of leaves, sticks, trash and other debris until completion of the Work.
3. Dispose of excavated materials as shown on the Drawings or directed by the soil engineer; except do not, in any case, deposit materials less than 3' -0" from the edge of a ditch.

I. Unauthorized excavation:

1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific instruction from the Architect or the soil engineer.
2. Under footings, foundations or retaining walls:
 - a. Fill unauthorized excavations by extending the indicated bottom elevation of the bottom or base to the excavation bottom, without altering the required top elevation.
 - b. When acceptable to the soil engineer, lean concrete fill may be used to bring the bottom elevation to proper position.
3. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations, unless otherwise directed by the soil engineer.

J. Stability of excavations:

1. Slope sides of excavations to 1:1 or flatter, unless otherwise directed by the soil engineer.
2. Shore and brace where sloping is not possible because of space restrictions or stability of the materials being excavated.
3. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

K. Shoring and bracing:

1. Provide materials for shoring and bracing as may be necessary for safety of personnel, protection of work and compliance with requirements of governmental agencies having jurisdiction.
2. Maintain shoring and bracing in excavations regardless of the time period excavations will be open.
3. Carry shoring and bracing down as excavation progresses.

L. Excavation for structures:

1. Conform to elevations and dimensions shown on contract documents within a tolerance of 0.10 ft., and extending a sufficient distance from footings and foundations to permit placing and removing concrete formwork, installation of services, other construction required and for inspection.

M. Cold weather protection:

1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.5 SUBGRADE INSPECTION

- A. Notify Architect when excavations have reached required subgrade.
- B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below the building slabs with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
 2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 20 tons.
 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

3.6 FILLING AND BACKFILLING

A. General:

1. For each classification listed below, please acceptable soil material in layers to required subgrade elevations.
2. Use an inactive fill material such as clayey sand or sandy clay having a maximum liquid limit of forty (40) and plasticity index between five (5) and twenty (20). See Structural.

B. Backfill excavations as promptly as progress of the Work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, damp proofing and waterproofing.
2. Inspecting, testing, approving and recording locations of underground utilities.
3. Removing concrete formwork.
4. Removing shoring and bracing and backfilling of voids with satisfactory materials.
5. Removing trash and debris.
6. Placement of horizontal bracing or horizontally supported walls.

C. Ground surface preparation:

1. Remove vegetation, debris, unsatisfactory soil materials, obstructions and deleterious matter from ground surface prior to placement of fills.
2. Plow, strip or break-up sloped surfaces steeper than one vertical to four horizontal so that fill material will bond with existing surface.
3. When existing ground surface has a density less than that specified under "compacting" for the particular area, break-up the ground surface, pulverize, moisture-condition to the optimum moisture content and compact to required depth and percentage of maximum density.

D. Placing and compacting:

1. Place backfill and fill materials in layers not more than 8" in loose depth.
2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
3. Compact each layer to required percentage of maximum density for area.
4. Do not place backfill or fill material on surfaces that are muddy, frozen or containing frost or ice.
5. Place backfill and fill materials evenly adjacent to structures, to required elevations.
6. Take care to prevent wedging action or backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.

3.7 GRADING

A. General:

1. Uniformly grade the area within limits of grading under this Section, including adjacent transition areas.
2. Smooth the finished surfaces within specified tolerance.
3. Compact with uniform levels or slopes between points where elevation are shown on the Drawings, or between such points and existing grades.
4. Where a change of slope is indicated on the Drawings, construct a rolled transition section having a minimum radius of approximately 8'0", unless adjacent construction will not permit such a transition, or if such a transition defeats positive control of drainage.

B. Grading outside building lines:

1. Grade areas adjacent to buildings to achieve drainage away from the structure, and to prevent ponding.
2. Finish the surfaces to be free from irregular surface changes, and:
 - a. Shape the surface of areas scheduled to be under walks to line, grade and cross-section, with finished surface not more than 0.10 feet above or below the required subgrade elevation.
 - b. Shape the surface of areas scheduled to be under pavement to line, grade and cross-section, with finished surface not more than 0.05 feet above or below the required subgrade elevation.

3.8 COMPACTING

- A. Control soil compaction during construction to provide the minimum percentage of density specified for each area as determined according to ASTM D 698.
- B. Provide not less than the following maximum density of soil material compacted at optimum moisture content for the actual density of each layer of soil material in place and as approved by the soil engineer.
 1. Structures:
 - a. Compact the top 8" of subgrade and each layer of fill material or backfill material to a minimum of ninety-five (95) percent Standard Proctor (ASTM D-698). Refer to General Notes for additional information.
- C. Moisture control:
 1. Where subgrade or layer of soil material must be moisture-conditioned before compacting, uniformly apply water to surface of subgrade or layer of soil material to prevent free water appearing on surface during or subsequent to compacting operation.
 2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.

3.9 FIELD QUALITY CONTROL

- A. Secure the soil engineer's inspection and approval of subgrades and fill layers before subsequent construction is permitted thereon.
- B. Provide at least the following tests to the approval of the soil engineer:
 1. At paved and building slab areas, at least one field density test for every 2,500 square feet of paved area, but not less than four tests.

3.10 MAINTENANCE

- A. Protection of newly graded areas:
 1. Protect newly graded areas from traffic and erosion, and keep free from trash and weeds;
 2. Repair and reestablish grades in settled, eroded and rutted areas to the specified tolerances.
- B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape and compact to the required density prior to further construction.

3.11 CERTIFICATION

- A. Upon completion of this portion of the Work, and as a condition of its acceptance, deliver to the Architect a written report from the soil engineer certifying that the compaction requirements have been obtained. State in the report the area of fill or embankment, the compaction density obtained and the type or classification of fill material placed.

END OF SECTION 31 20 00

SECTION 31 22 10

EXCAVATION AND EMBANKMENT

PART 1 - GENERAL

1.1 Scope: This Section covers the work required for all excavation and embankment related to the construction of the project including drives, curbs, graded swales, etc., at the locations, grades and dimensions as shown on the Drawings.

1.2 Reference Standard: Work shall conform to the following Section of the State of Louisiana, Department of Transportation and Development, "Louisiana Standard Specifications for Roads and Bridges", 2016 Edition, except as may be modified herein:

Section 203 - Excavation and Embankment

Subsections pertaining to Measurement and Payment are deleted.

1.3 Applicable Publications: The publications listed below form a part of this Specification to the extent referenced. The publication may be referred to in the text by basic designation only:

American Society for Testing and Materials (ASTM)

D698	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort
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D2487	Classification of Soils for Engineering Purposes (Unified Soil Classification System)
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PART 2 - PRODUCTS

2.1 Embankment Material: All embankment material shall meet the requirements of Section 203 - Excavation and Embankment of the referenced Standard.

2.1.1 Usable Soils: Refer to Section 203.06.1 of the referenced Standard.

2.1.2 Unsatisfactory Materials: Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH and PT and are not to be used.

2.1.3 Select Fill Materials: Refer to Section 701.08.1 "Type B" of the referenced Standard.

PART 3 - EXECUTION

3.1 General: Final plan grades excluding pavement and base shall be achieved using on-site materials. All excess materials shall be removed from the site by the CONTRACTOR. Unsatisfactory materials as defined herein shall not be used. Refer to Geotechnical.

3.2 Excavation: Excavation shall be performed in a manner that coincides with areas being prepared for fill.

3.2.1 Separation of Materials: On-site materials shall be used for this project and are categorized into three (3) groups; Usable Soils, Unsatisfactory Material and Select Fill Material.

- A. Usable Soils: Locate and separate Usable Soils by best practical means available to Contractor. Stockpile Usable Soils in convenient areas and protect from erosion and contamination.
- B. Unsatisfactory Material: CONTRACTOR to remove from the site.
- C. Select Fill Materials: Locate or provide and separate Select Fill Material. Select Fill Material shall be verified by a testing lab to be determined by the Owner. Stockpile Select Fill Material in one (1) convenient location. Coordinate this location with the ARCHITECT. Protect Select Fill Material from contamination and erosion.

3.3 Placement: Usable Soils shall as much as possible be placed in the upper four to five feet (4' - 5') of fill areas. Select Fill Materials shall be placed in areas prioritized as:

- 1. Drainage Pipe Trenches located in areas to be paved, and;
- 2. Areas to be Paved.
- 3. Base Course
- 4. As directed by ARCHITECT.

3.4 Compaction: Usable Soils shall be placed in eight inch (8") maximum loose lifts and compacted to 95% maximum density as defined by ASTM D698. Moisture at the time of compaction should be within the range of 2% below to 4% above theoretical optimum.

Select Fill Material shall be placed in eight inch (8") maximum loose lifts and compacted to 95% of the density defined by ASTM D698 (Standard Proctor). Maintain moisture during compaction within 1% below to 3% above theoretical optimum. Refer to Geotechnical.

3.5 Grading: Uniformly grade areas as designated on the Drawings including adjacent transition areas. Smooth finished surfaces within specified tolerances and compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.

3.5.1 Grading Tolerances: Contractor shall grade areas indicated within the following vertical tolerances:

Paved Areas +/- -1"
 Open Areas..... +/- 3"

3.6 Maintenance: Continually police and replace worn or damaged erosion and sedimentation control facilities throughout duration of Contract. Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded and rutted areas to specified tolerances. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape and compact to required density prior to further construction. Where settlement or erosion is measurable or observable, remove surface, add backfill material, compact, and reseed and establish surface or finish to match adjacent work and eliminate evidence of restoration to greatest extent possible.

3.7 Protection of Existing Structures:

A. All existing pipes, poles, wires, fences, curbing, property line markers, and other structures which in the opinion of the OWNER must be preserved in place without being temporarily or permanently relocated, shall be carefully supported and protected from damage by the CONTRACTOR. In case of damage, the CONTRACTOR shall notify the property Owner so that the proper steps may be taken to repair any and all damage done. When the property Owners do not wish to make the repairs themselves, all damage shall be repaired by the CONTRACTOR; or, if not promptly done by him, the Owner may have the repairs made at the expense of the CONTRACTOR.

B. All utility services shall be supported by suitable means so that the services do not fail when tamping and settling occurs.

3.8 Drainage:

A. At all times during construction, the CONTRACTOR shall temporarily provide, place and maintain ample means and devices with which to remove promptly, and dispose properly of, all water entering trenches and other excavations, or water that may flow along or across the site of the work. Excavations shall be kept dry until the structures, pipes and appurtenances to be built therein have been completed, to such extent that they will not be damaged. At that time, the CONTRACTOR may remove such temporary means and devices.

B. All water pumped or drained from the work shall be disposed of in a manner satisfactory to the ARCHITECT, without undue interference with other work or damage to pavements, other surfaces, or property.

- END OF SECTION -

SECTION 31 23 19

DEWATERING

PART 1 - GENERAL

1.1 Scope: This Section covers all work required to install and maintain drainage systems for handling groundwater and surface water encountered during construction of the civil sitework.

PART 2 - PRODUCTS (NOT USED)PART 3 - EXECUTION3.1 Dewatering:

A. The CONTRACTOR shall, at all times during construction, provide and maintain proper equipment and facilities to promptly remove and dispose of all water entering excavations and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition, until the fill, structure, or pipes to be built thereon or otherwise damaged by allowing water levels to return to natural elevations.

B. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.

C. The CONTRACTOR shall furnish all materials and equipment and perform all work required to install and maintain the drainage systems he proposes for handling groundwater and surface water encountered during construction of structures, pipelines, and compacted fills.

D. The established calendar day period for time of completion is intended to allow the CONTRACTOR to take advantage of the seasonal variations and groundwater levels during construction.

E. Any dewatering methods must meet the approval of the ENGINEER.

- END OF SECTION -

SECTION 31 25 00

**EROSION AND SEDIMENT CONTROL
(STORM WATER POLLUTION PREVENTION PLAN/SWPPP)**

PART 1 - GENERAL

1.1 **Scope:** This Section covers the preparation and implementation of the Storm Water Pollution Prevention Plan which includes the installation of temporary and permanent erosion controls, slope protection systems and required documentation.

1.2 **Environmental Requirements:** Protect adjacent properties, prevent soil and sediment erosion and minimize water quality degradation in receiving waters throughout life of Contract in conformance with LDEQ's General Permit for Discharges of Storm Water From Construction.

1.3 **Referenced Standard:** State of Louisiana, Department of Transportation and Development, "Louisiana Standard Specifications for Roads and Bridges," 2016 Edition.

Section 204	-	Temporary Erosion Control
Section 711	-	Rip Rap
Section 717	-	Seeding
Section 720	-	Erosion Control Systems
Section 739	-	Hydro Seeding
Section 1018	-	Miscellaneous Materials
Section 1019	-	Geotextile Fabrics and Geocomposite Systems

(All references made therein to measurement and payment are deleted).

1.4 **SWPPP File:** The CONTRACTOR shall establish and maintain a SWPPP file. The file shall be made available for review by the OWNER, ARCHITECT and/or regulatory agencies.

1.5 **Inspections:** The CONTRACTOR shall inspect site stormwater controls at least once every 14 calendar days, before anticipated storm events and within 24 hours after a storm event of 0.5 inches or greater.

PART 2 - PRODUCTS

2.1 **Silt Fence:** Silt fence for siltation control as specified on Drawings. Silt fence stakes shall be minimum of 4.5 ft in length and shall be metal stakes driven into ground.

2.2 **Seed:** Grass shall be an approved quick-growing species suitable to the area, providing a temporary cover, which will not compete with permanent grasses. Rye grass is the only acceptable grass for winter cover. All seeding work shall conform to section 717 of the Referenced Standard.

2.3 **Mulches:** Mulch shall comply with Subsection 1004.04 of the referenced Standard. Emulsified Asphalt shall conform to Section 1002 of the referenced Standard.

2.4 **Fertilizer:** Fertilizer shall comply with Subsection 1004.01 of the referenced Standard.

2.5 Temporary Construction Entrance / Inlet Sediment Filter / Rock Check Dam: Material shall be 2"-3" diameter clean stone over filter fabric as specified in Section 1019.01.2 (Class D) of the referenced Standard. Rip Rap (Check Dam Only) shall conform to Section 711 - 30 lb. Class of referenced Standard in combination with 2"-3" stone.

2.6 Filter Fabric: Underlayment for stone shall conform to LDOTD Section 1019.01.2 (Class D) of the Referenced Standard.

2.7 Straw Wattle: Straw wattle shall be 9" diameter tubular type with 2 lbs. per foot density minimum wheat straw filled with natural jute netting secured around drain opening for sediment filtering, available from Granite Environmental (888) 730 – 9889 or approved equal.

PART 3 – EXECUTION

3.1 Preparation: Review Drawings and implement Storm Water Pollution Prevention Plan.

3.2 Erosion Control and Slope Protection Implementation:

A. Place erosion control systems in accordance with Drawings and Storm Water Pollution Prevention Plan conforming to Section 720 of the referenced Standard and as may be dictated by site conditions in order to maintain the intent of the Specifications and Permits at no additional cost to OWNER.

B. Deficiencies or changes on Drawings or Storm Water Pollution Prevention Plan shall be implemented as site conditions change conforming to Section 204 of the referenced Standard.

C. OWNER has authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and to direct CONTRACTOR to provide immediate permanent or temporary pollution control measures at no additional cost to the OWNER.

D. Maintain temporary erosion control systems as directed by OWNER or governing authorities to control siltation during life of contract. CONTRACTOR shall respond to maintenance or additional work ordered by OWNER or governing authorities within 48 hours or sooner if required at no additional cost to the OWNER.

E. CONTRACTOR will be required to incorporate permanent erosion control features into project at earliest practical time to minimize need for temporary controls.

F. Seed and mulch temporary and permanent cut slopes as excavation proceeds to extent considered desirable and practical.

G. Slopes that erode easily or that will not be graded for a period of 14 days or more shall be temporarily seeded as work progresses with wheat, rye, or oats application at no additional cost to the OWNER.

3.3 Final Vegetative Cover: All non-paved areas disturbed due to construction (excluding areas to be landscaped with beds/plantings) shall receive topsoil/grass in accordance with the Plan.

3.4 Clean-up: All temporary measures, not directed by the ARCHITECT to remain, shall be removed and disposed of in an environmentally sound manner. All areas disturbed due to clean up shall receive permanent measures / proper ground cover as specified herein.

- END OF SECTION -

SECTION 31 31 16
TERMITE CONTROL

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Provide soil poisoning to control subterranean termites as specified herein and needed for a complete and proper treatment.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Qualifications of Subcontractor:
 - 1. Properly licensed to provide such services by governmental agencies having jurisdiction.
 - 2. Not less than five (5) years successful experience in soil treatment for subterranean termites.

1.3 WARRANTY

- A. Upon completion of the Work, and as a condition of its acceptance, deliver to the Architect two copies of a Warranty signed by an authorized representative of the installing Subcontractor and co-signed by the Contractor, agreeing:
 - 1. To make an inspection of the Work once each year for a total period of five (5) years following Date of Substantial Completion for the purpose of detecting termite infestation;
 - 2. If termite infestation is found during that five (5) year period, to retreat in accordance with prevailing practices of the trade and within ten (10) calendar days after such infestation is discovered;
 - 3. To repair damage to the Work caused by subterranean termites during that five (5) year period.
 - 4. To make such inspections, retreatment and repairs at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 MATERIALS

- A. The following materials are approved for use under this Section:
 - 1. The chemical to be used shall be one which is accepted by the Structural Pest Control Commission or the U.S. Department of Agriculture, Division of Insecticides and Fungicides as having prolonged effectiveness as a toxicant against subterranean termites. In no event shall the anticipated effective duration of the termite chemical be for less than two years. The chemical shall be applied at the dosage rate recommended by the manufacturer and acceptable to the Structural Pest Control Commission.
 - 2. Use termiticide carrying an EPA registration number, and approved by Louisiana governing authority.

3. There are certain Proprietary Materials which are being used as soil poisons for subterranean termite control. These are acceptable provided they contain one or more of the above approved chemicals in the concentrations specified, and providing, further that they possess acceptable compatibility materials that do not conform to these requirements will be evaluated on the basis of field performance according to standards approved by the Structural Pest Control Commission. Any other chemicals which in the future may be recommended by the Southern Forest Experiment Station's Forest Insect Laboratory at Gulfport, Mississippi, will be acceptable by the Structural Pest Control Commission.

C. APPLICATION

1. General

- a. The General Contractor shall remove all wood stakes, form boards, leveling pets and other wood or organic materials from the building area prior to treatment.
- b. Treatment shall not be made when the soil or fill is excessively wet or immediately after heavy rains, to avoid surface flow of the toxicant from application site.
- c. Unless the treated areas are to be immediately covered, precautions shall be taken to prevent disturbance of the treatment by human or animal contact with the treated soil.
- d. All openings around pipes that penetrate concrete floor slabs of filled foundations shall be sealed with a termite resistant mastic or cement grout. The mastic joint sealer shall be hot poured coat tar pitch, or a similar approved material that is equally resistant to penetration by termites. The joint sealer shall be applied in such a way as to provide a termite proof seal between the cement of the floor and the outer surface of the pipe or pipes.

2. Guarantee (Sample to be submitted as Shop Drawing.)

The cost of this work is to include the issuance of a \$100,000.00 termite control repair and guarantee for an initial period of two years with stipulated renewal rights at the sole option of the Owner for the life time of the building. This renewal, in the third year, shall not exceed 12% of the initial treatment price. Renewal insurance in the fourth year and each year thereafter for the life of the building shall be increased no more than the annual 10% per year or more than the annul rate of inflation (as measured by the consumer price index) whichever is greater. No failure on the part of the buyer to request reinspection shall, in any way, effect the buyer's rights under this contract. This contract cannot be canceled by any other way except the following:

- a. The Owner's written request.
- b. Failure of Owner to pay insurance premium within 6 months after renewal date. Written notice must be given to the Owner, once a month, within this 6 month period indicating that the premium is due or delinquent.

This blanket repair guarantee shall state the responsibility of the termite contractor to apply to the premises any necessary additional treatment and to make repairs or replacements to remedy damaged areas caused by subterranean termite reinfestation no extra cost to the Owner. If there is more than one building on a project, and these buildings do not connect, the issuance of a separate guarantee shall be provided, but in no event shall the accumulated totals of issuance premiums for the third year exceed 12% of the total price of the initial cost.

D. PRE-TREATMENT OF SLABS

1. Soil under open slab and appendages attached to building shall be pre-treated at the rate as recommended on manufacturer's label along a strip extending at least 3 ft. from wall of building.
2. After building has been completed and the yard filled and leveled so that the final grade has been reached along the outside of the foundation wall, this area shall be trenched and treated at the rate as recommended on manufacturer's label. Back fill as required.

PART 3 EXECUTION

- A. The above listed materials are to be applied exactly as indicated on the labels and labeling.
- B. Examine the areas and conditions under which work of this Section will be performed. Correct all conditions detrimental to timely and proper completion of the work. do not proceed until satisfactory conditions are provided.
- C. If soil is disturbed after treatment, retreat disturbed areas complete.

END OF SECTION

SECTION 31 66 15

HELICAL PILE FOUNDATIONS

PART 1 – GENERAL

1.1 Purpose of Specification

- A. The purpose of this specification is to detail the furnishing of all materials, tools, equipment, labor supervision, and installation techniques necessary to install helical piles as detailed on the drawings, including connection details. This shall include provisions for load testing that may be part of the scope of work.

1.2 Scope of Work

- A. This work consists of furnishing all necessary, supervision, labor, tools, materials, and equipment to perform all work necessary to install the helical piles per the specifications described herein, and as shown on the drawings. The Contractor shall install a helical pile that will develop the load capacities as detailed on the drawings.

1.3 Qualifications of the Helical Pile Contractor

- A. The helical pile Contractor shall be experienced in the installation of helical pile foundations and shall furnish all materials, labor, and supervision to perform the work. The Contractor shall provide names of on-site personnel materially involved with the work, including those who carry documented certification of helical pile training. At a minimum, these personnel shall include foreman, machine operator, and project engineer/manager.
- B. The helical pile Contractor shall not sublet the whole or any part of the contract without the express written permission of the Architect.

1.4 Allowable Tolerances

- A. Centerline of helical pile shall not be more than 3 inches from indicated plan location.
- B. Helical pile plumbness shall be within 2° of design alignment.
- C. Top elevation of helical pile shall be within +1 inch to –2 inches of the design vertical elevation.

1.5 Quality Assurance

- A. The Contractor shall employ an adequate number of skilled workers who are experienced in the necessary crafts and who are familiar with the specified requirements and methods needed for proper performance of the work of this specification.

B. All helical piles shall be installed in the presence of a designated representative of the Owner unless said representative informs the Contractor otherwise. The designated representative shall have the right to access any and all field installation records and test reports.

C. Helical pile components as specified therein shall be manufactured by a facility whose quality systems comply with ISO (International Organization of Standards) 9001 requirements. Certificates of Registration denoting ISO Standards Number shall be presented upon request to the Owner or their representative.

1.6 Ground Conditions

A. The Geotechnical Report, including logs of soil borings as shown on the boring location plan, shall be considered to be representative of the in-situ subsurface conditions likely to be encountered on the project site. Said Geotechnical Report shall be used as the basis for helical pile foundation design using generally accepted engineering judgment and methods.

PART 2 – REFERENCED CODES AND STANDARDS

The latest publication as of the issue of this specification shall govern, unless indicated otherwise.

2.1 American Society for Testing and Materials (ASTM):

- A. ASTM A29/A29M Steel Bars, Carbon and Alloy, Hot-Wrought and Cold Finished.
- B. ASTM A36/A36M Structural Steel.
- C. ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- D. ASTM A153 Zinc Coating (Hot Dip) on Iron and Steel Hardware.
- E. ASTM A252 Welded and Seamless Steel Pipe Piles.
- F. ASTM A775 Electrostatic Epoxy Coating
- G. ASTM A193/A193M Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service.
- H. ASTM A320/A320M Alloy-Steel Bolting Materials for Low Temperature Service.
- I. ASTM A500 Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- J. ASTM A572 HSLA Columbium-Vanadium Steels of Structural Quality.
- K. ASTM A618 Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing.
- L. ASTM A656 Hot-Rolled Structural Steel, High-Strength Low-Alloy Plate with Improved Formability.
- M. ASTM A1018 Steel, Sheet and Strip, Heavy Thickness Coils, Hot Rolled, Carbon, Structural, High-Strength Low-Alloy, Columbium or Vanadium, and High-Strength Low-Alloy with Improved Formability.
- N. ASTM D1143 Method of Testing Piles Under Static Axial Compressive Load.
- O. ASTM D3689 Method of Testing Individual Piles Under Static Axial Tensile Load.

2.2 American Welding Society (AWS):

- A. AWS D1.1 Structural Welding Code – Steel.
- B. AWS D1.2 Structural Welding Code – Reinforcing Steel.

2.3 American Society of Civil Engineers (ASCE):

- A. ASCE 20-96 Standard Guidelines for the Design and Installation of Pile Foundations.

2.4 Deep Foundations Institute (DFI):

- A. *Guide to Drafting a Specification for High Capacity Drilled and Grouted Micropiles for Structural Support*, 1st Edition, Copyright 2001 by the Deep Foundation Institute (DFI).

2.5 Society of Automotive Engineers (SAE):

- A. SAE J429 Mechanical and Material Requirements for Externally Threaded Fasteners.

PART 3 – SUBMITTALS

3.0 Construction Submittals

- A. The Contractor shall submit a detailed description of the construction procedures proposed for use to the Architect for review. This shall include a list of major equipment to be used.
- B. The technical submittal shall include the following:
 - a. Helical pile number, location and pattern by assigned identification number if not indicated on plans
 - b. Load required of each helical pile
 - c. Type and size of central steel shaft
 - d. Helix configuration (number and diameter of helix plates proposed)
 - e. Minimum effective installation torque
 - f. Minimum depth
 - g. Helical pile attachment to structure relative to grade beam, column pad, pile cap, etc.
- C. The Contractor shall submit shop drawings for all helical pile components, including corrosion protection and pile top attachment to the Architect for review and approval. This includes helical pile lead and extension section identification (manufacturer's catalog numbers).
- D. Work shall not begin until all the submittals have been received and approved by the Architect.

3.1 Installation Records

The Contractor shall provide the Architect copies of helical pile installation records within 24 hours after each installation is completed. Formal copies shall be submitted on a weekly basis. These installation records shall include, but are not limited to, the following information.

- A. Name of project and Contractor
- B. Name of Contractor's supervisor during installation
- C. Date and time of installation

- D. Name and model of installation equipment
- E. Type of torque indicator used
- F. Location of helical pile by assigned identification number
- G. Actual central steel shaft type and configuration – including lead section (number and size of helix plates), number and type of extension sections
- H. Helical pile installation duration and observations
- I. Total length of installed helical pile
- J. Cut-off elevation
- K. Inclination
- L. Installation torque at one-foot intervals for the entire length
- M. Comments pertaining to interruptions, obstructions, rate of advancement or other relevant information

PART 4 – PRODUCTS AND MATERIALS

4.1 Central Steel Shaft:

The central steel shaft, consisting of lead sections, helical extensions, and plain extensions, shall be hot rolled Round-Cornered-Square solid steel bars meeting dimensional and workmanship requirements of ASTM A29 or one of the following:

- a. *Pipe Shaft Material (2.875" O.D.):* Shall be structural steel tube or pipe, seamless or straight-seam welded, per ASTM A500 Grade B. Wall thickness is 0.203" (schedule 40).
- b. *Pipe Shaft Material (2.875" O.D.):* Shall be structural steel tube or pipe, seamless or straight-seam welded, per ASTM A500 Grade B. Wall thickness is 0.276" (schedule 80).
- c. *Pipe Shaft Material (3.5" O.D.):* Shall be structural steel tube or pipe, seamless or straight-seam welded, ASTM A53, A252, A500, or A618. Wall thickness is 0.300" (schedule 80).

4.2 Helix Bearing Plate:

Helix plates material shall be hot rolled carbon steel sheet, strip, or plate formed on matching metal dies to true helical shape and uniform pitch. Bearing plate material shall conform to the following ASTM specifications.

- a. *Solid Square Shaft Material (Torque $\leq 5,500$ ft-lb):* Per ASTM A572, or A1018, or A656 with minimum yield strength of 50 ksi. Plate thickness is 3/8".
- b. *Solid Square Shaft Material (Torque $\geq 5,500$ ft-lb):* Hot rolled steel sheet, strip or plate per ASTM A656 or A936 with minimum yield strength of 80 ksi. Plate thickness is 3/8" or 1/2".
- c. *Pipe Shaft Material (Torque $\leq 5,500$ ft-lb.):* Hot Rolled carbon steel, strip, or plate per ASTM A568 with minimum yield strength of 50 ksi. Alternate materials are A-36 or ASTM A572 Grade 50. Plate thickness is 3/8".
- d. *Pipe Shaft Material (Torque $\geq 5,500$ ft-lb.):* Per ASTM A36, or A572, or A1018, or A656 depending on helix diameter, with minimum yield strength of 80 ksi. Plate thickness is 3/8" or 1/2".

4.3 Bolts:

The size and type of bolts used to connect the central steel shaft sections together shall conform to the following ASTM specifications.

- a. *Solid Square Shaft Material (Torque $\leq 7,000$ ft-lb):* 3/4" diameter bolt per ASTM A320 Grade L7.
- b. *Solid Square Shaft Material (Torque $\geq 7,000$ ft-lb):* 7/8" – 1-1/4" per ASTM A193 Grade B7
- c. *Pipe Shaft Material (Torque $\leq 13,000$ ft-lb):* 3/4" diameter bolts (# of bolts per coupling depends on torque) per SAEJ429 Grade 5.
 - SAE J429 Grade 5: Sy (min) = 92 ksi, Su (min) = 120 ksi

4.4 Couplings:

Couplings shall be capable of transmitting both the maximum installation torque from the tool string to the helix plates, and the maximum axial load from the top of the pile to the helical bearing plates.

4.5 Plates, Shapes, or Pier Caps:

Structural steel plates and shapes for helical pile top attachments shall conform to ASTM A36 or ASTM A572 Grade 50.

4.6 Corrosion Protection

- a. Galvanization: All helical pile material that is not encased in concrete shall be hot-dipped galvanized in accordance with ASTM A153 after fabrication.

PART 5 – EXECUTION

5.1 Site Conditions

- a. Prior to commencing helical pile installation, the Contractor shall inspect the work of all other trades and verify that all said work is completed to the point where helical pile installation may commence without restriction.
- b. The Contractor shall verify that all helical piles may be installed in accordance with all pertinent codes and regulations regarding such items as underground obstructions, right-of-way limitations, utilities, etc.
- c. In the event of a discrepancy, the Contractor shall notify the Architect. The Contractor shall not proceed with helical pile installation in areas of discrepancies until said discrepancies have been resolved.

5.2 Installation Equipment

- a. Shall be rotary type, hydraulic power driven torque motor with clockwise and counter-clockwise rotation capabilities. The torque motor shall be capable of continuous adjustment to revolutions per minute (RPM's) during installation. Percussion drilling equipment shall not be permitted. The torque motor shall have torque capacity 15% greater than the torsional strength rating of the central steel shaft to be installed.

- b. Equipment shall be capable of applying adequate down pressure (crowd) and torque simultaneously to suit project soil conditions and load requirements. The equipment shall be capable of continuous position adjustment and swing capacity at maximum installation torque to maintain proper helical pile alignment during installation. The application of bending stress to the pile during installation will not be permitted.

5.2 Installation Tooling

- a. Shall consist of a Kelly Bar Adapter (KBA) and drive tool as appropriate for the central shaft of the helical pile under maximum installation torque and used in accordance with the manufacturers written installation instructions.
- b. Installation tooling should be maintained in good working order and safe to operate at all times. Flange bolts and nuts should be regularly inspected for proper tightening torque. Bolts, connecting pins, and retainers should be periodically inspected for wear and/or damage and replaced with identical items provided by the manufacturer. Heed all warning labels. Worn or damaged tooling should be replaced.
- c. A torque indicator shall be used during helical pile installation. The torque indicator shall be a device that directly measures torque and that is mounted in-line with the installation tooling. Devices that infer torque from hydraulic pressure will not be permitted.
- d. Shall be capable of providing continuous measurement of applied torque throughout the installation.
- e. Shall be capable of torque measurements in increments of 200 ft-lb or less.
- f. Shall be re-calibrated, if in the opinion of the Contractor reasonable doubt exists as to the accuracy of the torque measurements.

5.3 Installation Procedures

- a. The helical pile installation technique shall be such that it is consistent with the geotechnical, logistical, environmental, and load carrying conditions of the project.
- b. The lead section shall be positioned at the location as shown on the working drawings. Battered helical piles can be positioned perpendicular to the ground to assist in initial advancement into the soil before the required batter angle shall be established. The helical pile sections shall be engaged and advanced into the soil in a smooth, continuous manner at a rate of rotation of not to exceed 16 RPM's. The extension sections shall be provided to obtain the required minimum overall length and installation torque as shown on the working drawings. Connect sections together using coupling bolt(s) and nut torqued to 40 ft-lb.
- c. Sufficient down pressure shall be applied to uniformly advance the helical pile sections approximately 3 inches per revolution. The rate of rotation and magnitude of down pressure shall be adjusted for different soil conditions and depths.

5.3 Termination Criteria

- a. The torque as measured during the installation shall not exceed the torsional strength rating of the central steel shaft.
- b. The minimum installation torque and minimum overall length criteria as shown on the technical submittal shall be satisfied prior to terminating the helical pile foundation installation.

- c. If the torsional strength rating of the central steel shaft and has been reached prior to achieving the minimum overall length required, the Contractor shall have the helical design engineer review and comment.
- d. Remove the existing helical pile and install a new one with fewer and/or smaller diameter helix plates. The new helix configuration shall be subject to review and acceptance of the helical design Engineer.
- e. If the minimum installation torque as shown on the working drawings is not achieved at the minimum overall length, and there is no maximum length constraint, the Contractor shall have the following options:
 - f. Install the helical pile deeper using additional extension sections, or:
 - g. Remove the existing helical pile and install a new one with additional and/or larger diameter helix plates.
 - h. De-rate the load capacity of the helical pile and install additional helical screw foundation(s). The de-rated capacity and additional helical screw foundation location shall be subject to the review and acceptance of the architect / engineer.
 - i. If the helical pile is refused or deflected by a subsurface obstruction, the installation shall be terminated and the pile removed. The obstruction shall be removed, if feasible, and the helical pile re-installed. If the obstruction can't be removed, the helical pile shall be installed at an adjacent location, subject to review and acceptance of the Engineer.
 - j. If the torsional strength rating of the central steel shaft and has been reached prior to proper positioning of the last plain extension section relative to the final elevation, the Contractor may remove the last plain extension and replace it with a shorter length extension. If it is not feasible to remove the last plain extension, the Contractor may cut said extension shaft to the correct elevation. The Contractor shall not reverse (back-out) the helical pile to facilitate extension removal.
- l. The average torque for the last three feet of penetration shall be used as the basis of comparison with the minimum installation torque as shown on the working drawings. The average torque shall be defined as the average of the last three readings recorded at one-foot intervals.

END OF SECTION 316615

DIVISION 32
EXTERIOR IMPROVEMENTS

32 13 13	Portland Cement Concrete Pavement
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SECTION 32 13 13

PORTLAND CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

- 1.1 **Scope:** This Section covers all operations necessary to construct new Portland Cement concrete pavement at drives and parking within the areas as indicted on the Drawings and/or authorized by the Architect.
- 1.2 **Referenced Standard:** Work shall conform to the following Section of the State of Louisiana, Department of Transportation and Development, "Louisiana Standard Specifications for Road and Bridges," 2006 Edition, except as may be modified herein:

Section 601 - Portland Cement Concrete Pavement

Section 901 - Portland Cement Concrete

A. American Concrete Institute (ACI) latest edition

1. 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
2. 304R Guide for Measuring, Mixing, Transporting, and Placing Concrete
3. 305R Hot Weather Concreting
4. 306R Standard Specification for Cold Weather Concreting
5. 308 Standard Practice for Curing Concrete

B. American Society for Testing and Materials (ASTM) latest edition

1. A185 Steel Welded Wire Fabric, Plain for Concrete Reinforcement
2. A615 Deformed and Plain Billet-Steel for Concrete Reinforcement
3. C33 Concrete Aggregates
4. C94 Ready-Mixed concrete
5. C143 Method for Slump of Hydraulic Cement Concrete
6. C150 Portland Cement
7. C171 Sheet Material for Curing Concrete
8. C231 Air-Content of Freshly Mixed Concrete by the Pressure Method
9. C260 Air-Entraining Admixtures for Concrete
10. C309 Liquid Membrane-Forming Compounds for Curing Concrete
11. C494 Chemical Admixtures for Concrete
12. C920 Standard Specification for Elastomeric Joint Sealants
13. D994 Preformed Expansion Joint Filler for Concrete (Bituminous)
14. D1751 Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
15. D2628 Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements

All references made therein to measurement and payment are deleted.

- 1.3 **Submittals:** Submit concrete mix designs and product data sheets for joint devices, joint sealants and curing compound in accordance with provisions of Section 01 33 00 - Submittal Procedures.

1.4 **Quality Assurance:**

- A. Establish and maintain required lines and elevations.
- B. Check surface areas at intervals necessary to eliminate ponding areas. Remove and replace unacceptable paving as directed by Owner.

PART 2 - PRODUCTS

- 2.1 **General:** Materials shall conform to applicable provisions of Sections or subsections referred to in the Referenced Standard except as specified otherwise herein.

- 2.2 **Forms:** Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required. Coat forms with non staining type of coating that will not discolor or deface surface of concrete. Earth forms are not permitted.
- 2.3 **Reinforcing Bars:** Deformed steel bars, ASTM A 615, Grade 60, using deformed bars for number 3 or larger.
- 2.4 **Portland Cement Concrete at Drives:** Portland Cement concrete shall be Pavement Type B, 4,000 psi in accordance with Section 601 and 901 of Reference Standard and as specified in Section 03 30 00 – Cast-in-Place Concrete. Slump Range: 2" – 4" for hand placed concrete, 1" to 1 ½" for machine placed (slipform) concrete. A maximum of 20% (by weight) of flyash can be substituted for cement content.
- 2.5 **Portland Cement Concrete at Sidewalks:** Portland Cement concrete for sidewalks shall be 3,000 psi.
- 2.6 **Joint Fillers:** Resilient premolded bituminous impregnated fiberboard units complying with ASTM D994, D1751, D2628; FS HH-F-341, Type II, Class A or approved equal.
- 2.7 **Joint Sealants:** Sealant shall be a cold-pour, single-component, self-leveling polyurethane. When cured, the sealant shall meet the performance requirements of Federal Specifications SS-S-00200 E. The sealant shall be Sonneborn SL 1, as manufactured by Sonneborn-BASF and as locally represented by BASF Chemical Company (504-616-8777); 1500 SL by Geocel; or approved equal.
- 2.8 **Aggregate:** Shall conform to ASTM C33.
- 2.9 **Water:** Shall be clean and potable.
- 2.10 **Dowel Bars:** Shall conform to ASTM A615, grade 60, and plain steel bars, using deformed bars for number 3 and larger.
- 2.11 **Air Entraining Mixture:** Shall conform to ASTM C260 (Sika AER by Sika Corporation, Air mix by the Euclid Chemical Corporation or approved equal).
- 2.12 **Curing Compound:** This material shall conform to AASHTO Designation: M148 and be on the LDOTD Qualified Products list. The curing compound shall be white pigmented and conform to Subsection 101L01.
- 2.13 **Joint Backer Rods:** Shall be CCEVA Rod 100 by E-Poxy Industrials, Inc., Sealtight BACKER ROPE by W.R. Meadows, inc.; Best Materials; or approved equal.
- 2.14 **Welded Wire Fabric:** ASTM A185.

PART 3 – EXECUTION

- 3.1 **General:** All work related to this Section shall conform to Section 601 of the Referenced Standard, except as revised herein.
- 3.2 **Preparation:** Refer to Drawings for preparation of subgrade.
- 3.3 **Form Construction:**
- A. Set forms to required grades and lines, rigidly braced and secured.
 - B. Install sufficient quantity of forms to allow continuance of work and so that forms remaining place a minimum of 24 hours after concrete placement.
 - C. Check completed formwork for grade and alignment to following tolerances:

1. Top of forms not more than 1/8-inch in 10'-0"
 2. Vertical face on longitudinal axis, not more than 1/4-inch in 10'-0"
- D. Clean forms after each use and coat with form release agent as often as required to ensure separation from concrete without damage.

3.4 **Concrete Placement:**

- A. Concrete may be mixed and placed when the air temperature in the shade and away from artificial heat is a minimum of 35 degrees F and rising. Hot and cold weather concreting shall be in accordance with ACI305R and 306R, respectively.
- B. Upon completion of base course and formwork, install reinforcement as shown on the Drawings.
1. Clean reinforcement to remove loose rust and mill scale, earth and other materials which reduce bond or destroy bond with concrete.
 2. Position, support and secure reinforcement against displacement by formwork, construction and concrete placement operations.
 3. Place reinforcement to obtain the required coverages for concrete protection.
- C. Transit mix the concrete in accordance with provisions of ASTM C94.
1. With each load, provide ticket certifying to the materials and quantities and to compliance with the approved mix design.
 2. On the transit-mix ticket, state the time water was first added to the mix.
 3. At the batch plant, withhold 2-1/2 gallons of water per cubic yard of concrete.
 4. Upon arrival at the job site and as directed by the testing laboratory inspector, add all or part of the withheld water before the concrete is discharged from the mixer.
 5. Mix not less than five minutes after the withheld water has been added, and not less than one minute of that time immediately prior to discharge of the batch.
 6. Unless otherwise directed, provide 15 minutes total mixing time per batch after first addition of water.
- D. Do not use concrete that has stood over 30 minutes after leaving the mixer, or concrete that is not placed within 60 minutes after water is introduced into the mix.
- E. Conveying:
1. Place concrete in accordance with the following and pertinent recommendations contained in ACI 304.
 2. Deposit concrete continuously in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause formation of seams or planes of weakness within the section.
 3. If a section cannot be placed continuously, provide construction joints as specified herein.
 4. Perform concrete placing at such a rate that concrete which is being integrated with fresh concrete is still plastic.
 5. Deposit concrete as nearly as practicable in its final location so as to avoid segregation due to rehandling and flowing.
 6. Do not subject concrete to any procedure which will cause segregation.
 7. Do not use concrete which becomes non-plastic and unworkable, or does not meet required quality control limits, or has been contaminated by foreign materials.
 8. Remove rejected concrete from the site.
- F. Deposit and consolidate concrete in a continuous operation within the limits of construction joints until the placing of a panel or section is completed.
1. Bring surfaces to the correct level with a straight-edge, and then strike off.
 2. Use bullfloats or darbies to smooth the surface, leaving it free from bumps and hollows.
 3. Do not sprinkle water on the plastic surface. Do not disturb the surfaces prior to start of finishing operations.
- G. Do not place concrete until base material and forms have been checked for line and grade. moisten base material if required to provide uniform dampened condition at time concrete is placed. Concrete shall not be placed around manholes or other structures until they are at required finish elevation and alignment.

- H. Place concrete using methods that prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Consolidate with care to prevent dislocation of reinforcing, dowels and joint devices.
- I. Deposit and spread concrete in continuous operation between transverse joints, as far as possible. If interrupted for more than ½ hour, place construction joint.

3.5 **Finish:** Finishing of concrete by either machine or hand may be used.

- A. After striking off and consolidating concrete, smooth surface by screeding and floating. Adjust floating to compact surface and produce uniform texture. After floating, text surface for trueness wit 10'-0" straightedge. Distribute concrete as required to remove surface irregularities and refloat repaired areas to provide continuous smooth finish.
- B. Work edges of slabs and formed joints with edging tool, rounding edge to ½-inch radius. Eliminate tool marks on concrete surface. After completion of floating and toweling, when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
 - 1. Two types of finishes are indicated on the Drawings for the plaza and sidewalk paving, both a smooth finish and a heavy stiff-bristled broom finish. Contractor shall provide sample panels of both finishes for Architect's approval prior to placement of concrete.
 - 2. Direction of broom finish shall be delivered in field by Architect.
- C. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point up minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Owner.
- D. Sleeving for irrigation piping shall be set in place prior to concrete placement. Irrigation sleeving shall be 4" diameter Schedule 40, taped off and clearly marked on each end by a vertical stake labeled "irrigation sleeve," for use by irrigation contractor.
- E. New pavements shall be placed on compacted fill as per the drawing details.

3.6 **Reinforcement and Dowels:** Structural or fabric reinforcement will be supported by chairs. All structural reinforcement shall be Grade 60. Fasten reinforcing bars and dowels accurately and securely in place with suitable supports and ties. Remove from reinforcement all dirt, oil, loose mill scale, rust, and other substances that will prevent proper bonding of the concrete to the reinforcement.

3.7 **Joints:** Expansion, construction and dummy joints shall be constructed as detailed on the Drawings. If metal keyway forms are used to construct the longitudinal and transverse joints, the keyway form should be removed prior to installation of the adjacent panel pour.

3.8 **Joint Sealing:** Joints shall be sealed with either polyurethane polymers or silicone polymers conforming in Section 1005.02(b) or 1005.02(c) of the Reference Standard.

3.9 **Curing:** Curing and protection of the concrete shall be in accordance with Section 601.10 of the Referenced Standard.

3.10 **Cleaning and Adjusting:**

- A. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.
- B. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement.

END OF SECTION -

SECTION 32-16-33

CONCRETE WALKS AND INCIDENTAL PAVING

PART 1 - GENERAL

1.1 **Scope:** The CONTRACTOR shall furnish all labor, materials, tools and equipment, and perform operations necessary for the construction of Portland Cement concrete, sidewalks, sidewalk ramps and incidental paving in accordance with these Specifications and in conformity with the lines and grades as shown on the Drawings or established by the ENGINEER.

1.2 **Reference Standard:** Conform to the following sections of the State of Louisiana, Department of Transportation and Development, Standard Specifications for Roads and Bridges, 2006 Edition, except as modified herein:

Section 706	Concrete Walks, Drives, and Incidental Paving
Section 1005	Joint Materials for Pavements and Structures
Section 1009	Reinforcing Steel and Wire Rope
Section 1011	Concrete Curing Materials, Admixtures and Special Finishes

All references made therein to Measurement and Payment are deleted.

1.3 **Submittals:** Submit product data in accordance with provisions of Section 01340-Shop Drawings, Samples And Project Data.

PART 2 - PRODUCTS

2.1 **Portland Cement Concrete:** Portland Cement concrete for sidewalks, sidewalk ramps and incidental concrete pavement shall be Minor Structural Class "M" as specified in Section 03300 - Cast-in-Place Concrete.

2.2 **Joint Materials:**

A. **Curb and Pavement Expansion and Isolation Joint Material:** Material shall conform to Section 1005.01 (a) of the Reference Standard.

B. **Sidewalk Expansion Joint Material:** Material shall conform to Section 1005.01 (b) of the Reference Standard.

2.3 **Steel Reinforcing:** Steel reinforcing shall be grade 60 ksi and shall conform to Section 1009.01 of the Reference Standard.

2.4 **Fiber Reinforcement:** Concrete shall be reinforced with the use of polypropylene, collated, fibrillated fibers. The fibers shall be used at a rate of one and one half pounds (114 lbs.) per cubic yard and in strict accordance with the manufacturer's recommendations. The fiber manufacturer or approved distributor shall provide the services of a qualified technician at job startup.

2.5 Curing Compound: This material shall conform to AASHTO Designation: MI48 and be on the LDOTD Qualified Products list and conform to Subsection 1011.01. The curing compound shall be white pigmented.

2.6 Concrete Stain: Integral concrete stain shall be provided at areas of contrasting concrete color as detailed on the Drawings, Acceptable manufacturers shall be Kemiko Concrete Stains, H&C Concrete or approved equal.

PART 3 - EXECUTION

3.1 General: Concrete walks, ramps and incidental paving shall be constructed by the CONTRACTOR in the best workmanlike manner. The underlying subgrade as well as the finish surface shall conform to the requirements of these Specifications and of the Drawings.

3.2 Paving work shall be performed in accordance with Section 706 - "Concrete Walks, Drives and Incidental Paving" of the Reference Standard.

3.3 Walks shall be constructed on compacted subgrade. Subgrade shall be compacted in conformance with Section 31-22-10 - Excavation, Filling and Backfilling.

3.4 Finishing concrete by either machine or hand may be used, conforming to Section 706.03(d).

3.5 Expansion, longitudinal and dummy joints shall be constructed as detailed on the Drawings.

3.6 Pavement surface shall be finished with a broom finish.

3.7 All pavement shall receive white pigmented spray sealant curing compound upon completion of finish work.

- END OF SECTION -

SECTION 32-17-23.13

PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 **Scope:** This Section includes requirements for installation of pavement markings as indicated on the Drawings and as specified herein.

1.2 **Reference Standard:** Work shall conform to the following Section(s) of the State of Louisiana, Department of Transportation and Development, "Louisiana Standard Specifications for Roads and Bridges". 2006 Edition, except as may be modified herein:

Section 1015 Signs and Pavement Markings

All references made therein to Measurement and Payment are deleted.

1.3 **Project Conditions:** Maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize flagmen, barricades, warning signs, and warning lights as required.

1.4 **Quality Assurance:** Use trained and experienced personnel in applying the products and operating the equipment required for properly performed work.

PART 2 - PRODUCTS

2.1 **Traffic Paint:** Paint shall be non-bleeding, quick-drying, and alkyd petroleum base paint suitable for traffic-bearing surface and be mixed in accordance with manufacturer's instructions before application.

2.2 **Glass Beads:** Glass beads shall be transparent, clean, smooth, colorless, and spherically shaped glass. Beads shall meet the gradation requirements of subsection 1015.13(b)(1) of the Reference Standard.

PART 3 - EXECUTION

3.1 **Examination:** Examine the work area and correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 **Preparation:**

A. Sweep and clean surface to eliminate loose material and dust.

B. New pavement surfaces shall be allowed to cure for a period of no fewer than thirty (30) days before application of marking materials.

3.3 **Application:**

- A. Apply two (2) coats of paint at manufacturer's recommended rate, without addition of thinner, with maximum of 100 square feet per gallon. Apply with mechanical equipment to produce uniform straight edges. At sidewalk curbs and crosswalks, use straightedge to ensure uniform, clean, and straight stripe.
- B. Apply glass beads at an even rate free of clusters and lumps in accordance with the manufacturer's recommendations.
- C. Install pavement markings according to manufacturer's recommended procedures for the specified material.

3.4 **Inspection and Clean Up:**

- A. After the paint has thoroughly dried, visually inspect the entire application and touch up as required to provide clean, straight lines and surfaces throughout.
- B. Waste materials shall be removed at the end of each workday. Upon completion of the work, all containers and debris shall be removed from the site. Paint spots upon adjacent surfaces shall be carefully removed by approved procedures that will not damage the surfaces and the entire job left clean and acceptable.

- END OF SECTION -

SECTION 32 90 10

SEEDING AND FERTILIZATION

PART 1 - GENERAL

1.1 Scope: This Section covers the cultivation of grassing of the project area consisting of seeding and fertilizing on all disturbed areas as noted.

1.2 Referenced Standard: Work shall conform to the following Section of the State of Louisiana, Department of Transportation and Development, "Louisiana Standard Specifications for Roads and Bridges", 2016 Edition, except as may be modified herein.

Section 717 - Seeding

Section 718 - Fertilizer and Agriculture Lime

Subsections pertaining to Measurement and Payment are deleted.

1.3 Submittals: Submit product data and manufacturer's certifications in accordance with Architects Requirements.

PART 2 - PRODUCTS2.1 General:

A. Materials related to erosion control and soil stabilization shall conform to the following subsection(s) of the Referenced Standard:

- (1) Seeding..... 1004.03
- (2) Water..... 714.07
- (3) Fertilizer..... 1004.01

PART 3 - EXECUTION

3.1 General: The CONTRACTOR shall neatly dress and prepare areas designated for grassing as specified in the appropriate sections of these Specifications.

3.2 Seeding: Seeding work shall be in conformance with Section 717 of the reference Standard. There will be no separate measurement or payment for watering to establish ground cover (stabilization). Rye grass is the only acceptable grass for winter cover.

3.3 Fertilizer: Fertilizer shall be installed in conformance with Section 718 of the reference Standard and as directed by the ENGINEER.

- END OF SECTION -

DIVISION 33
UTILITIES

33 42 00	Catch Basins
33 42 10	Storm Drainage Pipe
33 46 13	Bedding and Foundation Material

SECTION 33 42 00

CATCH BASINS

PART 1 - GENERAL

1.1 Scope: This Section covers the installation of concrete catch basins to be constructed on this project.

1.2 Reference Standard: Work shall conform to the following Section of the State of Louisiana, Department of Transportation and Development, "Standard Specifications", 2016 Edition, except as may be modified herein:

Section 702 – Manholes, Junction Boxes, Catch Basins, and End Treatments

1.3 Submittals: Submittals consisting of product data sheets and manufacturer's certifications shall be provided in accordance with Architects requirements.

PART 2 - PRODUCTS

2.1 Catch Basin Grate and Frame: Grate and frame area inlets shall be East Jordan Iron Works V-5724-1 or approved equal. Grate and frame curb inlets shall be East Jordan Iron Works V-4066-1 or approved equal. Finishing shall be in conformance with the reference Standard.

PART 3 - EXECUTION

3.1 Catch Basins: Catch basins shall be installed in conformance with the reference Standard except as may be modified herein below.

A. The bottoms of all catch basins shall contain benches and they shall be constructed to allow smooth flow through the system. Grout shall extend to a height of six (6") inches for fifteen (15") inches and eighteen (18") inches diameter pipe and a height of 1/3 diameter of pipe for twenty-four (24") inches pipe and larger at all outside edges and shall slope to the invert of the catch basin.

B. On all masonry constructed catch basins, both the interior and exterior walls shall be coated with a half inch (½") thick layer of mortar.

C. Rings and covers, frames and grates shall be delivered unpainted and after installation shall be coated with asphaltic varnish.

- END OF SECTION -

33 42 00-1

SECTION 33 42 10

STORM DRAINAGE PIPE

PART 1 - GENERAL

1.1 Scope: This Section covers the installation of storm drainage pipe to be constructed on this project.

1.2 Reference Standard: Work shall conform to the following Section of the State of Louisiana, Department of Transportation and Development, "Louisiana Standard Specifications for Roads and Bridges", 2016 Edition, except as may be modified herein:

Section 701 - Culverts and Storm Drains

Section 1016 – Concrete Pipe and Precast Reinforced Concrete Drainage Units

1.3 Submittals: Submittals consisting of product data sheets and manufacturer's certifications shall be provided in accordance with ARCHITECT'S requirements.

PART 2 - PRODUCTS

2.1 General: Materials related to storm drainage piping shall conform to the following Sections or Subsections of the Reference Standard:

(1) Reinforced Concrete Pipe	1016.02
(2) Geotextile Fabric (Plastic Filter Cloth).....	1019
(3) Preformed Joint Filler	1005.01
(4) Gasket Material.....	1016.01.1

2.2 Reinforced Concrete Pipe: Reinforced concrete pipe shall conform to ASTM C76 Class III, Wall A, B, or C.

2.3 Reinforced Concrete Pipe Arch (RCPA): Reinforced concrete pipe arch shall conform to ASTM C 506 Class A-III.

2.4 RCP Pipe Joints: Joints for reinforced concrete pipe shall be Type 3 in accordance with Section 1018.03 of the referenced Standard.

2.5 Bedding Material: Refer to Section 33 46 13 - Bedding and Foundation Material.

PART 3 - EXECUTION

3.1 Storm Drainage Pipe: Storm drainage pipe shall be installed in conformance with Section 701 of the reference Standard.

3.2 Reinforced Concrete Pipe Joints: Joints of reinforced concrete pipe shall be wrapped a minimum of eighteen (18") inches on each side of the joint with approved filter cloth.

3.3 Bedding Material: Refer to Section 33 46 13 - Bedding and Foundation Material

3.4 Connection to Existing Concrete Catch Basin: For connections to existing catch basins, the wall of the catch basin shall be broken out with a hole to accommodate penetration by the new pipe and a flexible water stop clamped around the pipe. The pipe with water stop shall be inserted, set to line and grade, and the hole repaired with non-shrinking grout.

- END OF SECTION -

SECTION 33 46 13

BEDDING AND FOUNDATION MATERIAL

PART 1 – GENERAL

1.1 Scope: This Section covers all operations necessary to provide bedding or foundation material for all structures and or appurtenances, as shown on the DRAWINGS, as specified herein and or as directed by the ARCHITECT, to provide a stable working table.

1.2 Reference Standard: Work shall conform to the following Section of the State of Louisiana, Department of Transportation and Development, "Louisiana Standard Specifications for Roads and Bridges", 2016 Edition, except as may be modified herein:

Section 726 – Bedding Material

Section 1003 – Aggregates

(References made to Measurement and Payment are hereby deleted)

PART 2 – PRODUCTS

2.1 Bedding/Foundation Material: Stone, 1003.03.3 of the referenced Standard.

PART 3 – EXECUTION

3.1 Installation: Install bedding material to widths and thicknesses as shown on the DRAWINGS in conformance with Section 726 of the referenced Standard and accepted by the ARCHITECT.

END OF SECTION

APPENDIX "A"

CONTENTS

Geotechnical Soils Report



Geotechnical Testing Laboratory, Inc.

Engineering and Construction Materials Testing Services

November 1, 2022

Red River Bank

1412 Center Court Drive, Suite 101
Alexandria, Louisiana 71301
Attention: Mr. Blake Chatelain, President/CEO

Ashe | Broussard | Weinzettle Architects

301 Jackson Street, Suite 205
Alexandria, Louisiana 71301
Attention: Mr. Kevin Broussard, AIA

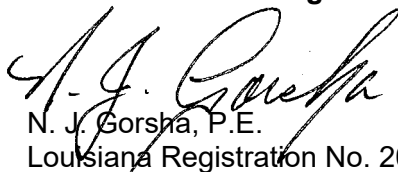
**RE: Geotechnical Investigation Services
Red River Bank – Veterans Branch
1918 Veterans Boulevard
Metairie, Jefferson Parish, Louisiana
Report Number 10-22-168**


Dear Mr. Chatelain:

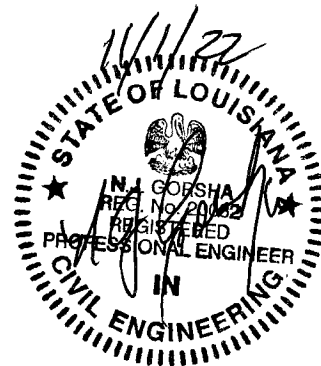
Geotechnical Testing Laboratory, Inc. is pleased to submit this report of subsurface exploration for the above referenced project. Included in the report are the results of the exploration and recommendations concerning the design and construction of the foundations as well as general site development.

We appreciate the opportunity to have provided you with our geotechnical engineering services. If you have any questions concerning this report, or if we may be of further service, please contact our office.

Respectfully submitted,
Geotechnical Testing Laboratory, Inc.


N. J. Gorsha, P.E.
Louisiana Registration No. 20082


Ken Gorsha
President



Distribution: (1) Red River Bank
(2) Ashe | Broussard | Weinzettle Architects

NJG/krq

Geotechnical Investigation Services
Red River Bank – Veterans Branch
1918 Veterans Boulevard
Metairie, Jefferson Parish, Louisiana
Report Number 10-22-168

Prepared For:

Red River Bank
1412 Center Court Drive, Suite 101
Alexandria, Louisiana 71301

Ashe I Broussard I Weinzettle Architects
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Alexandria, Louisiana 71301

Prepared By:

Geotechnical Testing Laboratory, Inc.
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APPENDICES

Appendix A – Field and Laboratory Procedures
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Geotechnical Investigation Services
Red River Bank – Veterans Branch
1918 Veterans Boulevard
Metairie, Jefferson Parish, Louisiana
Report Number 10-22-168

Introduction:

This report transmits the findings of a geotechnical investigation performed for the above-referenced project. The purpose of this investigation was to define and evaluate the general subsurface conditions in the immediate vicinity of a proposed new financial facility. Specifically, the study was planned to determine the following:

- Subsurface stratigraphy within the limits of our exploratory borings.
- Classification, strength, and compressibility characteristics of the foundation strata.
- Suitable foundation systems and allowable soil bearing pressures.
- Construction requirements for the placement of select earth fills.
- Recommendations for rigid pavement sections for unspecified traffic.

The purpose of this report is to provide the architect, structural engineer, civil engineer, and other design team professionals with recommendations for the design and construction of the proposed project. This report should not be used by the contractor in lieu of project plans or specifications.

Project Authorization:

Formal authorization to perform the work was provided by Ms. Debbie Triche, Senior Vice President with Red River Bank (Client), by accepting our September 29, 2022 written proposal. Written authorization to proceed was provided on October 11, 2022. Field procedures were conducted on October 26, 2022. To accomplish the intended purposes, a three-phase study program was conducted which included:

- a field investigation consisting of six exploratory test borings with samples obtained at selected intervals;
- a lab testing program designed to evaluate the expansive and strength characteristics of the subsurface soils; and,
- an engineering analysis of the field and laboratory test data for foundation design recommendations.

No additional analysis was requested. A brief description of the field and laboratory test procedures are provided in the Appendix.

Project Description:

We understand the project will consist of a one-story, slab-on-grade, wood or steel-frame building containing approximately 2,400 square feet of area, with associated light and moderate-duty rigid pavements. A common floor level is planned throughout. No below grade walls are anticipated.

For the purpose of this report, we have assumed that maximum column loads will not exceed approximately 20 kips (1 kip = 1,000 pounds), and that maximum continuous wall loads will be approximately one (1) to two (2) kips per linear foot. Information provided to this office indicates that the building pad area will receive a fill of approximately 12 to 24 inches to reach the design

grades. If larger grade changes are anticipated, these should be discussed with our geotechnical engineer prior to finalizing design.

If any of this information should change significantly or be in error, it should be brought to our attention so that we may review recommendations made in this report.

Site Conditions:

The site is located south of Veterans Boulevard in Metairie, Jefferson Parish, Louisiana. The site was noted to be relatively level with estimated maximum elevation differences of no more than one (1) foot, and was vegetated with weeds and grass. Portland cement concrete pavement was observed at the north end of the site. The drilling rig experienced moderate difficulty moving about the site.

Subsurface Stratigraphy:

The subsurface conditions at the proposed building site were explored by drilling a total of two (2) borings to a depth of approximately 30 feet. Additionally, the parking and drive areas were explored by drilling four (4) borings to a depth of approximately six (6) feet. The borings were located in the field by the drilling crew as shown on the Plan of Borings included in the Appendix of this report.

The stratification of the soils encountered during field drilling operations is presented on the boring logs in the Appendix. The stratification of the subsurface materials shown on the boring logs represents the subsurface conditions encountered at the actual boring locations and variations may occur across the site. The lines of demarcation represent the approximate boundary between the soil types, but the actual transition may be gradual. The following subsurface descriptions are of a generalized nature to highlight the major stratification features. The boring logs should be reviewed for more detailed information.

In order of increasing depth, the borings generally encountered the following soil strata beneath the surface: lean clay (CL) (CL)s, silty sand (SM), fat clay (CH), silt (ML)s and poorly graded sand (SP-SM).

Groundwater Conditions:

Seepage was observed at depths of six (6) and 8.5 feet during advancement of the test borings. Groundwater was measured at depths of nine (9) to 12 feet below existing ground surface upon completion of the borings. These levels are not expected to impact shallow excavations during construction, but the subsurface water regime is always subject to change with variations in climatic conditions and will likely coincide seasonal fluctuations. Future construction activities may also alter the surface and/or subsurface drainage patterns of this site. Therefore, groundwater conditions should be explored at the start of construction by others due to short-term observations by our field crew.

Perched water may be briefly encountered in low quantities during earthwork and is typically due to storage of recent rainfall or by a barrier to capillary evaporation. Where perched water is encountered, the contractor should expect to excavate gravity drainage ditches to divert it away from the construction area. The depth of the ditches should be at least two (2) to three (3) feet deeper than the lowest exterior footing elevation. Additionally, soft, wet and pumpable soils can be expected below perched water tables. In structural areas, these should be removed to firm ground and replaced with select fill soils compacted to project specifications as defined later in this report.

Foundation Recommendations:

Recent area rains are probably responsible for the presence the soft, saturated surface soils. If these wet conditions exist during construction, this can cause extreme difficulty in the preparation of the building pad and pavement areas. *We recommend that the construction take place during a warmer and drier time of year.*

It is further recommended that the plans and bid documents include a cost item and procedure for removal of wet soils, should they exist at that time, and replacement with properly moisture conditioned select fill. Over-excavation required during wet episodes could extend to depths ranging from one (1) to two (2) feet.

If instability persists within the exposed subgrades, the recommendations presented in our Wet Weather and Soft Ground Considerations section of this report should be reviewed.

Based on the existing moisture contents, a Potential Vertical Rise (PVR) value of less than one (1) inch was estimated for this site. One (1) inch of PVR is generally accepted as the maximum allowable value for design and construction in the geographical area. The surficial soils encountered by the borings are considered to be moderately expansive. There should be no requirement for the removal of swelling soils at this site.

A review of the borings indicates that the site is generally underlain by an approximately five (5) foot layer of firm clay which overlies very soft fat clay that extend to a depth of approximately 12 feet. The very soft fat clay contains high volumes of organics and was most likely formed from tertiary swamp deposits, which is fairly common in this geographic area. The levels of the moistures indicate that the organic content of this layer is extremely high and the soils are very compressible.

Consequently, any shallow foundation placed over these soils would have very low allowable soil bearing values and could experience high settlements. Therefore, we recommend placing the structure on a deep foundation system consisting of helical piers. Our recommendations are discussed in further detail below.

Foundation Subgrade Preparation:

To prepare for foundation construction, we recommend that all topsoil, vegetation, roots, and any soft soils in the building area be stripped from the site and either properly disposed or stockpiled for later use in landscaping. Utilities should be located and rerouted as necessary.

To remediate the variable soil conditions in the surficial zone and provide a consistent subgrade for slab support, GTL recommends that a uniform layer of density-approved select fill be provided beneath the floor slab. After stripping the site, the building pad should be cut to an elevation which allows the placement of at least 18 inches of density-approved select fill below the final subgrade elevation for the floor slab. The select fill building pad should extend at least five (5) feet beyond the edge of the building.

After stripping and undercutting, as required by the grading plan and the over-excavation as required herein, the building area should be proof-rolled with a heavy, loaded pneumatic-tired vehicle such as a 20 to 25 ton loaded dump truck. It is recommended that all areas beneath the floor slab be proof-rolled to identify loose or soft soils. All proof-rolling and undercutting activities should be witnessed by GTL or authorized representative and should be performed during a period of dry weather. Any weak areas which yield under the proof-roll, or any areas with a tendency to pump should be mitigated. Such mitigation may include over-excavation and backfilling, reprocessing to remove moisture, modification with lime or cement admixture, or

using geotextiles. In the event such mitigation is required, the geotechnical engineer should be contacted to design an appropriate procedure.

After stripping, excavating where required, and proof-rolling but prior to placing fill, the exposed soils should be scarified and then processed to a moisture content between one (1) percentage point below and three (3) percentage points above the Standard Proctor optimum. The subgrade soils should be re-compacted to a density of at least 95 percent of the Standard Proctor (ASTM D-698) maximum dry density for a depth of at least eight (8) inches below the surface.

If instability persists within the exposed subgrade at the bottom of the building pad excavation, the area may require over-excavation of the wet material to provide a single over-sized bridge lift of drier material. Over-excavation for a bridge lift could extend to depths ranging from 1.5 to two (2) feet. The fill for this layer should consist of silty or sandy clay with a plasticity index between 25 and 35 and a moisture content no more than four (4) percent below optimum moisture content. To prevent moisture from migrating into the bridge lift from below, compaction levels for the bridge lift should be between 90 and 95 percent of Standard Proctor density. Once the bridge lift is established, the select fill may be placed and compacted as recommended below.

Select Fill:

After the subgrade has been prepared and inspected, fill placement may begin. Select fill material should be free of organic or other deleterious materials, homogeneous mixture, have a maximum particle size of three (3) inches, have a liquid limit less than 40 and plasticity index between 8 and 20, and consist of silty-clayey sands (SM-SC), low plasticity sandy clays (CL), or clayey sands (SC) as defined by the Unified Soil Classification System. In addition to the above requirements, the material should have a minimum of 30 percent retained on the No. 200 sieve. If a fine-grained material is used for fill, very close moisture content control will be required to achieve the recommended degree of compaction.

Fill should be placed in maximum lifts of eight (8) inches of loose materials and should be compacted within the range of one (1) percentage point below to three (3) percentage points above the optimum moisture content value and a minimum of 95 percent of the maximum density as determined by the Standard Proctor (ASTM D-698) test.

The building pad should extend at least five (5) feet beyond the edge of the structure prior to sloping. Each lift of compacted soil should be tested and inspected by the soils engineer or his representative prior to placement of subsequent lifts. As a guideline, it is recommended that field density tests be taken at a frequency of not less than one (1) test per 2,500 square feet of surface area per lift or a minimum of four (4) per lift for each tested area for the building.

The fill can be used to elevate the building pad so that positive drainage is provided away from the building. Where feasible, elevating the building pad with fill is generally desirable because this aids in providing positive drainage away from the floor slab and foundations and helps prevent water from collecting in the filled area.

Helical Piers:

Due to the risks involved with driven piles near existing buildings and sealing the water from drilled shafts, we understand that a foundation system consisting of helical piers is being considered on this project. The use of helical piers has been proven an acceptable method for support for compressive and uplift loads by providing past satisfactory performance. GTL has no objection to the use of helical piers for structural support. Helical pier technology is available from several reputable companies and the designs are proprietary and should be performed by

a qualified professional engineer. If this option is considered, this office will gladly coordinate the transfer of information.

The above statements do not constitute a guarantee or warranty by this office as to future life or performance of helical piers or the surface slab designed by others.

Floor Slab and Grade Beams:

It is recommended that the floor slabs and grade beams utilized with the helical pier foundation be reinforced to act as a structurally suspended slab. The estimated total load of the floor slab and grade beams should be included in the estimated load delivered to the helical piers. Since swelling soils at this site are not an issue, the use of void boxes directly below the floor slab and grade beams may be omitted.

Membrane Under Slab:

The decision as to whether a synthetic membrane (polyethylene or HDPE sheeting, etc.) is required below the slab should be made by the architect and structural engineer based on planned floor coverings, proximity of groundwater, planned site grading and drainage patterns, tolerance for curling, local custom, weather conditions at the time of construction, and other pertinent considerations.

Seismicity:

Based on Section 1613 of the IBC-2012, a Site Class of E has been estimated for this site due to the lack of subsurface information to a depth of 100 feet. According to the USGS website for Seismic Hazard Design Parameters, the project site has a mapped 0.2 second spectral response acceleration (S_s) of 0.097 g. The project also has a mapped 1.0 second spectral response acceleration (S_1) of 0.052. The design spectral response accelerations, S_{DS} and S_{DI} , were determined to be 0.161 g and 0.121 g, respectively. Based on Tables 1613.3.5(1) and 1613.3.5(2), the site has an assigned Seismic Design Category of C for structures classified as Risk Categories I, II, and III. For structures classified as Risk Category IV, site has an assigned Seismic Design Category of D.

The presence of loose sands below the water table results in a moderate to high potential for liquefaction to occur.

Pavement Recommendations:

Our scope of services did not include extensive sampling and CBR testing of existing subgrade or potential sources of imported base material for the specific purpose of a detailed pavement analysis. Instead, we have assumed pavement related design parameters that are considered to be typical for the area soil types. It has been assumed that the constructed pavement subgrade will consist of well compacted soils. Based on experience, it is anticipated that the compacted native subgrade will yield a California Bearing Ratio (CBR) of at least 8.0.

The satisfactory performance of pavements for parking and drive areas depends upon several factors including the characteristics of the supporting soil, the magnitude and frequency of wheel load applications, quality of construction materials, the contractor's placement and workmanship abilities, good drainage, and the desired period of design life.

The general pavement design information presented in this report is based on subsurface conditions inferred by the test borings, information published by the Portland Cement Association, and past experience in the locale. The published information was utilized in conjunction with the available field and laboratory test data to develop general pavement designs based on the AASHTO structural numbering system.

Traffic and Design Data:

The pavement sections presented herein are based upon minimum material thickness as recommended by the Portland Cement Association. These sections are not based upon anticipated traffic loads as these were not available at the time this report was prepared. For the purposes of this report, we have assumed average traffic should consist of between 100 and 150 repetitions of light passenger automobile and pick-up trucks per day. If traffic in excess of normal light to moderate duty commercial drive traffic is anticipated (i.e., heavy trucks, medium duty loaded trucks, high automobile traffic, etc.), GTL should be contacted for additional recommendations.

The information for the design of the pavement system(s) is presented below. All referenced sections are in accordance with the State of Louisiana, Department of Transportation and Development, Standard Specifications for Roads and Bridges, 2016 Edition.

Subgrade:

It is paramount to the satisfactory performance of pavements that the subgrade be stable under loads and compacted prior to deployment of concrete. All pavement subgrade should be proof rolled prior to beginning placement of pavement section materials.

A bulk sample of the anticipated subgrade was subjected to standard laboratory tests to determine its usability beneath Portland cement concrete pavements. The results of those tests can be viewed on the pavement logs, and indicate that the material is Usable beneath rigid pavements.

Usable Soils Beneath Rigid Pavements:

Since the existing soils are considered Usable beneath rigid pavements, additional material required to reach the design grades should consist of a Select Soil having a maximum Liquid Limit (LL) of 35, a maximum Plasticity Index (PI) of 15, and containing a minimum of 50 percent retained on the No. 200 mesh sieve. An approved laboratory should test and classify the soil in accordance with DOTD TR423 from samples taken from designated sources. Soils which do not meet Liquid Limit or PI requirements should not be blended to reduce the Liquid Limit or PI.

After stripping and undercutting, as required by the grading plan, the entire pavement area should be proof-rolled with a heavy, loaded pneumatic-tired vehicle such as a 20 to 25 ton loaded dump truck. It is recommended that all areas beneath the pavements be proof-rolled to identify loose or soft soils. All proof-rolling and undercutting activities should be witnessed by GTL or authorized representative and should be performed during a period of dry weather. Any weak areas which yield under the proof-roll, or any areas with a tendency to pump should be mitigated. Such mitigation may include over-excavation and backfilling, reprocessing to remove moisture, modification with lime or cement admixture, or using geotextiles. In the event such mitigation is required, the geotechnical engineer should be contacted to design an appropriate procedure.

After proof-rolling but prior to placing fill, the exposed soils should be scarified and then processed to a moisture content between one (1) percentage point below and three (3) percentage points above the Standard Proctor optimum. The subgrade soils should be re-compacted to a density of at least 95 percent of the Standard Proctor test DOTD TR 418 Method A (ASTM D-698) maximum dry density for a depth of at least eight (8) inches below the surface. As a guideline, it is recommended that field density tests be taken at a frequency of not less than one (1) test per 5,000 square feet of surface area per lift.

The subgrade should be compacted within the range of one (1) percentage point below to three (3) percentage points above the optimum moisture content value and a minimum of 95 percent of the maximum density as determined by the Standard Proctor test DOTD TR 418 Method A (ASTM D-698). As a guideline, it is recommended that field density tests be taken at a frequency of not less than one (1) test per 5,000 square feet of surface area per lift or a minimum of four (4) per lift for each tested area for the pavement.

Subgrade may be, or become, wet and unstable under paving areas, depending on several factors, including construction season, groundwater fluctuations, contractor's maintenance of positive drainage, routing of equipment, weather, and scheduling constraints. Concrete should be placed only on subgrade that has passed both stability and compaction requirements. Also, it is prudent for contract documents to accommodate over-excavation and replacement as needed or, more typically, to anticipate such remedial activity through the change order process. In any event, the owner should be advised that this risk is inherent in practically every construction project that involves site work.

Crushed Stone Base:

A layer of Crushed Stone Base should be placed between the subgrade and pavement. The material should meet the requirements contained in Item 1003.03 of the LA DOTD SSFRB, 2006 Edition. Stone should consist of 100 percent stone meeting the gradation and plasticity requirements of Item 1003.03(b), and Recycled Portland Cement Concrete should consist of crushed Portland cement concrete meeting the gradation and plasticity requirements of Item 1003.03(c). The materials should be compacted to 95 percent of the maximum density defined by the Modified Proctor (DOTD TR418, Method G).

Portland Cement Concrete:

Portland cement concrete for all entrances and drives should be a Type B or D Pavement in accordance with the general guidelines set forth in Table 901-3 of Section 901.11. The mixture should achieve a minimum compressive strength of 4,000 psi at 28 days, and be designed with an air content between two (2) and seven (7) percent. Hot and cold weather limitation should be followed. The design of steel reinforcement should be in accordance with local or accepted codes.

If desired, the design team may substitute a Class A mix in accordance with the 2006 DOTD SSFRB specifications. The mixture should meet the previously mentioned air-entrainment requirements, and generate a minimum compressive strength of 3,500 psi in 28 days.

Proper finishing of concrete pavement requires appropriate construction joints to reduce the potential for cracking. Construction joints (weakened planes) should be designed in accordance with current Portland Cement Association guidelines. It is recommended that such weakened plane joints be spaced no more than 15' c-c, or as specified by the structural engineer. The depth of such joints should be 1/3 of the pavement thickness. The joints should be cut as soon as the concrete will support the machinery. Joints should be sealed to reduce the potential for water infiltration into pavement joints and subsequent infiltration into the supporting soils.

Recommended Pavement Sections:

The table below presents a summary of rigid pavement sections for light and heavy-duty applications. It should be noted that the pavement sections as presented below are minimums. If it is desired to reduce potential cracking, greater thickness of select fill and/or greater pavement section thickness could be utilized. In addition, long term pavement performance requires good drainage and performance of periodic maintenance activities. Refer to the text for qualification of the designs and further discussion and limitations.

MINIMUM PAVEMENT RECOMMENDATIONS *		
Pavement Type	Light Duty (Parking Stalls)	Moderate Duty (Entries & Drives)
Portland Cement Concrete	5.0" Portland Cement Concrete 4.0" Item 1003.03 Stone Base 8.0" Density Approved Imported Fill	6.0" Portland Cement Concrete 4.0" Item 1003.03 Stone Base 8.0" Density Approved Imported Fill
*Materials should meet general requirements of the Louisiana DOTD Standard Specifications for Construction of Roads & Bridges, and specific requirements listed herein.		

Concrete thickness at trash receptacles should be a minimum of seven (7) inches. All paving recommendations are based on stable subgrade. Subgrade areas which are unstable should be over-excavated and replaced, or otherwise rendered stable prior to proceeding with base material placement.

Construction Considerations:

Excessive movement should not occur if customary measures are taken to minimize moisture variations beneath the structure to preclude loss of shear strength of foundation soils. Proper surface drainage should be maintained, and landscape irrigation systems should be located and operated in a manner to minimize wetting of building foundations. Positive drainage away from the building should be provided at all times, including during construction. If positive drainage is not provided, water will pond around or below the building and excessive total and differential movements may occur.

Secondary Design Considerations:

The following information has been assimilated after examination of numerous problems dealing with soil strata throughout Louisiana. It is presented here for implementation by others. If these features are not incorporated, then performance of the structure may be "**at-risk**".

1. Roof drainage should be **routed via pipe or a hard surface at least 5 feet from the structure.**
2. The **depth of frost penetration** in the vicinity of the project site is estimated to be approximately six inches.
3. Pavements, sidewalks, and the general ground surface should be sloped away from the structure on all sides. Water must not be allowed to pond within 5 feet of the building.
4. Backfill for utility lines should be compacted to at least 95 percent of the standard compaction test (ASTM D-698).
5. Surficial soils of the type encountered at this site are subject to erosion. Therefore, unpaved areas should be protected from erosion by the establishment of a good vegetation cover.
6. Clayey fill has been specified for select fill to reduce the potential migration of water beneath the proposed establishment. Drainage details must focus on routing water away from the structure. Excessive water intrusion can produce undesirable latent vertical movement.
7. Landscaping elements, including irrigation systems must not be allowed to introduce excess water to the structure subgrade. Monitor irrigation controls frequently and adjust to avoid over-watering of plants positioned in close proximity to the structure.

Safety Considerations:

Prior to the commencement of construction, the owner and the contractor should make themselves aware of and become familiar with applicable local, state, and federal safety regulations, including the current Occupational Safety and Health Association (OSHA)

Excavation and Trench Safety Standards. Construction site safety generally is the sole responsibility of the contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations. We are providing this information solely as a service to our client. Under no circumstances should the information provided herein be construed that GTL is assuming responsibility for construction site safety of the contractor's activities. Such responsibility is not being implied and should not be inferred.

Worker Safety - Excavations and Slopes:

After excavating, footings should be inspected and concrete placed as quickly as possible to avoid exposure of the footing bottoms to wetting and drying. If it is required that footing excavations be left open for more than one (1) day, they should be protected to reduce evaporation or entry of moisture. Adequate protection against sloughing of soil should be provided for workers and inspectors entering the footing excavations and undercut areas.

The contractor should be aware that slope height, slope inclination, or excavation depths (including utility trench excavations) should in no case exceed those specified in local, state, or federal safety regulations, e.g., OSHA Standards for Excavations, Title 29, Part 1926, successor regulations as well as other building code requirements. Such regulations are strictly enforced and, if not followed, the owner, contractor, and earthwork and utility subcontractors could be liable for substantial penalties.

Drainage:

Water should not be allowed to collect near the foundations, floor slab or pavement areas of the project either during or after construction. Undercut or excavated areas should be sloped toward a sump area to facilitate removal of any collected groundwater or surface runoff. Proper drainage should be provided by sloping the ground surface away from the structure.

Wet Weather and Soft Ground Considerations:

The soils encountered in the surficial zone at this site are expected to be relatively sensitive to disturbances caused by construction traffic when wet. The contractor should be cognizant of the importance of proper maintenance of surface drainage. Depending on weather-related ground conditions, contractor's maintenance of drainage during construction, and other factors, some difficulty may be encountered by the contractor in achieving compaction on initial lifts of fill placed on loose or soft subgrade. This will be exacerbated by wet weather, particularly if the contractor allows surface drainage to enter and pond in the excavations.

Fine-grained soils are expected to be relatively sensitive to disturbances caused by construction traffic and to changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support characteristics. In addition, fine-grained soil that becomes wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather. Earthwork activities performed during cooler; wetter months may certainly offer more difficulties than if performed during warmer, drier periods.

If construction is performed during wet conditions, work platforms may be necessary; these can be created for earthwork by mixing soil and hydrated lime, cement, or combinations of these additives. Quicklime may also be used in areas where dusting is of concern, if proper worker safety considerations are observed. *"Pumping" (unstable) subgrades are possible at this site and it is recommended that bid documents incorporate this possibility into the bid schedule.*

It is advisable to obtain unit prices in the bid schedule for remedial subgrade preparation options, should these become necessary. The following lists several subgrade preparation options; the best option will depend upon the specific soil and groundwater conditions encountered. All items should be bid "in-place, complete", on a pre-approved, as-needed basis only. Only the necessary quantity should be approved, usually as recommended (and later confirmed) by the geotechnical engineer's representative. Over-excavation presumes that the contractor must dispose of unsuitable (unusable) materials off-site. The contract documents should carefully and specifically state that such options will be allowed only when the work cannot be successfully prosecuted using ordinary or normal construction skill, efforts and equipment. (descriptive wording only; not necessarily to be used for contract language).

Over-excavation and replacement with select fill (Cubic Yard)

Over-excavation and replacement with clay bridging layer (drier than optimum, $18 < P.I. < 35$ (or as otherwise approved), attainable compaction as specified by geotechnical engineer's representative (Cubic Yard)

Provide and deploy geogrid (Tensar TriAx TX140 geogrid or approved equal), cover with minimum 6-inch thick (compacted with plate compactor) layer of minimum one (1) inch durable, crushed gravel (LDOTD Item 1003.03.b Base or approved alternate).(Square Yard)

Provide and deploy light-duty non-woven drainage geotextile (Square Yard)

Provide and install subsurface ("French") drain; drain media of washed, durable one (1) inch crushed stone, 36 inch wide by 18 to 48 inch high, with minimum four (4) inch diameter perforated PVC or HDPE pipe (contractor to submit pipe manufacturer's assurance of "non-crushing" under depth of planned cover), non-woven geotextile layer across top of gravel (Cubic Yard)

Lime-stabilize upper 12 inches (compacted thickness) with minimum 40 lbs hydrated lime per square yard (Square Yard)

Construction de-watering well, including periodic pumping as required (Each, or per vertical foot from surface to bottom)

The above are suggested options; the site civil engineer should adopt these or similar, standardized bid items as deemed appropriate.

Groundwater Control:

Due to potential variations in groundwater levels, difficulty during excavation and construction of the proposed foundation is possible. Shallow groundwater was encountered at this site, and it is reasonable to anticipate that groundwater conditions may vary as noted previously. It is suggested that contract documents address the need for maintaining controls to preclude water from draining into excavations. Some dewatering through shaping of work areas to shed water, and construction of temporary ditches with sumps and pumping may be necessary to remove the loose soils and allow placement of imported select fill in a dry manner. Excavated soils intended for re-use as select fill may require special methods in order to dry the soil to a suitable moisture content prior to re-placing the soil as select fill.

Protection of Work:

Subgrade areas, base courses, and lifts of fill that have been successfully moisture conditioned, processed, and compacted in lifts to the required density, successfully proof-rolled, and approved must be protected from changes in moisture and other influences. Satisfactorily

completed areas may be adversely affected by prolonged exposure to dry weather, precipitation, equipment traffic, or by excavations and uncontrolled backfilling for utilities, and other disturbances rendering such areas unsatisfactory. Such areas should be reworked prior to continuing with subsequent construction.

Geotechnical Risk:

The concept of risk is an important aspect of the geotechnical evaluation. The primary reason for this is that the analytical methods used to develop geotechnical recommendations do not comprise an exact science. The analytical tools which geotechnical engineers use are generally empirical and must be used in conjunction with engineering judgment and experience. Therefore, the solutions and recommendations presented in the geotechnical evaluation should not be considered risk-free and, more importantly, are not a guarantee that the interaction between the soils and the proposed structure will perform as planned. The engineering recommendations presented in the preceding sections constitutes GTL's professional estimate of those measures that are necessary for the proposed structure to perform according to the proposed design based on the information generated and referenced during this evaluation, and GTL's experience in working with these conditions.

Limitations:

The exploration and analysis of the conditions reported herein are considered sufficient in detail and scope to form a reasonable basis for the pavement and foundation design. The recommendations submitted are based on the available soil information and preliminary design details furnished for the proposed project. Any revision of the plans for the proposed facility from those enumerated in this report should be brought to our attention so that we may determine if changes in the foundation recommendations are required. If deviations from the noted subsurface conditions are encountered during construction, GTL should be retained to determine if changes in foundation recommendations are required. If GTL is not retained to perform these functions, we will not be responsible for the performance of the structure.

The findings, recommendations, specifications, or professional advice contained herein have been made after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology. No other warranties are implied or expressed.

The scope of services did not include any environmental assessment for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site. Any statements in this report or on the boring logs regarding odors, colors, or unusual or suspicious items or conditions are strictly for the information of the client. Prior to purchase or development of this site, an environmental assessment is advisable.

The scope of services did not include a geologic investigation to address any faults, large scale subsidence, or other macro geologic features not specifically addressed in this report or the agreement between GTL and the client.

After the plans and specifications are more complete, it is recommended that the soils and foundation engineer be provided the opportunity to review the final design and specifications in order that the earthwork and foundation recommendations may be properly interpreted and implemented. At that time, it may be necessary to submit supplementary recommendations.

This report has been prepared for the exclusive use of our client for the specific application to the referenced project. GTL cannot be responsible for interpretations, opinions, or recommendations made by others based on the data contained in this report.

This report was prepared for design purposes only and may not be sufficient for purposes of preparing an accurate bid for construction. Contractors reviewing this report are advised that the discussions and recommendations contained herein were provided exclusively to and for use by the project owner.

END OF REPORT TEXT

SEE FOLLOWING APPENDIX w/BORING LOGS & TEST RESULTS

APPENDIX A

FIELD AND LABORATORY PROCEDURES

Field and Laboratory Procedures
Red River Bank - Veterans Branch
1918 Veterans Boulevard
Metairie, Jefferson Parish, Louisiana
Report Number 10-22-168

I. Field Operations:

Subsurface conditions were evaluated by advancing six (6) intermittent sample borings on October 26, 2022 within the project area. The borings located and staked in the field by representatives of Geotechnical Testing Laboratory, Inc. An illustration of the approximate boring locations with respect to the areas investigated is provided on the Plan of Borings herein. Descriptive terms and symbols used on the logs are in accordance with the Unified Soil Classification System (USCS).

A truck-mounted rotary drilling rig was used to make the test borings. Each boring was advanced in the dry using flight auger drilling techniques. Intermittent undisturbed samples were obtained in the following manner.

Standard penetration tests were performed in accordance with ASTM D-1586 procedures. This test is conducted by recording the number of blows required for a 140-pound hammer falling 30 inches to drive a split-spoon sampler eighteen inches into the substrata. Depths at which split-spoon samples were taken are indicated by two crossed lines in the "Samples" column on the Log of Boring. The number of blows required to drive the sampler for each 6-inch increment were recorded. The penetration resistance is the number of blows required to drive the split-spoon sampler the final 12-inches of penetration. Information related to the penetration resistance is presented under the "Field Data" heading of the Log of Boring as the Standard Penetration (Blows/Foot). These samples were visually examined, logged, and packaged for transport to our laboratory.

The presence of ground water was monitored during drilling operations. Initial water seepage readings are provided under "Groundwater Information" in the right hand column of the Log of Boring. Upon boring completion, water levels were allowed to rise and stabilize for several minutes prior to final water readings. These readings are found under "Groundwater Information". Soil sloughing from the walls of the boring are also recorded here as depth of cave-in.

II. Laboratory Studies:

Upon return to the laboratory, all samples were visually examined and representative samples were selected for testing. Tests were performed on selected samples recovered from the test borings to verify classification and to determine pertinent engineering properties of the substrata. Individual test and ASTM designations are provided below:

Test	ASTM Designations
Atterberg Limits	ASTM D4318
Moisture Content	ASTM D2216
Percent Minus #200	ASTM D1140
Hydrometer Analysis	ASTM D 422

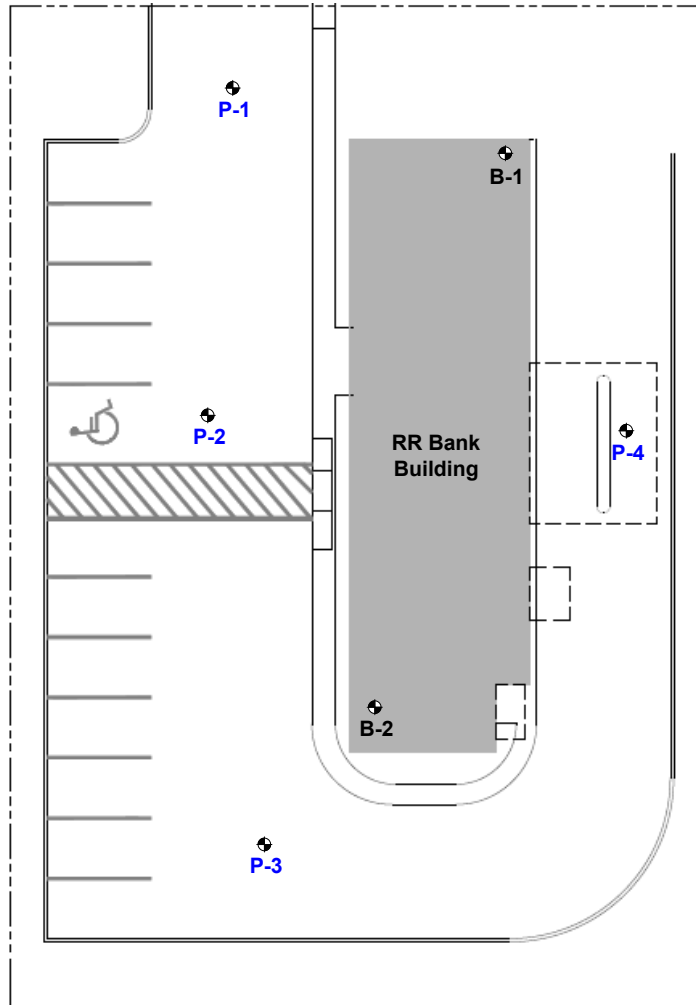
Results for soil classifications are located on the Log of Boring in their respective columns under "Laboratory Data."

Samples obtained during our field studies and not consumed by laboratory testing procedures will be retained free of charge for a period of 30 days. Arrangements for storage beyond that period of time must be made in writing to ***Geotechnical Testing Laboratory, Inc.***

APPENDIX B

PLAN OF BORINGS

Veterans Boulevard



This drawing is intended to locate the borings relative to the surrounding area.

PLAN OF BORINGS

PROJECT

Red River Bank - Veterans Branch, 1918 Veterans Blvd., Metairie, Jefferson Parish, LA

SCALE

Not to Scale

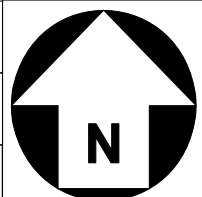
DATE

10/31/2022

FILENAME

10-22-168

Red River Bank



APPENDIX C

BORING LOGS AND SOIL CLASSIFICATION CHART

LOG OF BORING B-1

SHEET 1 of 1



Geotechnical Testing Laboratory, Inc.
226 Parkwood Drive
Alexandria, LA 71301
Telephone: (318) 443-7429

CLIENT: Red River Bank
PROJECT: Red River Bank - Veterans Branch
LOCATION: Metairi, Jefferson Parish, Louisiana
FILE NO.: 10-22-168

DRILL DATE: 10/26/22

DRILLING METHOD(S):
CME 45B, 4.5" I.D. Hollow Stem Auger

DRILLER: W. Hebert CHECKED BY: K. Gorsha

GROUNDWATER INFORMATION:
Water Seepage Noted @ 6.0 Feet While Drilling
Water Observed @ 9.0 Feet Upon Completion
Boring Walls Collapsed @ 14.0 Feet

SURFACE ELEVATION: Not Determined

DESCRIPTION OF STRATUM

Firm Gray & Brown LEAN CLAY (CL)									
5.0'									
Very Soft Gray FAT CLAY (CH)									
- w/humus @ 7.0 feet									
- w/humus @ 9.0 feet									
12.0'									
Loose Gray SILT (ML)s w/sand & clayey silt (CL-ML) traces									
16.0'									
Very Soft Gray & Brown FAT CLAY (CH)									
22.0'									
Loose Gray & Brown, Poorly Graded, SAND (SP-SM) w/silt									
30.0'									
Boring Terminated @ 30.0 Feet									

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE

NOTES:
See Plan of Borings for Location
Stratification and Groundwater Depths Are Not Exact

LOG OF BORING B-2

SHEET 1 of 1



Geotechnical Testing Laboratory, Inc.
226 Parkwood Drive
Alexandria, LA 71301
Telephone: (318) 443-7429

CLIENT: Red River Bank
PROJECT: Red River Bank - Veterans Branch
LOCATION: Metairi, Jefferson Parish, Louisiana
FILE NO.: 10-22-168
DRILL DATE: 10/26/22

DRILLING METHOD(S):
CME 45B, 4.5" I.D. Hollow Stem Auger

DRILLER: **W. Hebert** CHECKED BY: **K. Gorsha**

GROUNDWATER INFORMATION:
Water Seepage Noted @ 8.5 Feet While Drilling
Water Observed @ 12.0 Feet Upon Completion
Boring Walls Collapsed @ 15.0 Feet

SURFACE ELEVATION: **Not Determined**

DESCRIPTION OF STRATUM

Firm Gray & Brown LEAN CLAY (CL)

3.5'

Firm Gray FAT CLAY (CH)

- soft @ 5.5 feet

- very soft @ 7.0 feet

- soft w/humus @ 9.0 feet

12.0'

Very Loose Gray SILT (ML)s w/sand & clayey silt (CL-ML) traces

17.0'

Very Soft Gray & Brown FAT CLAY (CH)

23.0'

Loose Gray & Brown, Poorly Graded, SAND (SP-SM) w/silt

30.0'

Boring Terminated @ 30.0 Feet

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE

NOTES:
See Plan of Borings for Location
Stratification and Groundwater Depths Are Not Exact

LOG OF BORING P-1

SHEET 1 of 1



Geotechnical Testing Laboratory, Inc.
226 Parkwood Drive
Alexandria, LA 71301
Telephone: (318) 443-7429

CLIENT: Red River Bank
PROJECT: Red River Bank - Veterans Branch
LOCATION: Metairi, Jefferson Parish, Louisiana
FILE NO.: 10-22-168
DRILL DATE: 10/26/22

FIELD DATA		LABORATORY DATA							DRILLING METHOD(S): CME 45B, 4.5" I.D. Hollow Stem Auger				
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT	MOISTURE CONTENT (%)	ATTERBERG LIMITS			MINUS NO. 200 SIEVE (%)	DRY DENSITY (Lbs./Cu.Ft.)	COMPRESSIVE STRENGTH (lb./Sq. Ft.)	DRILLER: W. Hebert	CHECKED BY: K. Gorsha	
					LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX				GROUNDWATER INFORMATION:		
											No Water Seepage Noted While Drilling No Water Observed pon Completion Boring Walls Remained Open		
											SURFACE ELEVATION: Not Determined		
DESCRIPTION OF STRATUM													
	1			10	NP	NP	NP	18			Yellowish Brown & Silty SAND (SM) - SILT 13%; SAND 82%, CLAY 5%		1.0'
	2			54	51	24	27	95			Gray & Brown FAT CLAY (CH)		3.0'
	3			40							Gray & Brown LEAN CLAY (CL)		6.0'
	4												
	5												
	6												
Boring Terminated @ 6.0 Feet													
NOTES: See Plan of Borings for Location Stratification and Groundwater Depths Are Not Exact													

LOG OF BORING P-2

SHEET 1 of 1



Geotechnical Testing Laboratory, Inc.
226 Parkwood Drive
Alexandria, LA 71301
Telephone: (318) 443-7429

CLIENT: Red River Bank
PROJECT: Red River Bank - Veterans Branch
LOCATION: Metairi, Jefferson Parish, Louisiana
FILE NO.: 10-22-168
DRILL DATE: 10/26/22

FIELD DATA		LABORATORY DATA							DRILLING METHOD(S): CME 45B, 4.5" I.D. Hollow Stem Auger												
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT	MOISTURE CONTENT (%)	ATTEMBERG LIMITS			MINUS NO. 200 SIEVE (%)			DRY DENSITY (Lbs./Cu.Ft.)	COMPRESSIVE STRENGTH (lb./Sq. Ft.)									
					LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX														
													LL	PL	PI						
DRILLER: W. Hebert CHECKED BY: K. Gorsha																					
GROUNDWATER INFORMATION: No Water Seepage Noted While Drilling No Water Observed pon Completion Boring Walls Remained Open																					
SURFACE ELEVATION: Not Determined																					
DESCRIPTION OF STRATUM																					
				7		NP		NP		NP		16						Yellowish Brown & Silty SAND (SM)		1.5'	
				34		42		23		19		98						Gray & Brown LEAN CLAY (CL)			
				34																	
																				6.0'	
																				Boring Terminated @ 6.0 Feet	
NOTES: See Plan of Borings for Location Stratification and Groundwater Depths Are Not Exact																					




LOG OF BORING P-3

SHEET 1 of 1



Geotechnical Testing Laboratory, Inc.
226 Parkwood Drive
Alexandria, LA 71301
Telephone: (318) 443-7429

CLIENT: Red River Bank
PROJECT: Red River Bank - Veterans Branch
LOCATION: Metairi, Jefferson Parish, Louisiana
FILE NO.: 10-22-168
DRILL DATE: 10/26/22

		FIELD DATA		LABORATORY DATA							DRILLING METHOD(S): CME 45B, 4.5" I.D. Hollow Stem Auger	
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT	MOISTURE CONTENT (%)	ATTEMBERG LIMITS			MINUS NO. 200 SIEVE (%)	DRY DENSITY (Lbs./Cu.Ft.)	COMPRESSIVE STRENGTH (Lb./Sq. Ft.)	DRILLER: W. Hebert CHECKED BY: K. Gorsha	
					LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX				GROUNDWATER INFORMATION: No Water Seepage Noted While Drilling No Water Observed pon Completion Boring Walls Remained Open	
											SURFACE ELEVATION: Not Determined	
											DESCRIPTION OF STRATUM	
	1			8	NP	NP	NP	16			Yellowish Brown & Silty SAND (SM)	2.5'
	2			18								
	3			33							Gray & Brown LEAN CLAY (CL)	6.0'
	4											
	5											
	6											
Boring Terminated @ 6.0 Feet												
NOTES: See Plan of Borings for Location Stratification and Groundwater Depths Are Not Exact												
N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE												

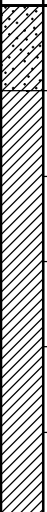
SHEET 1 of 1

SHEET 1 of 1



Geotechnical Testing Laboratory, Inc.
226 Parkwood Drive
Alexandria, LA 71301
Telephone: (318) 443-7429

CLIENT: **Red River Bank**
PROJECT: **Red River Bank - Veterans Branch**
LOCATION: **Metairi, Jefferson Parish, Louisiana**
FILE NO.: **10-22-168**
DRILL DATE: **10/26/22**

FIELD DATA		LABORATORY DATA							DRILLING METHOD(S): CME 45B, 4.5" I.D. Hollow Stem Auger				
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT	MOISTURE CONTENT (%)	ATTEBERG LIMITS			MINUS NO. 200 SIEVE (%)	DRY DENSITY (Lbs./Cu.Ft.)	COMPRESSIVE STRENGTH (lb/Sq. Ft.)	DRILLER: W. Hebert	CHECKED BY: K. Gorsha	
					LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX				GROUNDWATER INFORMATION:		
											No Water Seepage Noted While Drilling No Water Observed pon Completion Boring Walls Remained Open		
											SURFACE ELEVATION: Not Determined		
DESCRIPTION OF STRATUM													
	1			19	28	17	11	72			Yellowish Brown & Gray LEAN CLAY (CL)s w/sand - SILT 55%; SAND 26%, CLAY 19%		1.0'
	2			36	44	23	21	97			Gray & Brown LEAN CLAY (CL)		6.0'
	3			31									
	4												
	5												
	6											Boring Terminated @ 6.0 Feet	
NOTES: See Plan of Borings for Location Stratification and Groundwater Depths Are Not Exact													

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

APPENDIX B

Energy Code Documentation



Envelope Compliance Certificate

Project Information

Energy Code: 90.1 (2007) Standard
Project Title: Red River Bank - Metairie Branch
Location: Metairie, Louisiana
Climate Zone: 2a
Project Type: New Construction
Vertical Glazing / Wall Area: 24%

Construction Site:
1918 Veterans Boulevard
Metairie, Louisiana 70005

Owner/Agent:
Debbie Triche
Red River Bank
1412 Centre Court, Suite 407
Alexandria, Louisiana 71301

Designer/Contractor:
Broussard Kevin
ABW
301 Jackson St, Suite 205
Alexandria, Louisiana 71301
3184730252
kevinbroussard@abwarchitects.com

Building Area

Floor Area

1-Office : Nonresidential

2500

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U- Factor _(a)
Roof: Attic Roof, Wood Joists, [Bldg. Use 1 - Office]	2275	37.5	14.1	0.020	0.027
Roof: Metal Building, Standing Seam, [Bldg. Use 1 - Office]	225	37.5	5.0	0.038	0.065
North EFIS: Wood-Framed, 16in. o.c., [Bldg. Use 1 - Office]	288	37.5	11.2	0.027	0.089
Window: Metal Frame, Thermal Break, Perf. Specs.: Product ID Kawneer, SHGC 0.28, PF 0.13, [Bldg. Use 1 - Office] (b)	125	---	---	0.260	0.750
North Brick: Wood-Framed, 16in. o.c., [Bldg. Use 1 - Office]	388	60.0	4.2	0.031	0.089
Window: Metal Frame, Thermal Break, Perf. Specs.: Product ID Kawneer, SHGC 0.28, [Bldg. Use 1 - Office] (b)	139	---	---	0.260	0.750
West Brick: Wood-Framed, 16in. o.c., [Bldg. Use 1 - Office]	390	60.0	4.2	0.031	0.089
Window: Metal Frame, Thermal Break, Perf. Specs.: Product ID Kawneer, SHGC 0.28, PF 0.13, [Bldg. Use 1 - Office] (b)	139	---	---	0.260	0.750
WEst EFIS: Wood-Framed, 16in. o.c., [Bldg. Use 1 - Office]	1766	37.5	11.2	0.027	0.089
Window: Metal Frame, Thermal Break, Perf. Specs.: Product ID Kawneer, SHGC 0.28, [Bldg. Use 1 - Office] (b)	372	---	---	0.260	0.750
Window: Metal Frame, Thermal Break, Perf. Specs.: Product ID Kawneer, SHGC 0.28, PF 0.45, [Bldg. Use 1 - Office] (b)	124	---	---	0.260	0.750
South EFIS: Wood-Framed, 16in. o.c., [Bldg. Use 1 - Office]	639	37.5	11.2	0.027	0.089
Window: Metal Frame, Thermal Break, Perf. Specs.: Product ID Kawneer, SHGC 0.28, [Bldg. Use 1 - Office] (b)	124	---	---	0.260	0.750
East EFIS: Wood-Framed, 16in. o.c., [Bldg. Use 1 - Office]	1888	37.5	11.2	0.027	0.089
Window: Metal Frame, Thermal Break, Perf. Specs.: Product ID Kawneer, SHGC 0.28, PF 1.95, [Bldg. Use 1 - Office] (b)	33	---	---	0.260	0.750
Window: Metal Frame, Thermal Break, Perf. Specs.: Product ID Kawneer, SHGC 0.28, [Bldg. Use 1 - Office] (b)	248	---	---	0.260	0.750

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U- Factor ^(a)
Door: Insulated Metal, Swinging, [Bldg. Use 1 - Office]	24	---	---	0.320	0.700
East block: Concrete Block, 6in., Partially Grouted, Cells Ins., Light Density, Furring: None (d), [Bldg. Use 1 - Office]	197	---	10.4	0.057	0.151
Floor: Unheated Slab-On-Grade, [Bldg. Use 1 - Office] (c)	251	---	---	0.730	0.730


- (a) Budget U-factors are used for software baseline calculations ONLY, and are not code requirements.
- (b) Fenestration product performance must be certified in accordance with NFRC and requires supporting documentation.
- (c) Slab-On-Grade proposed and budget U-factors shown in table are F-factors.
- (d) CMU insulated cells must be filled with a material having a maximum thermal conductivity of 0.44 Btu in./h-ft²-degrees F. Perlite, vermiculite, polystyrene beads, or spray foam as defined in ASHRAE 2009 Handbook of Fundamentals meet this requirement. Other materials require documentation of thermal conductivity.

Envelope PASSES: Design 3% better than code

Envelope Compliance Statement

Compliance Statement: The proposed envelope design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed envelope systems have been designed to meet the 90.1 (2007) Standard requirements in COMcheck Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Kevin Broussard, Partner
Name - Title


Signature

6/9/2023
Date



Inspection Checklist

Energy Code: 90.1 (2007) Standard

Requirements: 0.0% were addressed directly in the COMcheck software

Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
4.2.2 [PR1] ¹	Plans and/or specifications provide all information with which compliance can be determined for the building envelope and document where exceptions to the standard are claimed.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

Section # & Req.ID	Footings / Foundation Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
5.5.3.3 [FO1] ¹	Below-grade wall insulation R-value.	R-_____	R-_____	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Envelope Assemblies table for values.
5.5.3.5 [FO3] ¹	Slab edge insulation R-value.	R-_____ <input type="checkbox"/> Unheated <input type="checkbox"/> Heated	R-_____ <input type="checkbox"/> Unheated <input type="checkbox"/> Heated	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Envelope Assemblies table for values.
5.8.1.2 [FO4] ¹	Slab edge insulation installed per manufacturer's instructions.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
5.5.3.5 [FO5] ¹	Slab edge insulation depth/length.	_____ ft	_____ ft	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Envelope Assemblies table for values.
5.8.1.7.3 [FO7] ¹	Insulation in contact with the ground has ≤0.3% water absorption rate per ASTM C272.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

Section # & Req.ID	Framing / Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
5.4.3.2 [FR1] ³	Factory-built fenestration and doors are labeled as meeting air leakage requirements.	Fenestration _____ _ cfm/ft ² Doors _____ cfm/ft ²	Fenestration _____ _ cfm/ft ² Doors _____ cfm/ft ²	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
5.5.4.3a [FR8] ¹	Vertical fenestration U-Factor.	U- _____	U- _____	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Envelope Assemblies table for values.
5.5.4.3b [FR9] ¹	Skylight fenestration U-Factor.	U- _____	U- _____	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Envelope Assemblies table for values.
5.5.4.4.1 [FR10] ¹	Vertical fenestration SHGC value.	SHGC: _____	SHGC: _____	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Envelope Assemblies table for values.
5.5.4.4.2 [FR11] ¹	Skylight SHGC value.	SHGC: _____	SHGC: _____	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Envelope Assemblies table for values.
5.8.2.1, 5.8.2.4 [FR12] ²	Fenestration products rated in accordance with NFRC.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
5.8.2.2 [FR13] ¹	Fenestration products are certified as to performance labels or certificates provided.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
5.8.2.3, 5.5.3.6 [FR14] ²	U-factor of opaque doors associated with the building thermal envelope meets requirements.	U- _____ <input type="checkbox"/> Swinging <input type="checkbox"/> Nonswinging	U- _____ <input type="checkbox"/> Swinging <input type="checkbox"/> Nonswinging	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Envelope Assemblies table for values.

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Section # & Req.ID	Insulation Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
5.4.3.1 [IN1] ¹	All sources of air leakage in the building thermal envelope are sealed, caulked, gasketed, weather stripped or wrapped with moisture vapor-permeable wrapping material to minimize air leakage.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
5.5.3.1 [IN2] ¹	Roof R-value. For some ceiling systems, verification may need to occur during Framing Inspection.	R-____ <input type="checkbox"/> Above deck <input type="checkbox"/> Metal <input type="checkbox"/> Attic	R-____ <input type="checkbox"/> Above deck <input type="checkbox"/> Metal <input type="checkbox"/> Attic	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Envelope Assemblies table for values.
5.8.1.2, 5.8.1.3 [IN3] ¹	Roof insulation installed per manufacturer's instructions. Blown or poured loose-fill insulation is installed only where the ceiling slope is <= 3:12.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
5.5.3.1.1 [IN5] ³	High-albedo roofs meet solar reflectance of 0.70 and thermal emittance of 0.75 or SRI of 82.	SR:____ SRI:____	SR:____ SRI:____	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
5.5.3.2 [IN6] ¹	Above-grade wall insulation R-value.	R-____ <input type="checkbox"/> Mass <input type="checkbox"/> Metal <input type="checkbox"/> Steel <input type="checkbox"/> Wood	R-____ <input type="checkbox"/> Mass <input type="checkbox"/> Metal <input type="checkbox"/> Steel <input type="checkbox"/> Wood	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Envelope Assemblies table for values.
5.8.1.2 [IN7] ¹	Above-grade wall insulation installed per manufacturer's instructions.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
5.5.3.4 [IN8] ¹	Floor insulation R-value.	R-____ <input type="checkbox"/> Mass <input type="checkbox"/> Steel <input type="checkbox"/> Wood	R-____ <input type="checkbox"/> Mass <input type="checkbox"/> Steel <input type="checkbox"/> Wood	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Envelope Assemblies table for values.
5.8.1.1 [IN10] ²	Building envelope insulation is labeled with R-value or insulation certificate providing R-value and other relevant data.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
5.8.1.4 [IN11] ²	Eaves are baffled to deflect air to above the insulation.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
5.8.1.5 [IN12] ²	Insulation is installed in substantial contact with the inside surface separating conditioned space from unconditional space.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
5.8.1.6 [IN13] ²	Recessed equipment installed in building envelope assemblies does not compress the adjacent insulation.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

☐ 1 High Impact (Tier 1)
 ☐ 2 Medium Impact (Tier 2)
 ☐ 3 Low Impact (Tier 3)

Section # & Req.ID	Insulation Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
5.8.1.7 [IN14] ²	Exterior insulation is protected from damage with a protective material. Verification for exposed foundation insulation may need to occur during Foundation Inspection.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
5.8.1.7.1 [IN15] ²	Attics and mechanical rooms have insulation protected where adjacent to attic or equipment access.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
5.8.1.7.2 [IN16] ²	Foundation vents do not interfere with insulation.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
5.8.1.8 [IN17] ³	Insulation intended to meet the roof insulation requirements cannot be installed on top of a suspended ceiling. Mark this requirement compliant if insulation is installed accordingly.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)
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Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
5.4.3.3 [FI1] ¹	Weatherseals installed on all loading dock cargo doors in Climate Zones 4-8.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)
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Interior Lighting Compliance Certificate

Project Information

Energy Code: 90.1 (2007) Standard
Project Title: Red River Bank
Project Type: New Construction

Construction Site:
1918 Veterans Boulevard
Metairie, LA 70005

Owner/Agent:
Red River Bank

Designer/Contractor:
Ashe Broussard Weinzettle
Architects

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft ²)	C Allowed Watts / ft ²	D Allowed Watts (B X C)
1-Bank/Office (Office)	2330	1.00	2330
Total Allowed Watts =			2330

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
1-Bank/Office (Office)				
LED 1: A1: 2X2 FLAT PANEL: LED Panel 41W:	1	3	41	123
LED 2: A2: 2X4 FLAT PANEL: LED Panel 33W:	1	3	28	84
LED 3: A3: 2X4 FLAT PANEL: LED Panel 40W:	1	6	40	240
LED 4: A4: 2X4 FLAT PANEL: LED Panel 54W:	1	2	49	98
LED 5: B1: 2X4 ARCH. TROFFER: LED Panel 44W:	1	6	43	258
LED 6: D1: 6' DOWNLIGHT: LED Other Fixture Unit 13W:	1	33	12	396
LED 7: D2: 6' DOWNLIGHT: LED Other Fixture Unit 25W:	1	3	23	69
LED 8: H1: 6' ROUND WALL LT.: LED Panel 19W:	1	1	13	13
LED 9: K1: 6' PORCELAIN: LED A Lamp 9W:	1	6	15	90
LED 10: L1: 8' SUSP. LINEAR: LED Linear 33W:	1	5	46	230
Track lighting 1: T1: PENDANT TRACK: Wattage based on low-voltage transformer capacity	0	0	200	200
Total Proposed Watts =				1801

Interior Lighting PASSES: Design 23% better than code

Interior Lighting Compliance Statement

Compliance Statement: The proposed interior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been designed to meet the 90.1 (2007) Standard requirements in COMcheck Version 4.1.1.0 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Michael J. Clark

Name - Title

Signature

06/08/2023

Date



Inspection Checklist

Energy Code: 90.1 (2007) Standard

Requirements: 0.0% were addressed directly in the COMcheck software

Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
4.2.2 [PR4] ¹	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include interior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
8.4.1.1, 8.4.1.2 [PR6] ²	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the electrical systems and equipment and document where exceptions are claimed. Feeder connectors sized in accordance with approved plans and branch circuits sized for maximum drop of 3%.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
9.4.1.1 [EL1] ²	Automatic controls to shut off all building lighting installed in buildings >5,000 ft ² .	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
9.4.1.2 [EL2] ²	Independent lighting controls installed per approved lighting plans and all manual controls readily accessible and visible to occupants.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
9.4.1.4 [EL4] ¹	Separate lighting control devices for specific uses installed per approved lighting plans.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
9.4.2 [EL5] ³	Ballasted one and three lamp fixtures with >30 W/lamp have two lamp tandem wired ballasts when >=2 fixtures in same space on same control.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
9.4.3 [EL6] ¹	Exit signs do not exceed 5 watts per face.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
9.6.2 [EL8] ¹	Additional interior lighting power allowed for special functions per the approved lighting plans and is automatically controlled and separated from general lighting.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
8.7.1 [FI16] ³	Furnished as-built drawings for electric power systems within 30 days of system acceptance.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
8.7.2 [FI17] ³	Furnished O&M instructions for systems and equipment to the building owner or designated representative.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
9.2.2.3 [FI18] ¹	Interior installed lamp and fixture lighting power is consistent with what is shown on the approved lighting plans, demonstrating proposed watts are less than or equal to allowed watts.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Interior Lighting fixture schedule for values.

Additional Comments/Assumptions:



Mechanical Compliance Certificate

Project Information

Energy Code: 90.1 (2007) Standard
Project Title: Red River Bank
Location: Metairie, Louisiana
Climate Zone: 2a
Project Type: New Construction

Construction Site:
1918 Veterans Boulevard
Metairie, LA 70005

Owner/Agent:
Red River Bank

Designer/Contractor:
Ashe Broussard Weinzettle
Architects

Mechanical Systems List**Quantity System Type & Description**

- 1 HVAC System RTU1 (Single Zone):
Heating: 1 each - Central Furnace, Electric, Capacity = 48 kBtu/h
No minimum efficiency requirement applies
Cooling: 1 each - Single Package DX Unit, Capacity = 58 kBtu/h, Air-Cooled Condenser
Proposed Efficiency = 13.00 SEER, Required Efficiency: 13.00 SEER
Fan System: None
- 1 HVAC System RTU2 (Single Zone):
Heating: 1 each - Central Furnace, Electric, Capacity = 35 kBtu/h
No minimum efficiency requirement applies
Cooling: 1 each - Single Package DX Unit, Capacity = 48 kBtu/h, Air-Cooled Condenser
Proposed Efficiency = 13.00 SEER, Required Efficiency: 13.00 SEER
Fan System: None
- 2 HVAC System RTU3 & RTU4 (Single Zone):
Heating: 1 each - Central Furnace, Electric, Capacity = 35 kBtu/h
No minimum efficiency requirement applies
Cooling: 1 each - Single Package DX Unit, Capacity = 35 kBtu/h, Air-Cooled Condenser
Proposed Efficiency = 13.00 SEER, Required Efficiency: 13.00 SEER
Fan System: None
- 1 Mini Split MS-1 (Single Zone):
Split System Heat Pump
Heating Mode: Capacity = 22 kBtu/h,
Proposed Efficiency = 7.70 HSPF, Required Efficiency = 7.70 HSPF
Cooling Mode: Capacity = 22 kBtu/h,
Proposed Efficiency = 15.00 SEER, Required Efficiency: 13.00 SEER
Fan System: None
- 1 Water Heater 1 (4KW):
Electric Storage Water Heater, Capacity: 20 gallons
No minimum efficiency requirement applies
- 1 Water Heater 2 (3KW):
Electric Instantaneous Water Heater, Capacity: 0 gallons
No minimum efficiency requirement applies

Mechanical Compliance Statement

Compliance Statement: The proposed mechanical design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 90.1 (2007) Standard requirements in COMcheck Version 4.1.1.0 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

GREG GRIMES

Name - Title



Signature

6/8/2023

Date



Inspection Checklist

Energy Code: 90.1 (2007) Standard

Requirements: 0.0% were addressed directly in the COMcheck software

Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
4.2.2, 6.4.2 [PR2] ¹	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the mechanical systems and equipment and document where exceptions to the standard are claimed. Load calculations per acceptable engineering standards and handbooks.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
4.2.2, 7.4.1 [PR3] ¹	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the service water heating systems and equipment and document where exceptions to the standard are claimed. Hot water system sized per manufacturer's sizing guide.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.7.2.4 [PR5] ¹	Detailed instructions for HVAC systems commissioning included on the plans or specifications for projects $\geq 50,000$ ft ² .	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)
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Section # & Req.ID	Footing / Foundation Inspection	Complies?	Comments/Assumptions
6.4.3.8 [FO9] ³	Freeze protection and snow/ice melting system sensors for future connection to controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)
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Section # & Req.ID	Plumbing Rough-In Inspection	Complies?	Comments/Assumptions
7.4.3 [PL1] ²	Service hot-water piping systems insulated. Where piping is installed in or under a slab, verification may need to occur during Foundation Inspection.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
7.4.3 [PL1] ²	Service hot-water piping systems insulated. Where piping is installed in or under a slab, verification may need to occur during Foundation Inspection.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
7.4.4.1 [PL2] ³	Temperature controls installed on service water heating systems (<=120°F to maximum temperature for intended use).	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
7.4.6 [PL4] ³	Heat traps installed on non-circulating storage water tanks.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)
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Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.4.1.4, 6.4.1.5 [ME1] ²	HVAC equipment efficiency verified. Non-NAECA HVAC equipment labeled as meeting 90.1.	Efficiency: _____	Efficiency: _____	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Mechanical Systems list for values.
6.4.3.4.1 [ME3] ³	Stair and elevator shaft vents have motorized dampers that automatically close.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.4.3.4.5 [ME5] ³	Ventilation fans >0.75 hp have automatic controls to shut off fan when not required.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.4.3.9 [ME6] ¹	Demand control ventilation provided for spaces >500 ft ² and >40 people/1000 ft ² occupant density and served by systems with air side economizer, auto modulating outside air damper control, or design airflow >3,000 cfm.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.4.4.1.1 [ME7] ³	Insulation exposed to weather protected from damage. Insulation outside of the conditioned space and associated with cooling systems is vapor retardant.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.4.4.1.2 [ME8] ²	HVAC ducts and plenums insulated.	R- _____	R- _____	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.4.4.1.3 [ME9] ²	HVAC piping insulation thickness.	_____ in.	_____ in.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.4.4.2.1 [ME10] ²	Ducts and plenums sealed based on static pressure and location.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.4.4.2.2 [ME11] ³	Ductwork operating >3 in. water column requires air leakage testing.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.4.4.2.2 [ME11] ³	Ductwork operating >3 in. water column requires air leakage testing.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.4.4.2.2 [ME11] ³	Ductwork operating >3 in. water column requires air leakage testing.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.4.4.2.2 [ME11] ³	Ductwork operating >3 in. water column requires air leakage testing.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

☐ 1 High Impact (Tier 1)
 ☐ 2 Medium Impact (Tier 2)
 ☐ 3 Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.5.2.3 [ME19] ³	Dehumidification controls provided to prevent reheating, recooling, mixing of hot and cold airstreams or concurrent heating and cooling of the same airstream.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.5.4.1 [ME25] ³	HVAC pumping systems >10 hp designed for variable fluid flow.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.5.6.1 [ME30] ¹	Exhaust air energy recovery on systems >=5,000 cfm and 70% of design supply air.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.5.7.1 [ME32] ²	Kitchen hoods >5,000 cfm have make up air >=50% of exhaust air volume.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.5.7.2 [ME33] ¹	Fume hoods exhaust systems >=15,000 cfm have VAV hood exhaust and supply systems, direct make-up air or heat recovery.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.5.8.1 [ME34] ³	Unenclosed spaces that are heated use only radiant heat.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.5.9 [ME35] ¹	Hot gas bypass limited to: <=240 kBtu/h - 50% >240 kBtu/h - 25%			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.5.9 [ME35] ¹	Hot gas bypass limited to: <=240 kBtu/h - 50% >240 kBtu/h - 25%			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.5.9 [ME35] ¹	Hot gas bypass limited to: <=240 kBtu/h - 50% >240 kBtu/h - 25%			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
7.4.2 [ME36] ²	Service water heating equipment meets efficiency requirements.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
7.4.2 [ME36] ²	Service water heating equipment meets efficiency requirements.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)
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Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
10.4.1 [EL9] ²	Electric motors meet requirements where applicable.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)
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Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
6.4.3.1.1 [FI2] ²	Heating and cooling to each zone is controlled by a thermostat control.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.4.3.1.2, 6.4.3.2, 6.4.3.3, 6.4.3.3.1, 6.4.3.3.2 [FI3] ²	Thermostatic controls have a 5 °F deadband.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.4.3.5 [FI5] ³	Heat pump controls prevent supplemental electric resistance heat from coming on when not needed.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.4.3.7 [FI6] ³	When humidification and dehumidification are provided to a zone, simultaneous operation is prohibited.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.7.2.1 [FI7] ³	Furnished HVAC as-built drawings submitted within 90 days of system acceptance.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.7.2.2 [FI8] ³	Furnished O&M manuals for HVAC systems within 90 days of system acceptance.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.7.2.3 [FI9] ¹	An air and/or hydronic system balancing report is provided for HVAC systems serving zones >5,000 ft2 of conditioned area.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.7.2.4 [FI10] ¹	HVAC control systems have been tested to ensure proper operation, calibration and adjustment of controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
7.4.4.3 [FI11] ³	Public lavatory faucet water temperature <=110°F.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
7.4.4.3 [FI11] ³	Public lavatory faucet water temperature <=110°F.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.4.3.2 [FI20] ¹	Temperature controls have setpoint overlap restrictions.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
6.4.3.3.1 [FI21] ¹	HVAC systems equipped with at least one automatic shutdown control.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)
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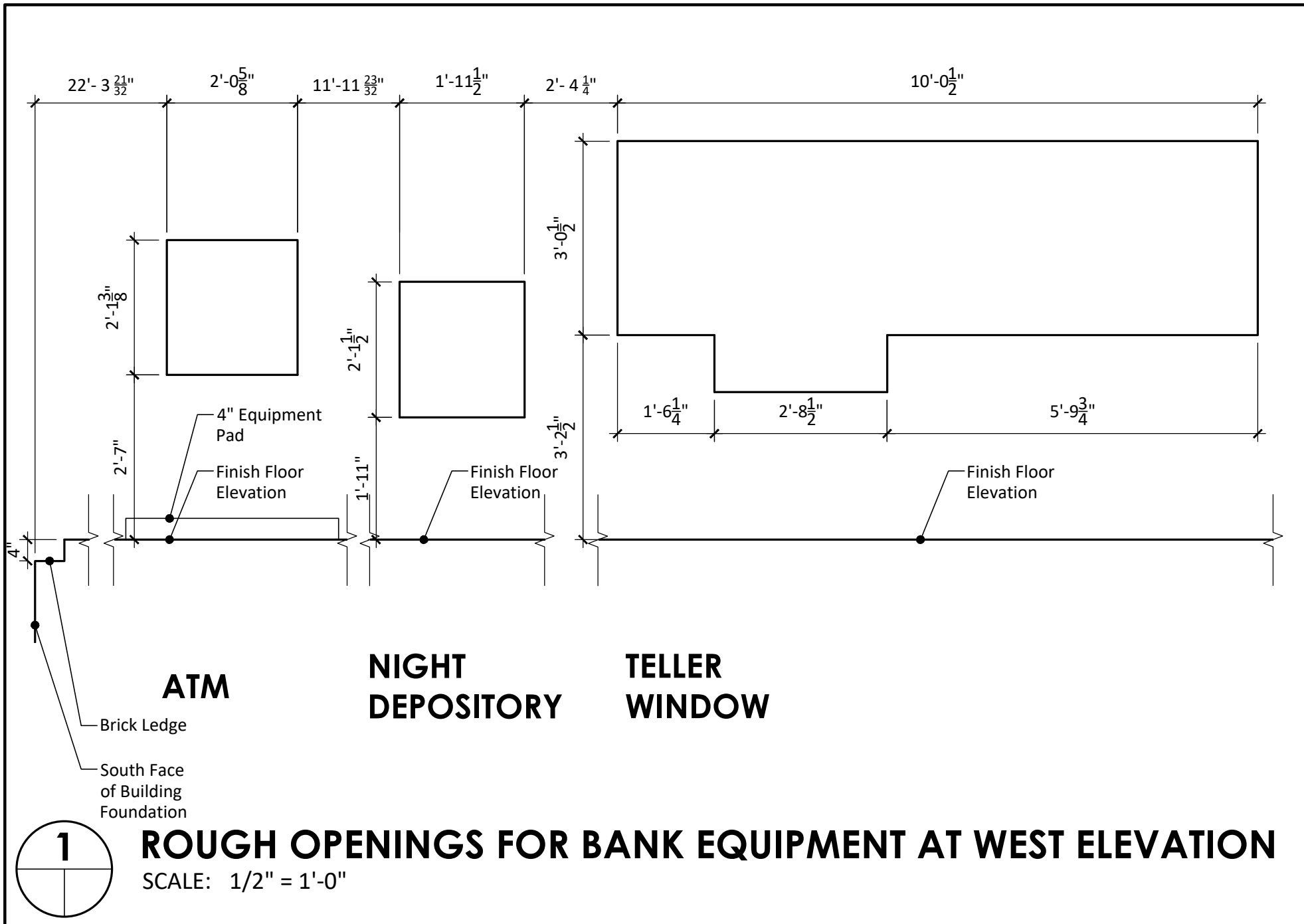
Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
6.4.3.3.2 [FI22] ¹	Setback controls allow automatic restart and temporary operation as required for maintenance.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)
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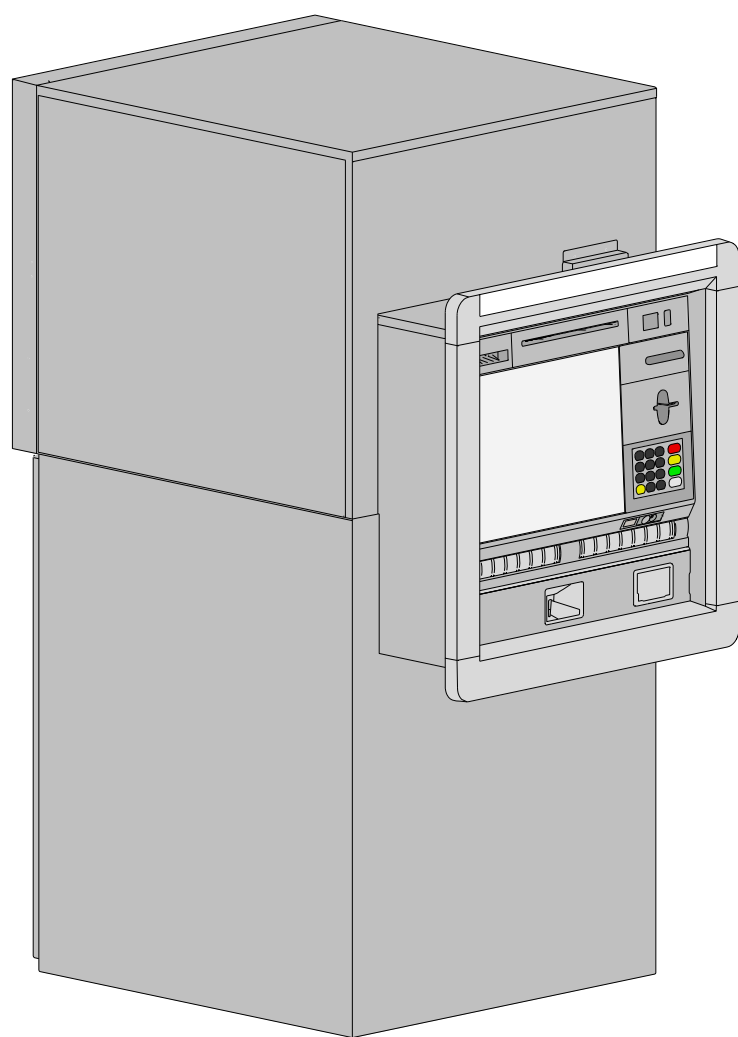
APPENDIX C

Owner Furnished Bank Equipment





NCR SelfServ™ 84 Drive-Up ATM Site Preparation



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Standard Collar - Long Sleeve

Servicing Areas - Minimum - Single ATM

Standard Collar - Short Sleeve

Standard Collar - Long Sleeve

Variant Details - Advert Collar

Package Dimensions

ATM Dimensions

Cable Entry

Clearances - Corridor

Facia Items

15" Touchscreen

19" Touchscreen

Touchscreen Dimensions

Heights and Depths

Distance for Voice Guidance

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Hole in the Wall Overlap - Advert Collar

Vents Location - Air Flow

Servicing Areas - Optimum - Single ATM

Advert Collar - Short Sleeve

Advert Collar - Long Sleeve

Servicing Areas - Minimum - Single ATM

Advert Collar - Short Sleeve

Advert Collar - Long Sleeve

AUDIENCE

This document is intended for architects and those responsible for preparing a site prior to the arrival of the ATM.

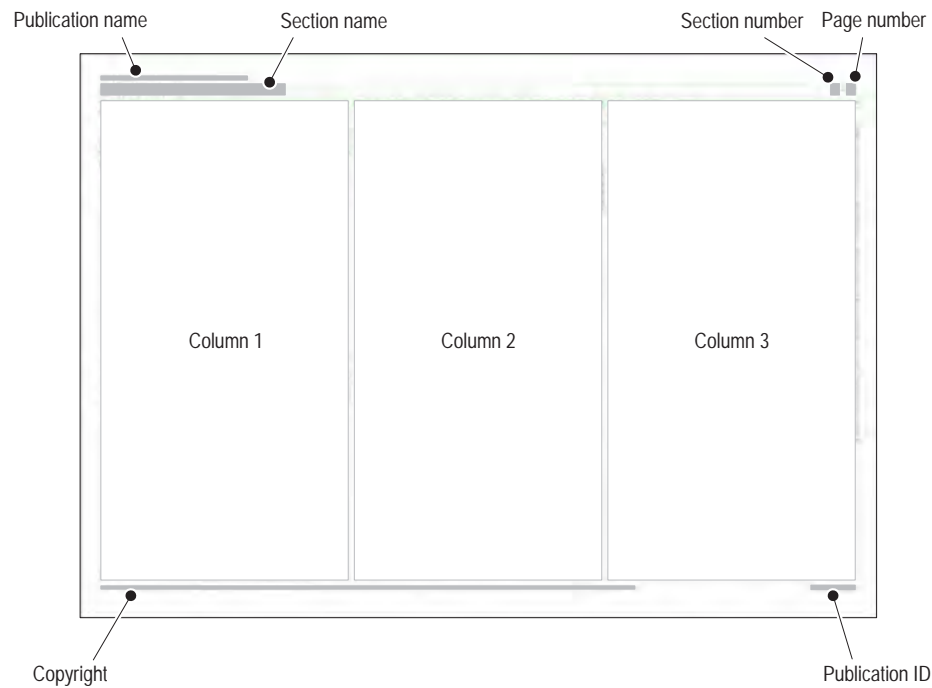
ABOUT THIS DOCUMENT

This site preparation document is designed to be read on wide aspect ratio screens. Each section has been structured to fit the maximum amount of information on the minimum number of pages yet still be readable when printed on A3 size paper. Printing on smaller paper sizes may reduce readability but will make handling easier.

The document is organised into sections covering the following topics:

- Introduction - this section
- Customer Responsibilities
- Standards Compliance
- Product Overview
- Site Requirements
- Power Requirements
- Cable Requirements
- Decals
- Variant Details - Standard Collar
- Variant Details - Advert Collar

Each page has two or three columns laid out as follows:



Where left and right side are stated the ATM is viewed from the front (facia side) of the ATM. All plan views are from the top unless otherwise stated.

Unless otherwise stated all dimensions are rounded to the nearest millimetre and equivalent decimal of an inch.

REVISION RECORD


Date	Revision	Pages	Reason for Change
January 2017	A	All	Initial release
February 2017	B	Various	Remove Statement Printer option

NOTICE

This is a contractual document. It contains important warnings and confers important legal rights and obligations. You are advised to read it carefully.

It is the responsibility of you, the customer, to assure that all installation preparations are complete and in compliance with all specifications and requirements of NCR and all applicable national, state, or local codes, regulations and laws.

This equipment must be installed and used in strict accordance with the manufacturer’s instructions. However, there is no guarantee that interference to radio communications will not occur in a particular commercial installation. If this equipment does cause interference, which can be determined by turning the equipment off and on, the user is encouraged to consult an NCR service representative immediately.



CAUTION NCR Corporation is not responsible for any radio or television interference caused by unauthorized modifications of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by NCR. Such unauthorized modifications, substitutions, or attachments may void the user’s authority to operate the equipment. The correction of interference caused by such unauthorized modifications, substitutions, or attachments will be the responsibility of the user.

SITE COMPLIANCE

This document contains the information necessary for the preparation of a site conforming to NCR specifications. It is very important that the site complies with the requirements specified in this document, because, once the equipment has been installed, deficiencies in site preparation or the problems caused by these deficiencies are much more difficult to detect and correct.

Further, failure to comply with these requirements or to take proper steps to protect equipment against risks identified in this document may cause serious damage to the equipment and to the customer’s business.

In addition to the need to comply with the requirements specified, electrical wiring and mechanical systems must also comply with all relevant codes, laws and regulations.

It is important that the site be prepared by a customer or his agent who is fully conversant with the special requirements of electronic equipment. The responsibility for ensuring that the site is prepared in compliance with this document remains with the customer.

For information and guidance purposes only, a list is provided, in general terms, of those matters for which the customer is responsible. This list is not intended to be comprehensive, and in no way modifies, alters, or limits the responsibility of the customer for all aspects of adequate site preparation.

NCR staff will be available to answer questions relating to the contents of this document but, except where:

a.

b.

the customer has been notified that a full or partial consultancy service is available and/or that NCR will be willing to undertake a preliminary or final site survey and

the customer shall have entered into a formal contract with NCR for provision of the same

no comment, suggestion or advice offered or not offered about preparation of the site nor any inspection of the site whether before or after preparation is to be taken as approval of the location of the site and equipment or of its preparation and NCR will not be liable in respect of any comment, suggestion or advice given by its staff or in respect of any failure to give advice.

- Finally, only the customer can know the full extent of damage which may be caused to his business by reason of failure of the equipment which is to be installed. For this reason it is the customer’s responsibility to ascertain the extent of any such possible damage to his existing or planned business, and to effect, full insurance in respect of it.

CUSTOMER ACTIONS

The customer must do or provide the following:

- When required by NCR, provide the NCR customer service representative with appropriate drawings that indicate:
 - Location of the equipment
 - Site wiring (power and signal, paths and lengths)
 - Location of other equipment capable of generating electrical noise, electromagnetic interference, heat, etc.
- Make building alterations necessary to meet wiring and other site requirements.
- Provide and install all communications cables, wall jacks, special connectors, and associated hardware.
- Provide and install necessary power distribution boxes, conduits, grounds, lightning protection, and associated hardware.
- Make sure all applicable codes, regulations and laws (including, but not limited to, electrical, building, safety, and health) are met.
- Provide and install auxiliary power or other equipment as required.
- Provide storage or service areas as required.
- Make sure the environmental requirements of the system/unit are met.
- Provide floor coverings and environmental systems that limit or control static electricity build-up and discharge.
- Install the product at a height which meets the accessibility regulations of the relevant country.

RADIO FREQUENCY INTERFERENCE

FCC Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the Federal Communications Commission (FCC) Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case you, the customer, will be required to correct the interference at your own expense.

Canadian Class A Device Declaration

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n’émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

SAFETY

Safety Directive

- 73/23/EEC, 93/68/ECC ‘Low Voltage Directive and Amendment’.

Harmonised Safety Standard

- EN 60950-1: 2006 ‘Information Technology Equipment - Safety’

ELECTROMAGNETIC COMPATIBILITY (EMC)

Immunity Standards

The ATM complies with the following requirements for radiated and conducted immunity:

- EN 55024

As per the requirements of EN55024, the ATM complies with the requirements of the following normative Immunity Standard:

- EN 61000-4-2 Electrostatic Discharge
- EN 61000-4-3 Radiated RF
- EN 61000-4-4 Electrical Fast Transient/Burst
- EN 61000-4-5 Surge
- EN 61000-4-6 Conducted RF
- EN 61000-4-8 Power Frequency Magnetic Field
- EN 61000-4-11 Voltage Dips/Short Interruption.

EMC Directives

This equipment has been found to comply with the essential requirements of EMC Directive 2014/30/EU, by testing to harmonized standards EN55032, EN55024, EN61000-3-2 and EN61000-3. The equipment complies with the limits for a Class A digital device, pursuant to EN55032.


The ATM complies with the following Electromagnetic Compatibility (EMC) directives and standards for IT equipment:

- 2014/30/EU ‘EMC Directive’
- 93/68/EEC ‘CE Marking Directive’

Emission Standards

The ATM complies with the following requirements for radiated and conducted emissions:

- EN55032 Class A
- FCC 47CFR Part 15. Class A
- CISPR 32 Class A
- AS/NZS 3548 Class A
- GB 9254 Class A
- CNS 13438 Class A.



WARNING This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

Additional Requirements for 220V - 240V Units

The ATM complies with the following requirements for conducted emissions:

- EN 61000-3-2: Mains harmonics, Class A
- EN 61000-3-3: Mains flicker.

ACCESSIBILITY

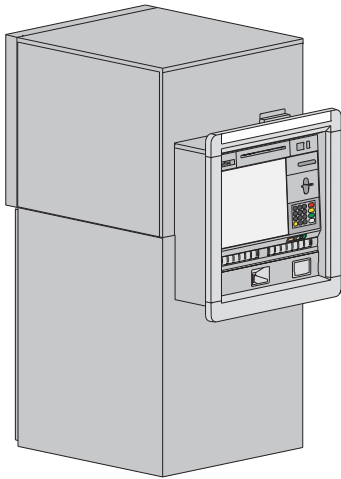
It is the responsibility of the owning institution to ensure that the heights from the floor level to the facia items comply with any local regulations.

Note: The heights listed in this document assume that the installation does not add depth in front of the ATM. Increased depth may change the height requirements due to increasing the user’s reach, therefore please refer to the relevant accessibility regulation if additional depth has been added.

Product Overview

GENERAL DESCRIPTION

The NCR SelfServ 84 Drive-Up Automated Teller Machine is a ‘through the wall’ ATM which can also be deployed as a walk-up ATM.



Options

Standard Security Enclosure

- CEN Grade 1

Sleeve

- Short Sleeve
- Long Sleeve

Collars

- Standard
- Advert

ACOUSTICS

For most variants the acoustics sound power does not exceed:

- 65 dB(A) when idle
- 68 dB(A) when operating.

However, the following configurations will affect the sound levels as shown in the table below:

Configuration	Acoustic sound power when operating
Coin and passbook	does not exceed 72 dB(A)
Cooling fans	does not exceed 75 dB(A)

HEAT DISSIPATION

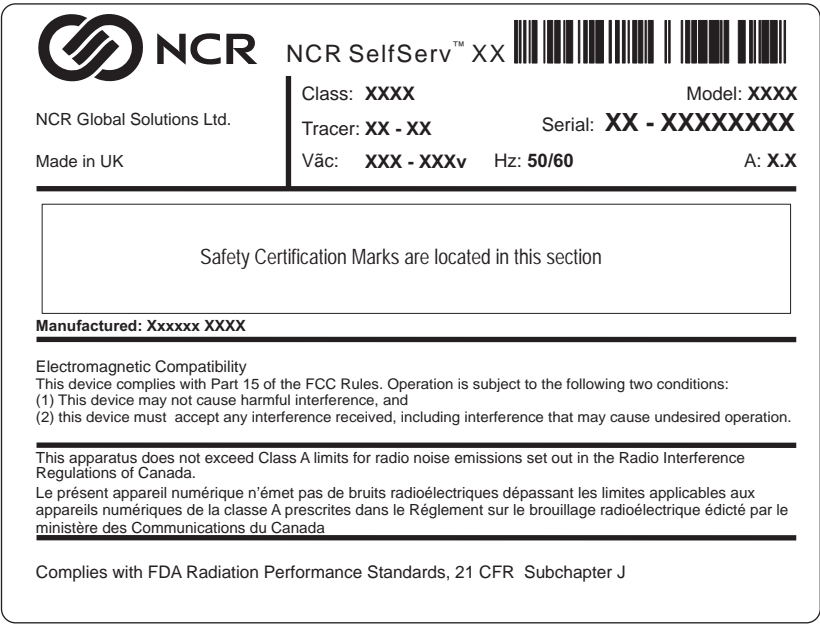
The NCR SelfServ product range is a flexible hardware platform. NCR recommends that actual power measurements are taken and used to establish the heat dissipation for specific hardware configurations. These measurements should include any custom or third party features.

Where specific measurements are not available then, as a guide, **760 KJ/hour** can be used as an indicative heating load. This figure is based on an ATM in idle mode, with a medium to high feature functionality configuration.

Heat dissipation figures are largely unaffected by transactional rates.

PRODUCT IDENTIFICATION

The illustration below is typical of the layout of the product identification label which is fixed inside the ATM.



The product is identified by a class and a 4 digit model number. The serial number is unique to each ATM. The tracer number is used to identify where the ATM was built.

Please quote all of the serial and tracer numbers, including the prefix, when making reference to the ATM.

Electrical rating information is also shown on the product label.

POSITIONING THE ATM

- The ATM may be installed through any suitable exterior wall.
- Position the ATM where bright sunlight will not fall directly on the display.
- The ATM must also be positioned away from heat sources or any air conditioning equipment.
- Allow sufficient room for installation and servicing requirements.

CAUTION The ATM is designed to withstand exposure to rainfall. However do not locate it where it may be exposed to water spray, for example, from vehicles driving through puddles.

FLOOR

- The ATM *must* be installed on a level, even, concrete or other noncombustible surface. In locations where the floor may be uneven, it is recommended that a steel plate is used under the ATM.
- An antistatic floor covering should be used and must be of a type that will not generate dust or fluff.
- The ATM must be installed on a floor capable of supporting the maximum weight including media. Only the maximum weight should be considered as additional options may be added after installation. Floor loading is calculated by dividing the maximum weight of the ATM by the surface area of the ATM base in contact with the floor.
- Service areas, ATM weights and floor loading for your ATM can be found in the Variant Details section.*

DOORWAYS AND CORRIDORS

- Make sure that doorways and corridors leading to your point of installation are wide enough to allow the package to pass through, or make arrangements to unpack the ATM and remove it from the pallet in an area with sufficient access then move it to the installation site.
- Make sure that any corridors can support the weight of the ATM, including all packaging and the pallet.

WALL

A **25 mm** (1.0 in.) wide smooth surface is required around the edge of the wall opening to enable a good weather seal.

Wall Cavity

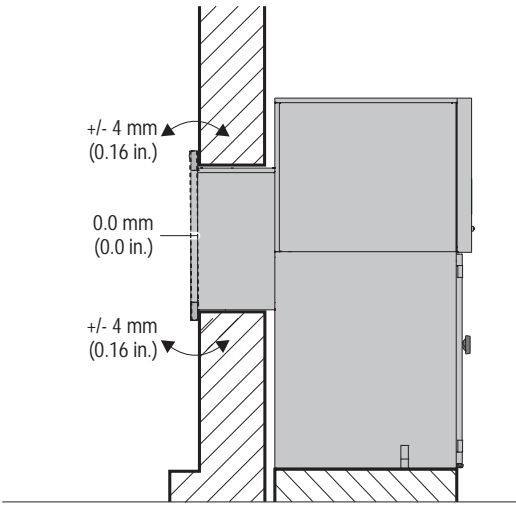
Any cavity in the wall must be sealed to provide a flush surface that does not extend into the wall opening. Leave the gap between the ATM sleeve and the wall opening clear to allow air at room temperature to circulate.

Installing Through a Glass Wall

If you are installing your ATM through a glass wall you may require a suitable glass support (normally a steel collar) to sit between the ATM collar and the glass. The requirement for this support should be determined by the architect. If required, any such support should be sourced locally.

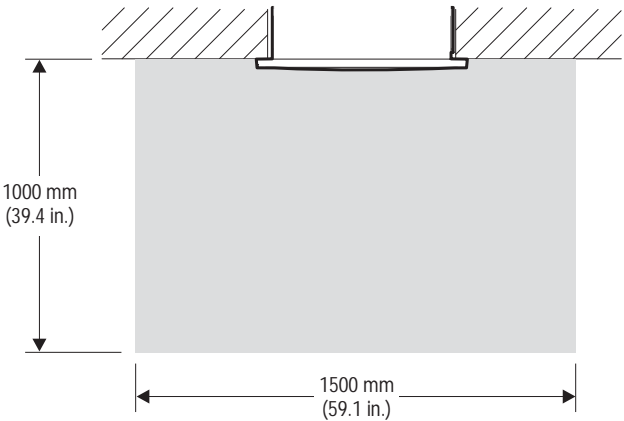
Collar Tolerance

- The collar has a tolerance of **+/- 4 mm** (0.2 in. (**+/- 0.5°**)) at the top and bottom, with **0 mm** (0.0 in. (**0°**)) at its centre.
- The collar cannot accommodate large dips or depressions in the wall. Make sure the wall is smooth and even.



AMBIENT LIGHTING

If the ATM is fitted with a camera, it is strongly recommended that there is a minimum of **50 LUX** lighting at floor level within the area illustrated below.



TASK LIGHTING

A minimum of **200 LUX** is required for task lighting.

TEMPERATURE AND HUMIDITY

Continuous operating at or near the range limits, or in a location where the temperature and humidity change beyond the specification, should be avoided.

If installing though an exterior wall, the site must meet the requirements of both the Interior and Exterior environments.

Note: For exterior through the wall ATMs the humidity inside the building is restricted to a maximum of **30%** at an outside temperature of **-35°C** (-31°F), with a linear relationship between temperature and humidity to a maximum humidity at **0°C** (32°F).

Normal Operating Range (Interior Environment)

- Temperature: **0°C to 40°C** (32°F to 104°F)
- Relative Humidity: **20% to 80%**
- Dew Point Temperature Restriction: **26°C** (79°F) maximum

Normal Operating Range (Exterior Environment)

- Temperature: **-35°C to 50°C** (-31°F to 122°F)
- Relative Humidity: **10% to 100%**
- Dew Point Temperature Restriction: **26°C** (79°F) maximum

Storage Range (Up To Three Months)

- Temperature: **-10°C to 50°C** (14°F to 122°F)
- Relative Humidity: **10% to 90%**

Transit Range (Up To One Week)

- Temperature: **-40°C to 60°C** (-40°F to 140°F)
- Relative Humidity: **5% to 95%**

Extreme Power On Range (Up To One Hour)

- Temperature: **0°C to 45°C** (32°F to 113°F)
- Relative Humidity: **10% to 95%**

BAROMETRIC PRESSURE

- Operating/Transit Limits: **105 kPa** (15.2 lb.F/in.) to **70 kPa** (10.2 lb.F/in.)
- Equivalent Altitude: Up to a maximum of **3000 m** (9842.52 ft)

Power Requirements

AC POWER REQUIREMENTS

The maximum current requirements are:

- 10A at 120V
- 6.3A at 230V.

The maximum inrush current is 100A.

NCR does not recommend running an ATM with deposit devices without an Uninterruptible Power Supply (UPS). Without a UPS, there is the potential for customer’s cash to be retained in the device if there is a power failure.

INPUT VOLTAGE SETTING

The ATM can operate from the following input mains voltages:

- 90V to 136V at 50/60Hz
- 180V to 264V at 50/60Hz.

GROUNDING

The ATM operates from a single phase, 3 wire supply: live, neutral and ground.

The ATM power requirements will normally permit it to operate within existing wiring configurations and from existing mains outlets provided that:

- the branch circuit of the distribution panel supplying the ATM is not also used to supply equipment with heavy inductive loads such as air conditioners or AC motors.
- other branch circuits on the same distribution panel do not supply such equipment.
- the installation meets or exceeds the regulatory and local guidelines with regard to electrical safety and all conductor sizing.

The normal and safe operation of this ATM is dependent on the above. Only qualified personnel that meet local certification standards should be permitted to ensure compliance.

Note that the building ground point can also affect data integrity. For additional information refer to [Data Line Transient Protection](#) in the [Cable Requirements](#) section.

TRANSIENT PROTECTION

In the process of power distribution, transient electrical energy (including, but not limited to, lightning strikes, intermittent short circuits, and switching transients) can be introduced on to power lines. Such transient energy can be very damaging to electronic hardware and can also cause data corruption. Under these circumstances, NCR recommends the use of AC power transient suppressors and data (communication) line transient suppressors. Such protective devices are intended to guard against power and data line transients that can result in hardware damage and various system or program errors.

Improvement of any deficiencies in power quality is a customer responsibility. Malfunction and/or component failure as a result of power quality problems are/is not covered by NCR Corporation Maintenance Agreement. NCR accepts no liability for any such occurrence nor for its consequences.

When power transient suppression is required, the suppressors used should meet the following minimum requirements:

- Dissipate energy to match the appropriate application categories as defined by ANSI/IEEE Standard C62.41, Guide on Surge Voltages in Low-Voltage AC Power Circuits.
- Be of the voltage limiting (clipping), or tracking filter type. The suppressor must not ‘clamp’ the voltage to zero, and must self-recover after the passage of the transient. The suppressor may be of the hybrid type construction that makes use of various technologies in order to meet speed and dissipation requirements.
- Exhibit a ‘short circuit’ mode upon its failure, thus providing a positive indication of its failure such as a blown fuse or tripped breaker
- Be listed by the accepted safety organization for the country involved (e.g. UL, CSA, VDE, ETL, etc.) and the installation must conform to local, state, and national electrical codes and regulations.

Location Category	Comparable to IEC No 664 Category	Transient	
		Waveform	Amplitudes
B = Major feeders, short branch circuits, and load centres	III	Volts = 1.2 x 50 μ s	6kV
		Current = 8 x 20 μ s	3kA
C = Service Entrance and run to load centre	IV	0.5 μ Rise - 100 kHz	6kV
		Ringwave	500A
		Volts = 1.2 x 50 μ s	10kV or more
		Current = 8 x 20 μ s	10kA or more

CABLE PREPARATION

NCR supply a power cable for the ATM. Other external cables are not supplied. Specifications for these cables are given in this section.

It is the customer’s responsibility to have any required external cables installed and to make sure that all cable preparations comply with NCR specifications as well as with all national, state or local telephone and telegraph regulations and laws.

When producing cables allow for **2.2 m (7.22 ft)** of cable within the ATM.

DATA LINE TRANSIENT PROTECTION

Voltage transients, line noise, surges, sags, impulses, and spikes may be experienced routinely or sporadically. When such phenomena occur the use of protective devices may be required to ensure proper operation of the equipment.

It is the responsibility of the customer to install and connect a data line transient suppression system to correct or prevent any deficiencies. Such systems must meet the following minimum requirements:

Be of the self-recovering voltage limiting type. Exhibit a ‘short circuit’ mode upon its failure to ensure a positive indication of its failure. Insert minimum inductive and capacity loading at the operating frequency. Be installed in accordance with all applicable local, state, and national electrical codes and regulations.

Protect the data port from damage in the presence of a data line transient event as defined in IEC Standard 1000-4-5 (formerly IEC 801-5).

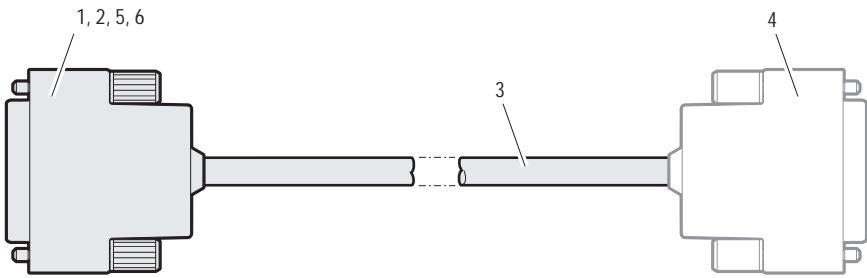
ALARM INTERFACE CABLES

The ATM may optionally be configured to provide an alarm interface which enables the ATM to be connected to an external local alarm system. The interface may take the form of one of two options; a basic alarm system or an enhanced alarm system.

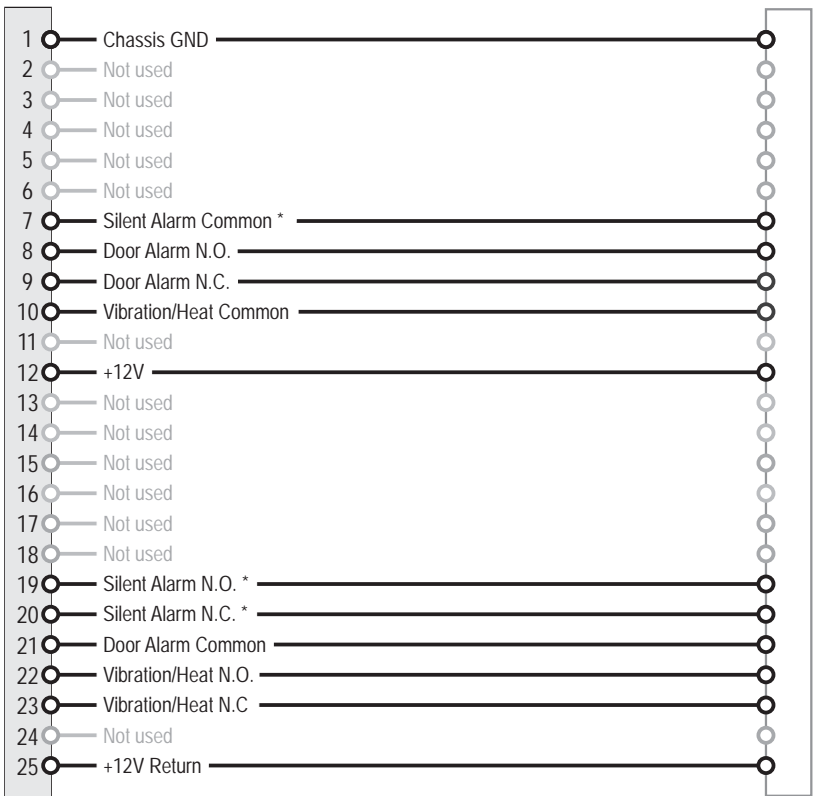
A stabilised, non-interruptible power supply must be provided through the external alarm system. The alarm interface cable wiring must conform to the following specification:

- 12V +/- 2V dc
- 200mA maximum
- Ripple, 5% maximum.

Basic Alarm Cable

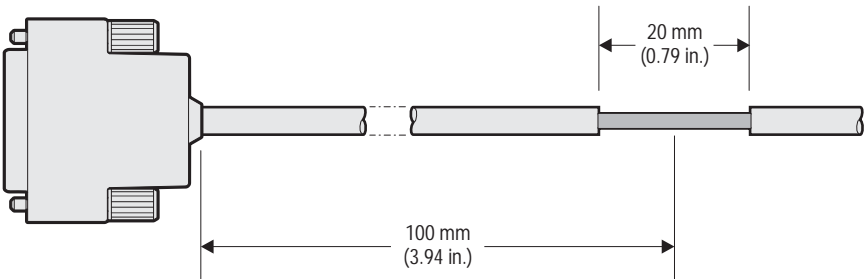


1. Connector, 25 Way (NCR part no. 006-0005896)
2. Terminal, wire, female (NCR part no. 009-0002640)
3. Cable, multiconductor (determined by the alarm installed).
4. Connector (determined by remote device).
5. Shell Hood (NCR part no. 006-1500038).
6. Screw retainer (NCR part no. 601-0101584).

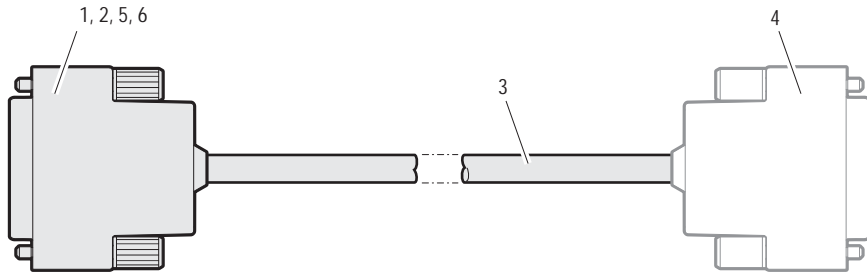


Remove a **20 mm (0.79 in.)** section of the outer sleeve, **100 mm (3.94 in.)** from the ATM end of the cable.

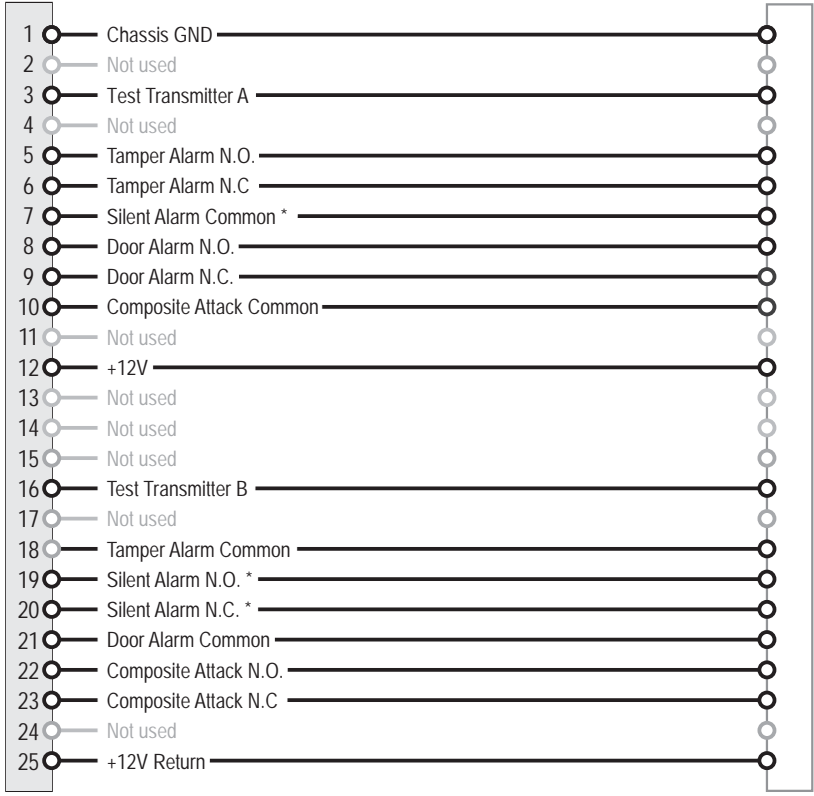
Take care not to cut through the cable shielding.



Enhanced Alarm Cable

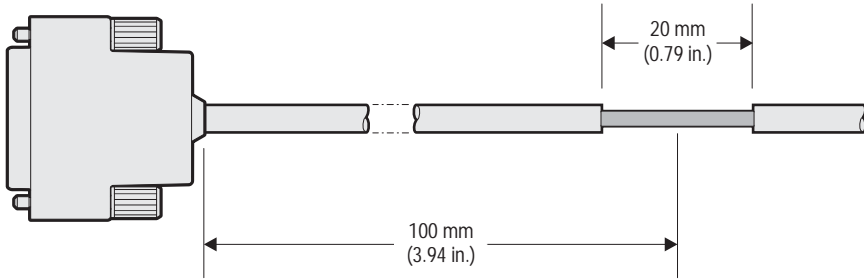


1. Connector, 25 Way (NCR part no. 006-0005896)
2. Terminal, wire, female (NCR part no. 009-0002640)
3. Cable, multiconductor (determined by the alarm installed).
4. Connector (determined by remote device).
5. Shell Hood (NCR part no. 006-1500038).
6. Screw retainer (NCR part no. 601-0101584).



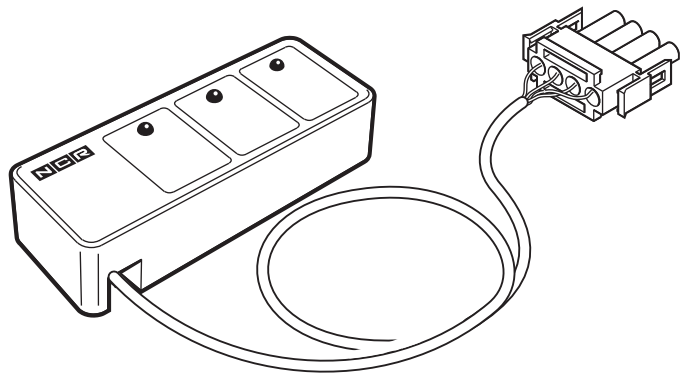
Remove a **20 mm (0.79 in.)** section of the outer sleeve, **100 mm (3.94 in.)** from the ATM end of the cable.

Take care not to cut through the cable shielding.



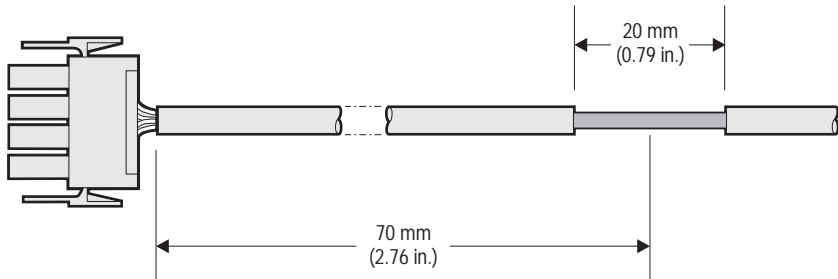
REMOTE STATUS MONITOR

The remote status monitor feature is supplied as a complete assembly consisting of a status indicator unit, **76.2 m** (250 ft) of cable and a connector.



Remove a **20 mm** (0.79 in.) section of the outer sleeve, **70 mm** (2.76 in.) from the ATM end of the cable.

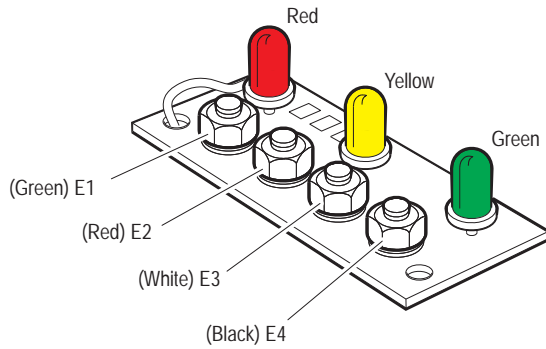
Take care not to cut through the cable shielding.



Shortening the Cable

If you need to shorten the cable, proceed as follows:

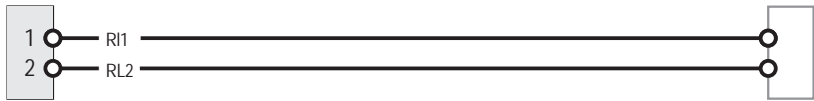
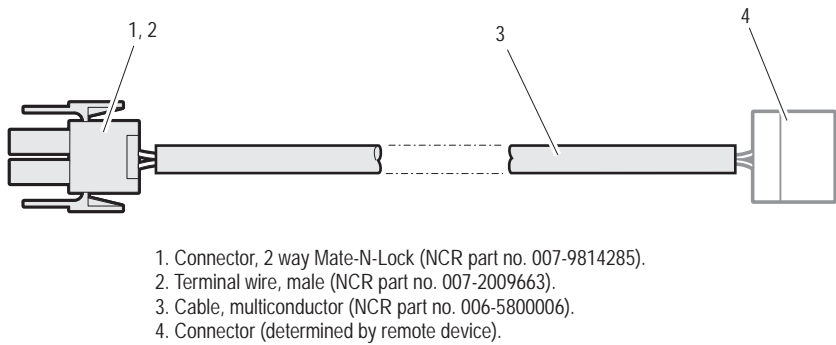
1. Remove the cover from the remote status indicator unit
2. Disconnect the four leads (E1, E2, E3 and E4) from the indicator



3. Cut the cable to the required length and strip the four wire ends
4. Connect the wires to the correct terminals
5. Replace the status indicator cover.

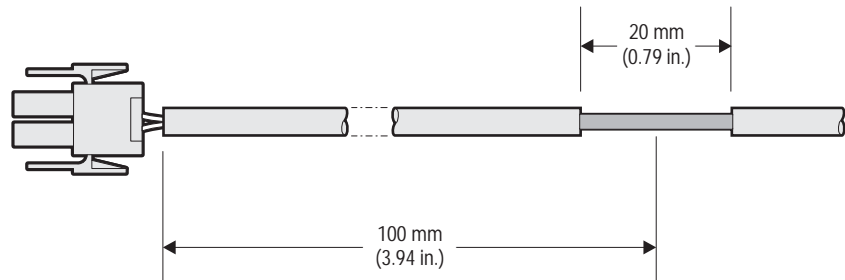
REMOTE RELAY CABLE

The remote relay provides a pair of open contacts, rated at 28 volts per ampere for both ac and dc supplies, which can be closed to activate a remote device. The interconnecting cable to a remote device must conform to the following specification and wiring:



Remove a **20 mm** (0.79 in.) section of the outer sleeve, **100 mm** (3.94 in.) from the ATM end of the cable.

Take care not to cut through the cable shielding.

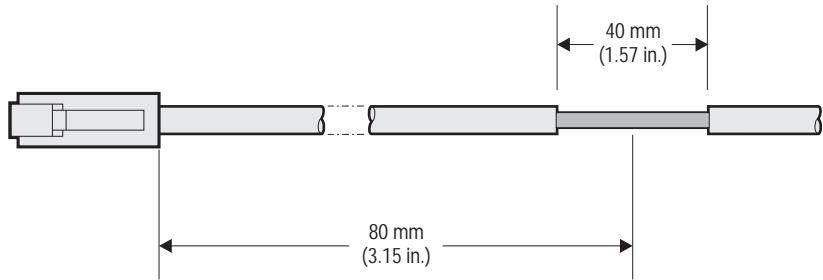


ETHERNET STANDARD CABLE

The ethernet standard cable must be fully shielded, 8 pin, category 5 compliant and must not exceed **97 m** (318.20 ft) in length.

Remove a **40 mm** (1.57 in.) section of the outer sleeve, **80 mm** (3.15 in.) from the ATM end of the cable.

Take care not to cut through the cable shielding.



POWER CABLE

The ATM is supplied either as a 120V or a 220-240V unit.

120V ATMs are supplied with a power cable fitted with a NEMA type 5-15P power source connector.

220-240V ATMs are supplied with an unterminated power cable. Information about suitable power connectors is supplied with the accessories.

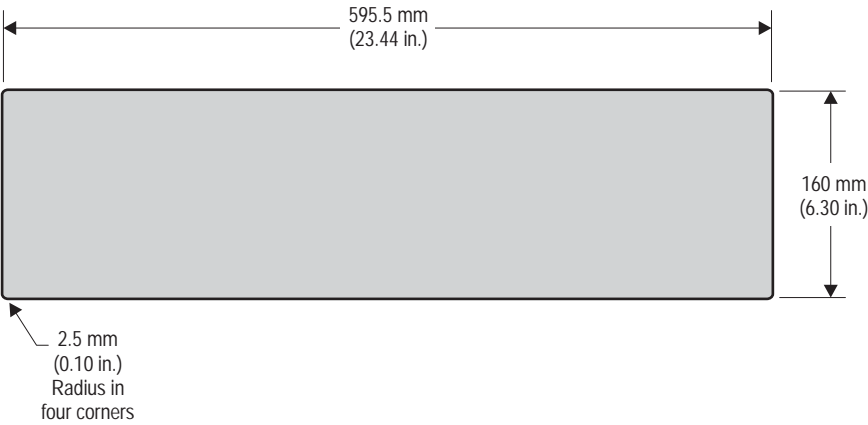
The power cable supplied is **3 m** (9.84 ft) in length. If it is necessary to increase this length to meet site requirements, then the extension must satisfy local or country regulations.

 **WARNING** This equipment must be earthed.

ADVERT WINDOW

The decals should be a maximum of **0.75 mm** (0.0295 in.) thick.

Advert Window



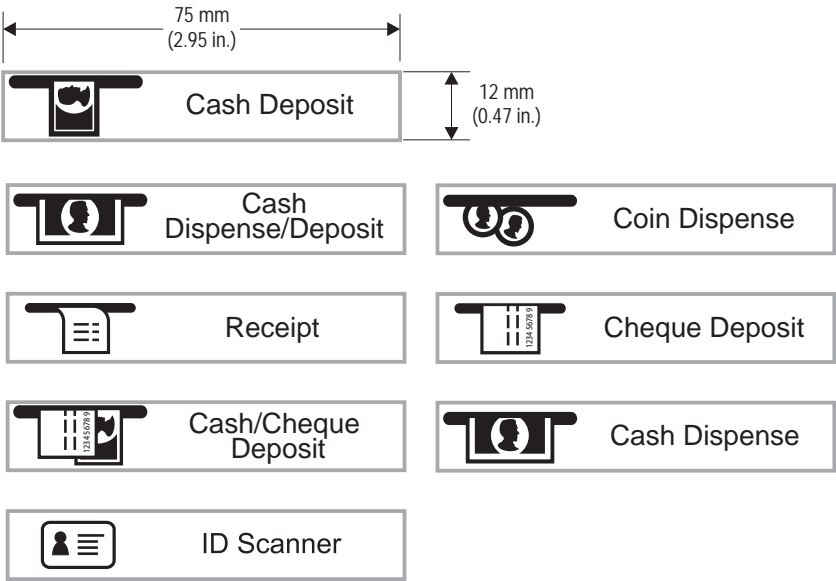
ENTRY/EXIT DECALS

Entry/Exit decals should be a maximum of **0.5 mm** (0.02 in.) thick. NCR recommends they be made from textured polycarbonate with 3M 467 High Performance MP adhesive.

Decals should provide good contrast, at least 70%, between foreground (text/icon) and background.

A sans serif typeface should be used (Tiresias is recommended). The text size should be at least 14 point, and larger where possible. Where tactile decals are required they should be designed in line with specific country requirements.

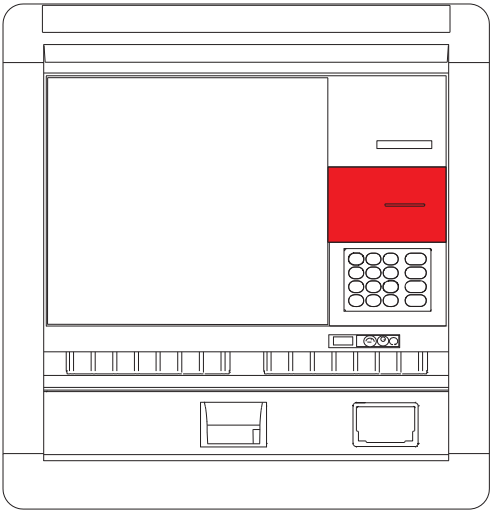
Suggested icon designs and wording are shown below:



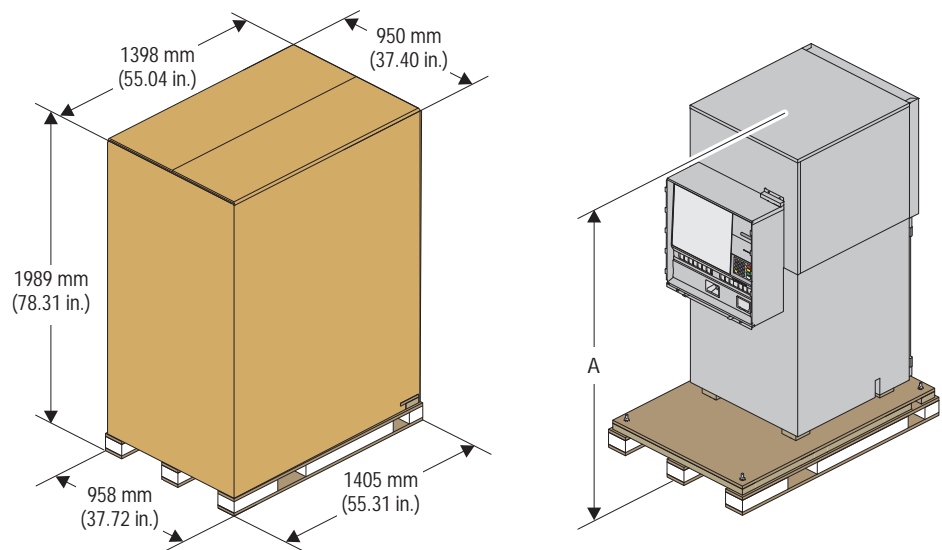
CAUTION When placing any card reader decal, make sure that the label does not obscure the contactless card reader or card entry slot lights.



CAUTION Do NOT place any metallic coated or substrate label on the glass area around the CCR or card reader, highlighted below:

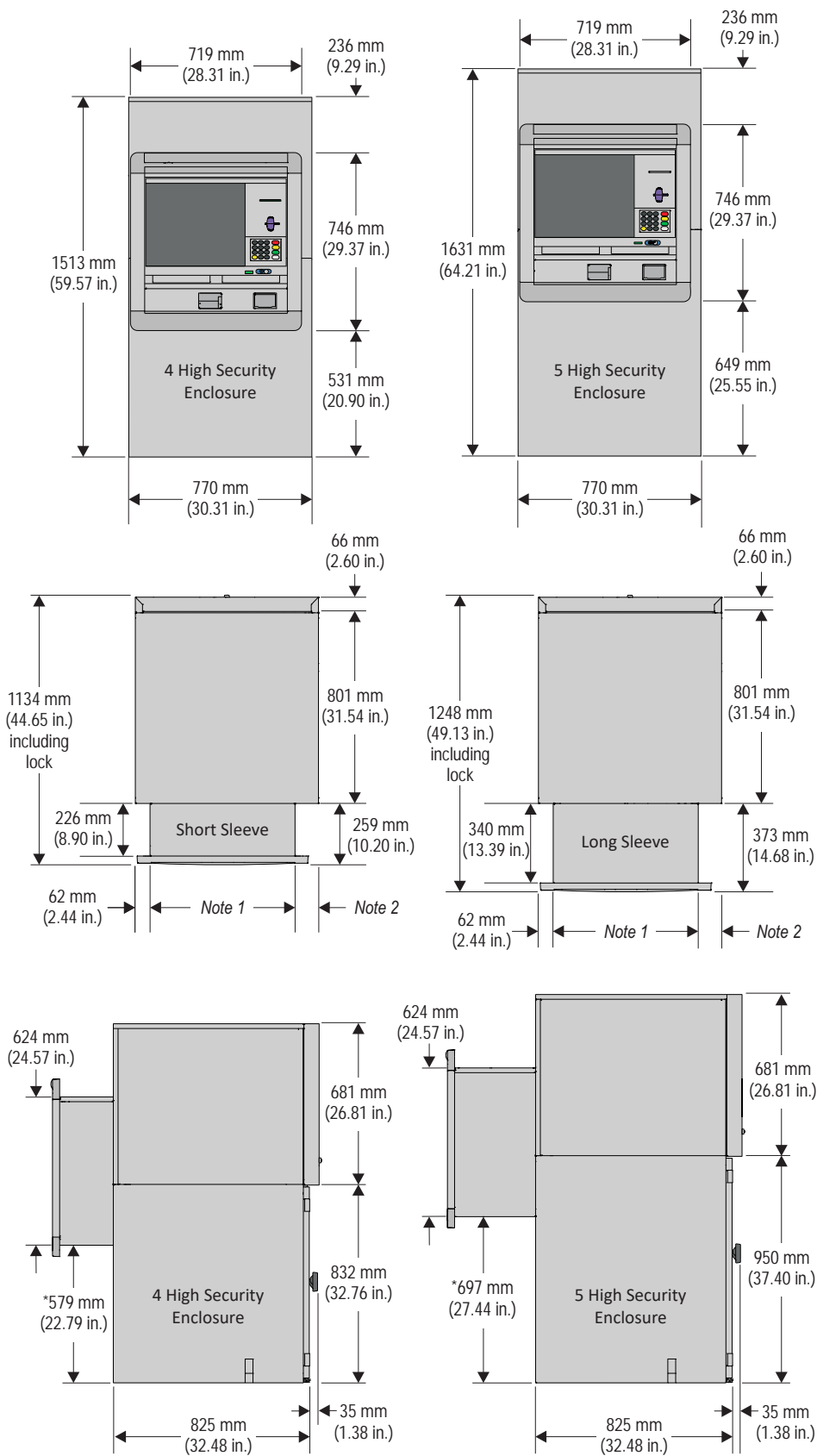


PACKAGE DIMENSIONS



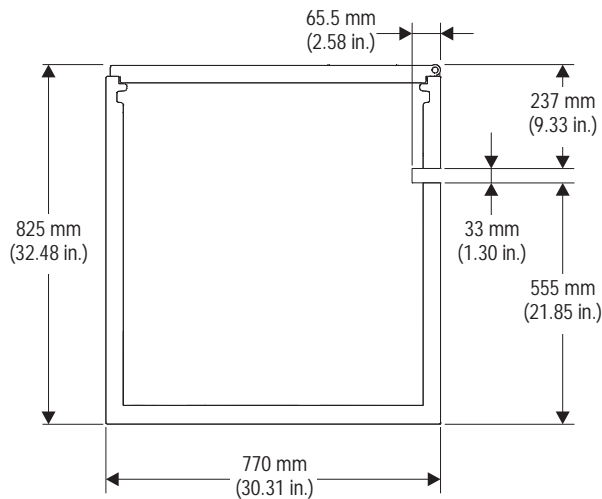
A - 1847 mm (72.72 in.) with a 5 High Security Enclosure
1729 mm (68.07 in.) with a 4 High Security Enclosure

ATM DIMENSIONS



* Dimensions are the same for short or long sleeve options
Note 1: 610 mm (24.02 in.) without cash camera
617.3 mm (24.30 in.) including cash camera
Note 2: 98 mm (3.86 in.) without cash camera option
90.7 mm (3.57 in.) with cash camera option

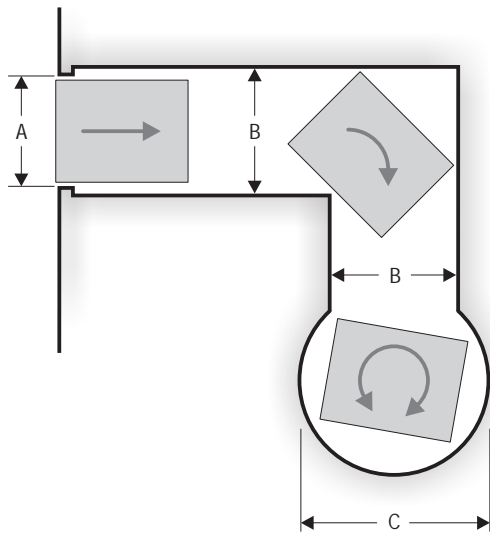
CABLE ENTRY



CLEARANCES - CORRIDOR

The dimensions shown assume the ATM is being moved using equipment that does not extend beyond the ATM or packaging.

A surrounding clearance of 6 mm (0.24 in.) has been allowed in the dimensions.

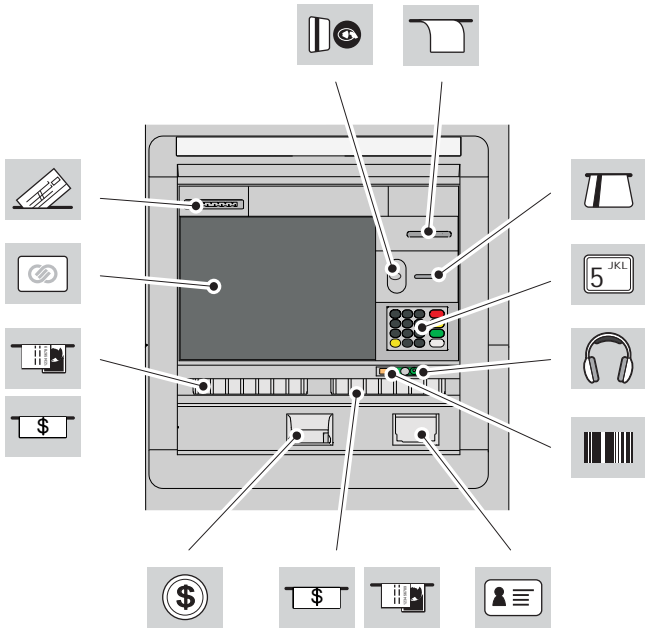


		Packaged ATM (pallet and carton)	Unpackaged ATM
A	Doorway or straight corridor	970 mm (38.19 in.)	782 mm (30.79 in.)
B	Corridor with corner	1186 mm (46.69 in.)	998 mm (39.29 in.)
C	Rotation about centre	1713 mm (67.44 in.)	1478 mm (58.19 in.)

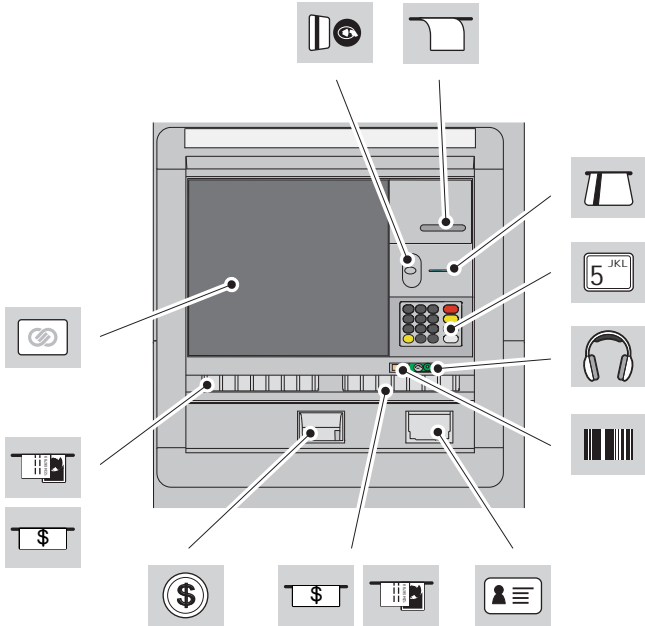
Variant Details - Standard Collar

FACIA ITEMS

15" Touchscreen



19" Touchscreen



Touchscreen Dimensions

Touchscreen Size	Touchscreen Height x Width	Touchscreen Angle
15 inch	234 mm x 310 mm 9.21 in. x 12.20 in.	3 degrees from vertical
19 inch	305 mm x 380 mm 12.01 in. x 14.96 in.	3 degrees from vertical

Heights and Depths

Facia Item	Height from base of ATM (4-High Dispenser Safe)	Height from base of ATM (5-High Dispenser Safe)	Depth from front of shelf
Cheque Entry	1133 mm (44.61 in.)	1251 mm (49.25 in.)	71 mm (2.80 in.)
Touchscreen - Top 483 mm (19.0 in.)	1123 mm (44.21 in.)	1241 mm (48.86 in.)	71 mm (2.80 in.)
Touchscreen - Top 381 mm (15.0 in.)	1064 mm (41.89 in.)	1182 mm (46.54 in.)	68 mm (2.68 in.)
Receipt	1063 mm (41.85 in.)	1181 mm (46.50 in.)	62 mm (2.44 in.)
Card Reader	980 mm (38.58 in.)	1098 mm (43.23 in.)	63 mm (2.48 in.)
Contactless Card Reader (behind Facia)	980 mm (38.58 in.)	1098 mm (43.23 in.)	63mm (2.48 in.)
PIN Pad - Number 5 Key	880 mm (34.65 in.)	998 mm (39.29 in.)	57 mm (2.24 in.)
Private Audio	780 mm (30.71 in.)	898 mm (35.35 in.)	59 mm (2.32 in.)
Barcode Reader - Activation Point	757 mm (29.80 in.)	875 mm (34.45 in.)	33 mm (1.30 in.)
Cash Exit/Entry	747 mm (29.41 in.)	865 mm (34.05 in.)	73 mm (2.87 in.)
Scalable Deposit Module	747 mm (29.41 in.)	865 mm (34.05 in.)	73 mm (2.87 in.)
ID Scanner	656 mm (25.83 in.)	774 mm (30.47 in.)	66 mm (2.60 in.)
Coin Exit	628 mm (24.72 in.)	746 mm (29.37 in.)	80 mm (3.15 in.)

Distance for Voice Guidance

Facia Item	No. 5 Key		Audio Jack	
		Distance to Facia Item		Distance to Facia Item
Receipt	1	188 mm (7.40 in.)	1	284 mm (11.18 in.)
Card Reader	1	110 mm (4.33 in.)	1	202 mm (7.95 in.)
ID Scanner	6	225 mm (8.86 in.)	6	125 mm (4.92 in.)
Private Audio	6	100 mm (3.94 in.)	-	-
Barcode Reader - Activation Point	7	134 mm (5.28 in.)	8	73 mm (2.87 in.)
Cash Exit/Entry	Right hand 7	140 mm (5.51 in.)	8	65 mm (2.56 in.)
Scalable Deposit Module	Right hand 7	140 mm (5.51 in.)	8	65 mm (2.56 in.)
Coin Exit	7	327 mm (12.87 in.)	8	269 mm (10.59 in.)
Scalable Deposit Module	Left hand 8	359 mm (14.13 in.)	9	349 mm (13.74 in.)
Cash Exit/Entry	Left hand 8	359 mm (14.13 in.)	9	349 mm (13.74 in.)
Touchscreen 381 mm (15.0 in.)	Centre 10	283 mm (11.14 in.)	10	333 mm (13.11 in.)
Touchscreen 483 mm (19.0 in.)	Centre 10	290 mm (11.42 in.)	10	346 mm (13.62 in.)
Cheque Entry	10	482 mm (18.98 in.)	10	551 mm (21.69 in.)
Contactless Card Reader (behind Facia)	11	104 mm (4.09 in.)	11	203 mm (7.99 in.)

Variant Details - Standard Collar

SECURITY BOLTS

Bolts and anchors must be supplied by the owning organisation.

To meet security standards the ATM must be bolted to the floor, through all of the bolt holes, using bolts with anchor washers as specified below. Bolts and anchor washers are to be supplied by the owning organisation.

Make sure that the floor or plinth is capable of withstanding the loading imposed by the anchor points for these bolts.

If an adjustable plinth is used, it must be bolted to the floor to the same specification as the ATM.

The minimum specification for bolts and washers to secure the ATM to a concrete floor is:

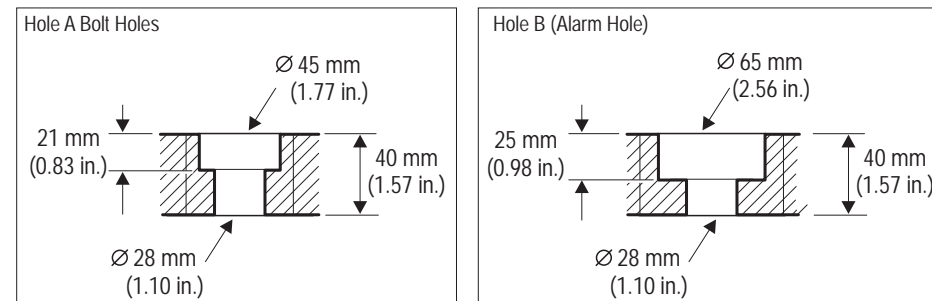
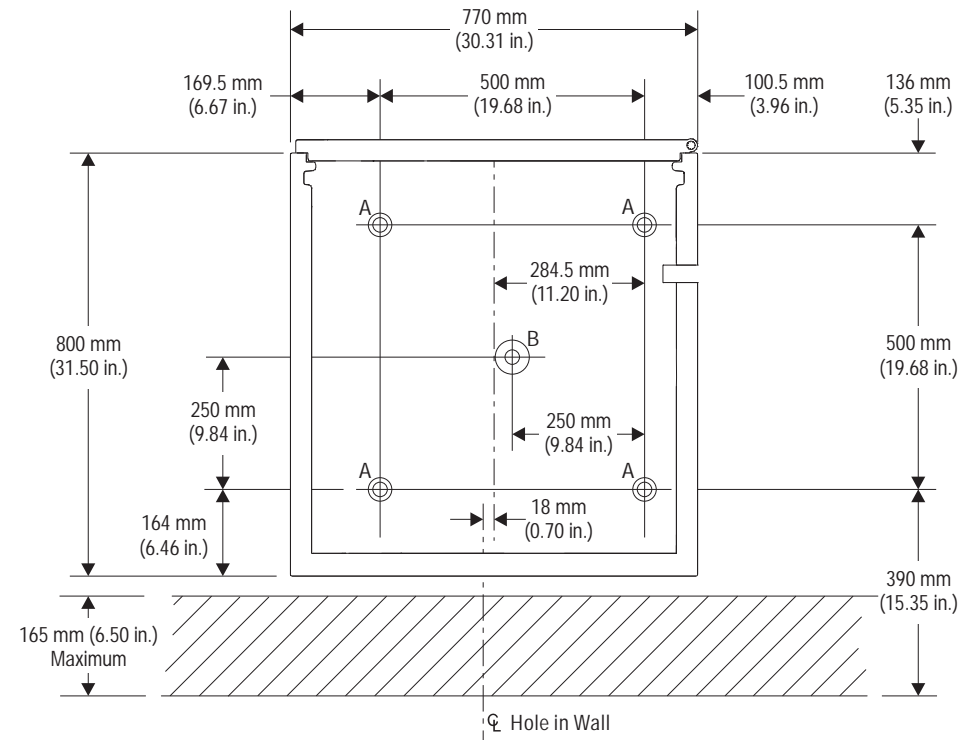
- Bolts
 - Type - either resin anchor or shield anchor bolts
 - Size - **M16** (5/8 in.)
 - Minimum Length - **150 mm** (5.9 in.)
 - Strength - high tensile (minimum ISO property class **8,8**).
- Washers
 - Type - flat, steel (as per DIN7349 or equivalent)
 - Size - **M16** (5/8 in.)
 - Outer diameter - no greater than **40 mm** (1.58 in.)
 - Minimum thickness - **6 mm** (0.2 in.).

BOLT HOLES

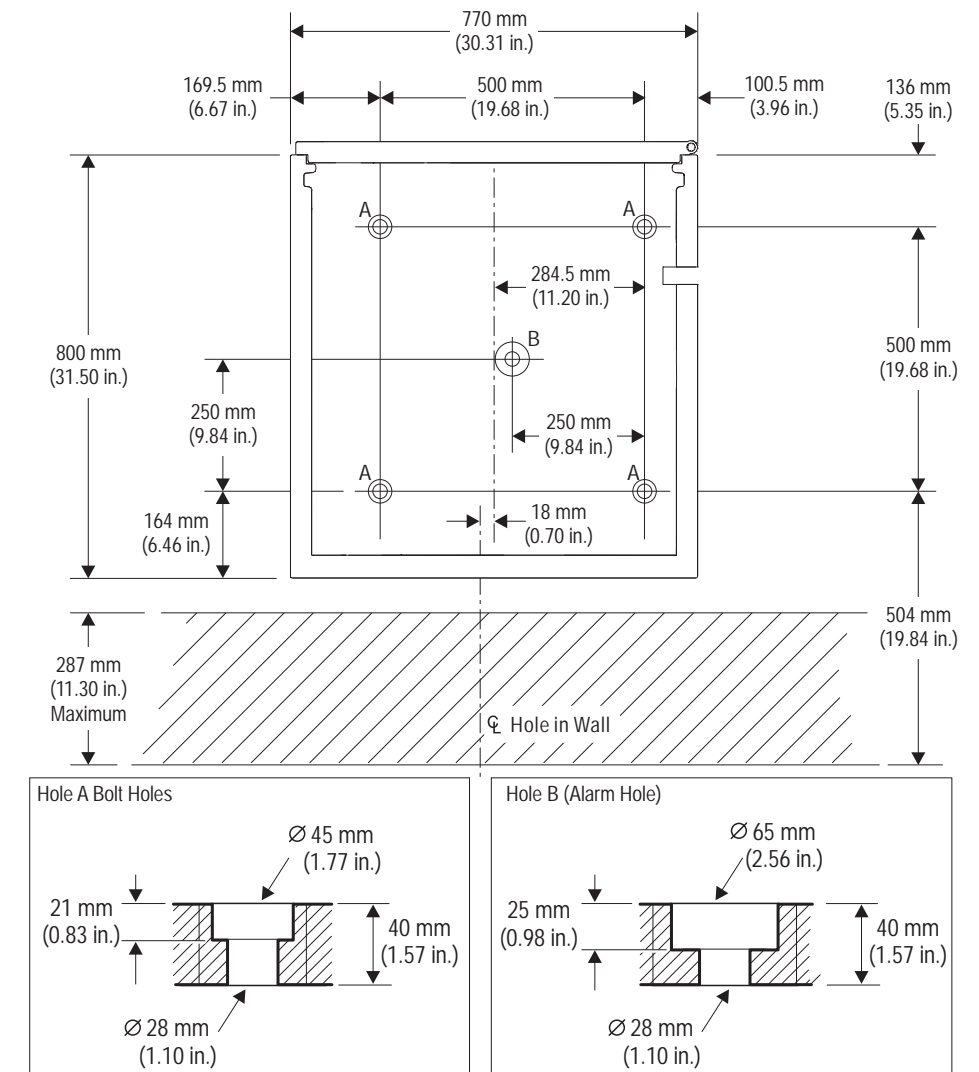
The ATM should be bolted to the floor or plinth, through all the holes marked 'A', using four bolts with anchor washers.

The hole marked 'B' enables an alarm to be fitted.

Standard Collar - Short Sleeve



Standard Collar - Long Sleeve



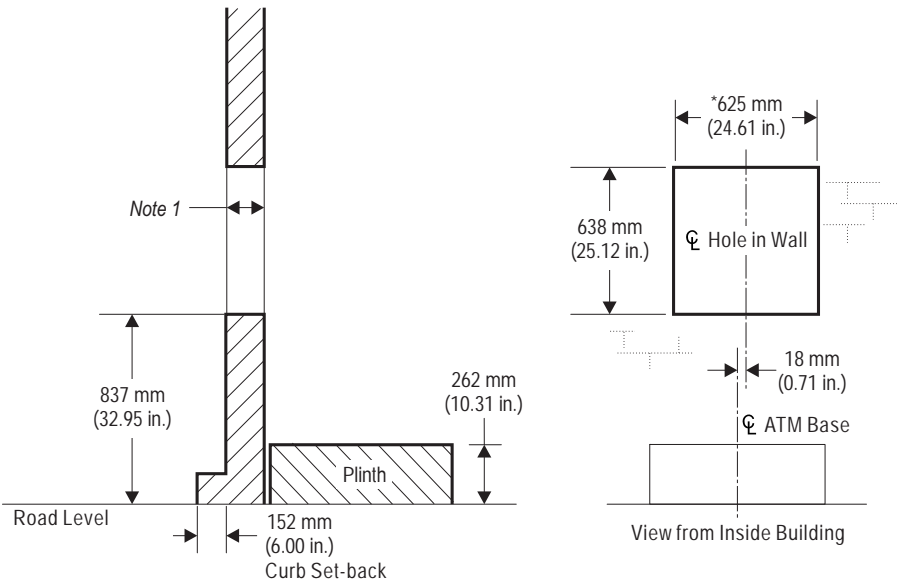
Variant Details - Standard Collar

HOLE IN THE WALL

It is the responsibility of the owning institution to ensure that the heights from the sidewalk level to the facia items comply with any local regulations.

For correct installation height you must consider the difference in height between the sidewalk and the interior floor. If there is no difference then the plinth must have the height specified in the illustrations below.

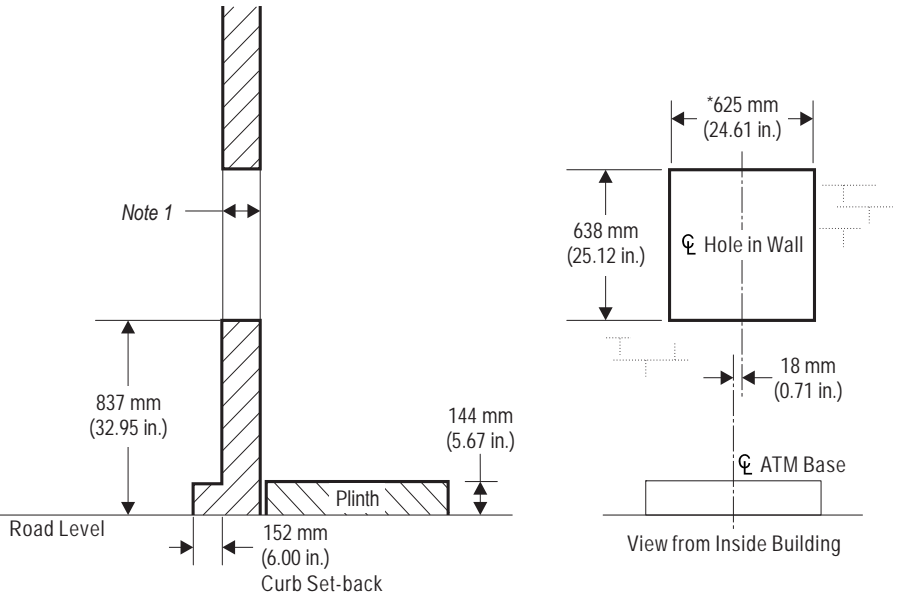
Standard Collar - 4 High Security Enclosure



*increase to 635 mm (25.00 in.) if ATM installed with cash camera

Note 1 : Short Sleeve - maximum 165 mm (6.50 in.)
Long Sleeve - maximum 287 mm (11.30 in.)

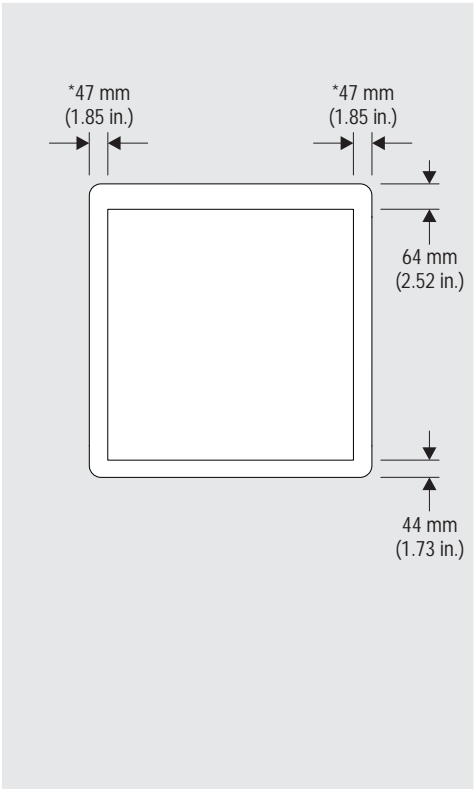
Standard Collar - 5 High Security Enclosure



*increase to 635 mm (25.00 in.) if ATM installed with cash camera

Note 1 : Short Sleeve - maximum 165 mm (6.50 in.)
Long Sleeve - maximum 287 mm (11.30 in.)

Hole in the Wall Overlap - Standard Collar

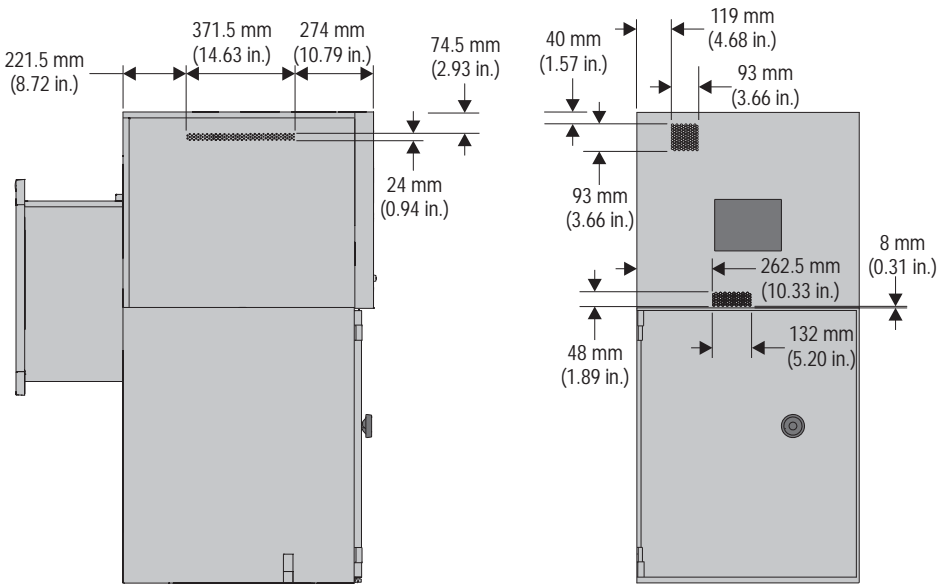


*decreased to 42 mm (1.65 in.) if ATM installed with cash camera

VENTS LOCATION - AIR FLOW

Unrestricted air flow is required on both the left and right hand side and at the rear of the ATM. There must be no obstruction of the vents at any time.

If a third-party surround/topper is fitted then equivalent venting, or a hot air extraction system must be installed within the surround/topper.



Variant Details - Standard Collar

SERVICING AREAS - OPTIMUM - SINGLE ATM

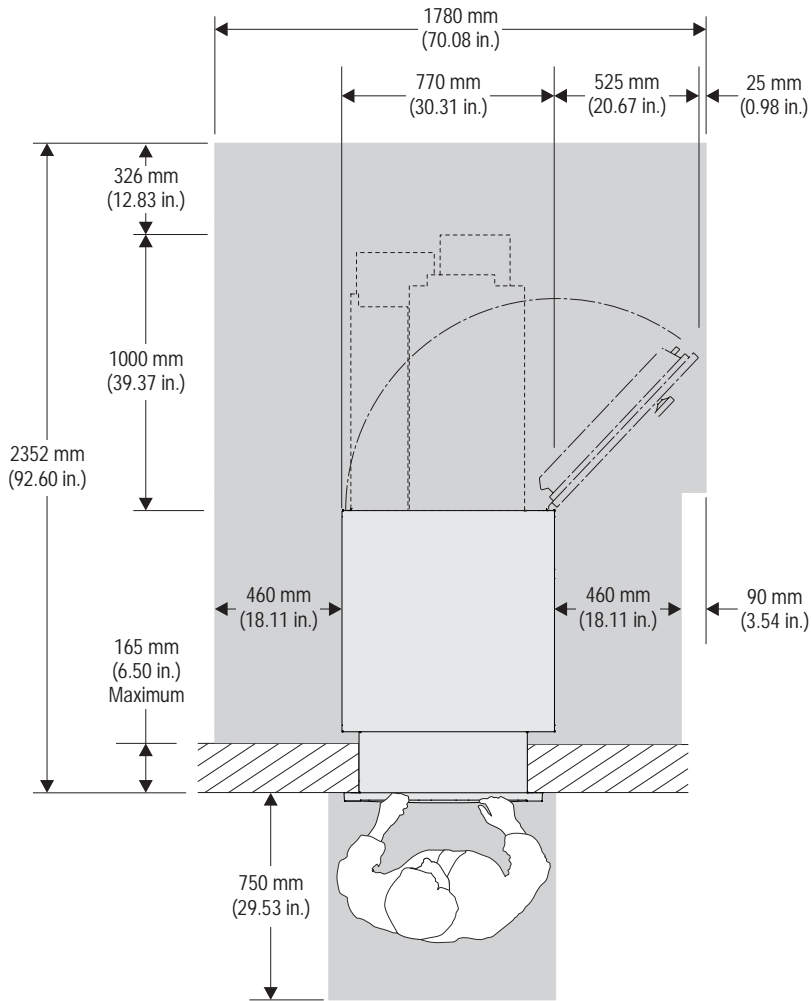
The optimum servicing area provides the best access to the ATM for all servicing and operation tasks.

Wherever possible the ATM should be installed within the optimum servicing area.

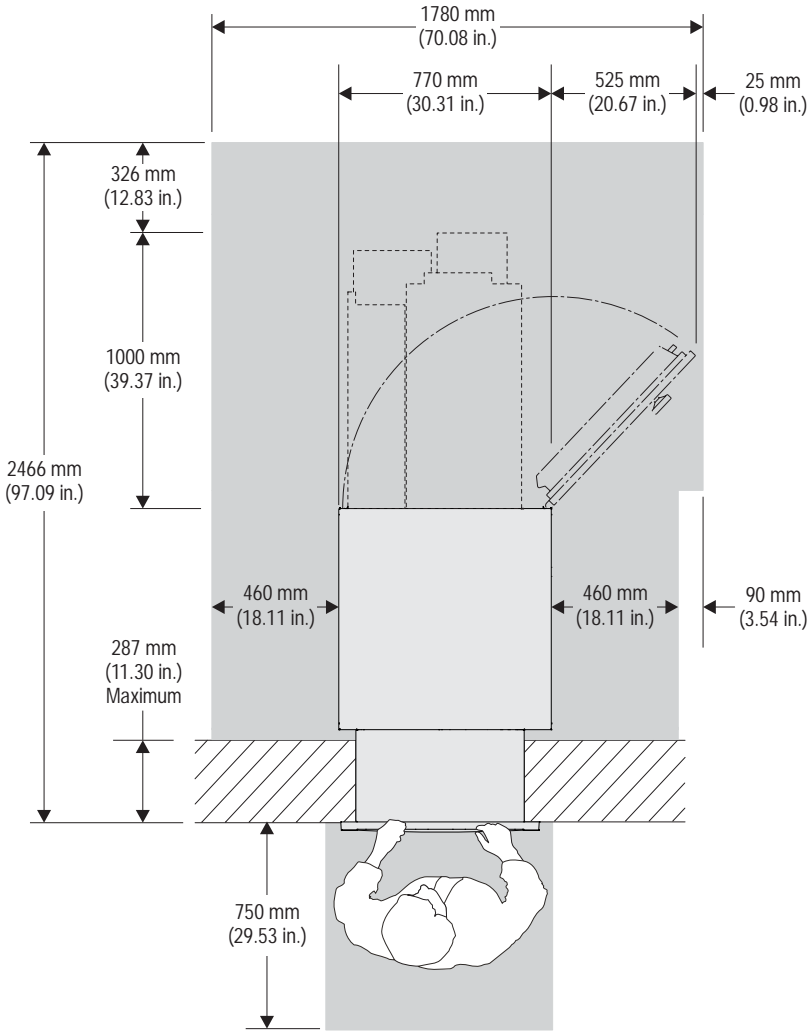
If the optimum area is not available then refer to Servicing Areas - Minimum. However note that installing the ATM in the minimum servicing area may increase the servicing and/or upgrading time over a ATM installed using the optimum area.

Always leave as much space as possible around the ATM to facilitate safe operation and servicing.

Standard Collar - Short Sleeve



Standard Collar - Long Sleeve



Variant Details - Standard Collar

SERVICING AREAS - MINIMUM - SINGLE ATM

This is the **minimum** area required for operating and servicing the ATM.

Wherever possible the ATM should be installed within the optimum servicing area. Installing the ATM in the minimum servicing area may increase the servicing and/or upgrading time.

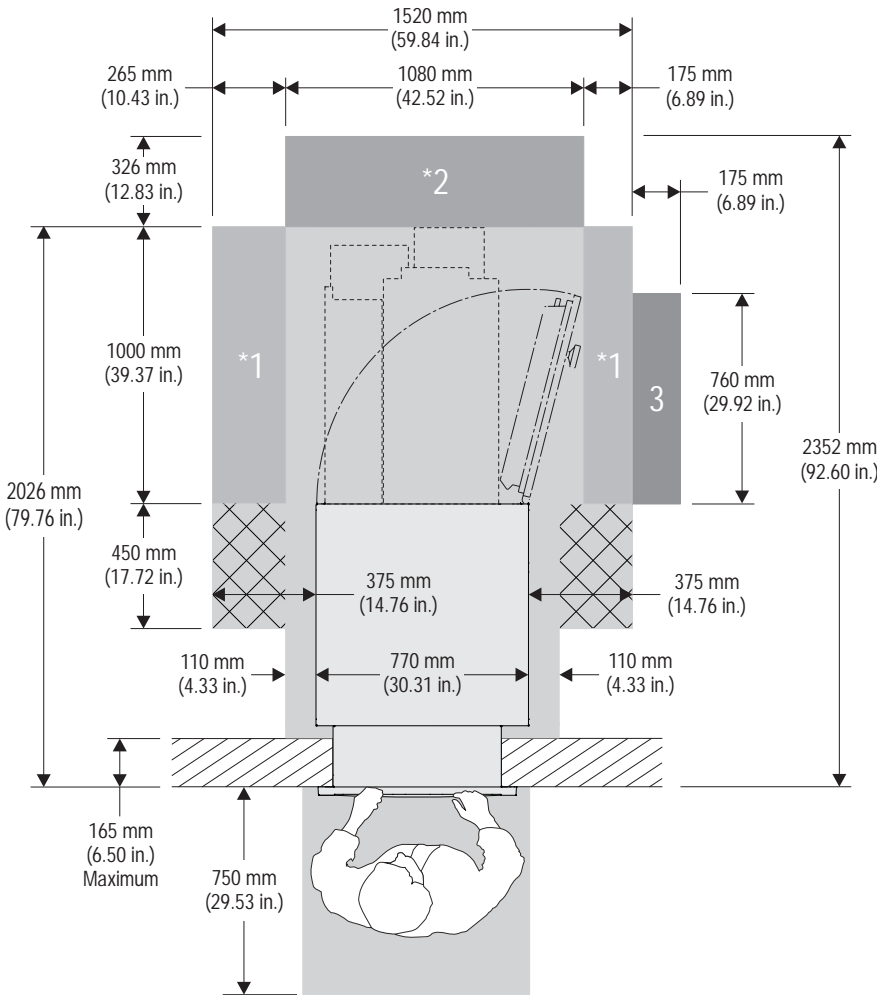
If the minimum area is not available then consult your local service representative. Every site is different and you may still be able to install the ATM but with further increases to servicing and/or upgrading time.

If you install in the minimum area then note that doors can open, and devices rack out, beyond the area shown. Always leave as much space as possible around the ATM to facilitate safe operation and servicing.

Standard Collar - Short Sleeve

Minimum clearance area is composed of:

- Basic clearance
- Mandatory left OR right
- 1 OR 2
- 3 If the UPS is located in the safe enclosure

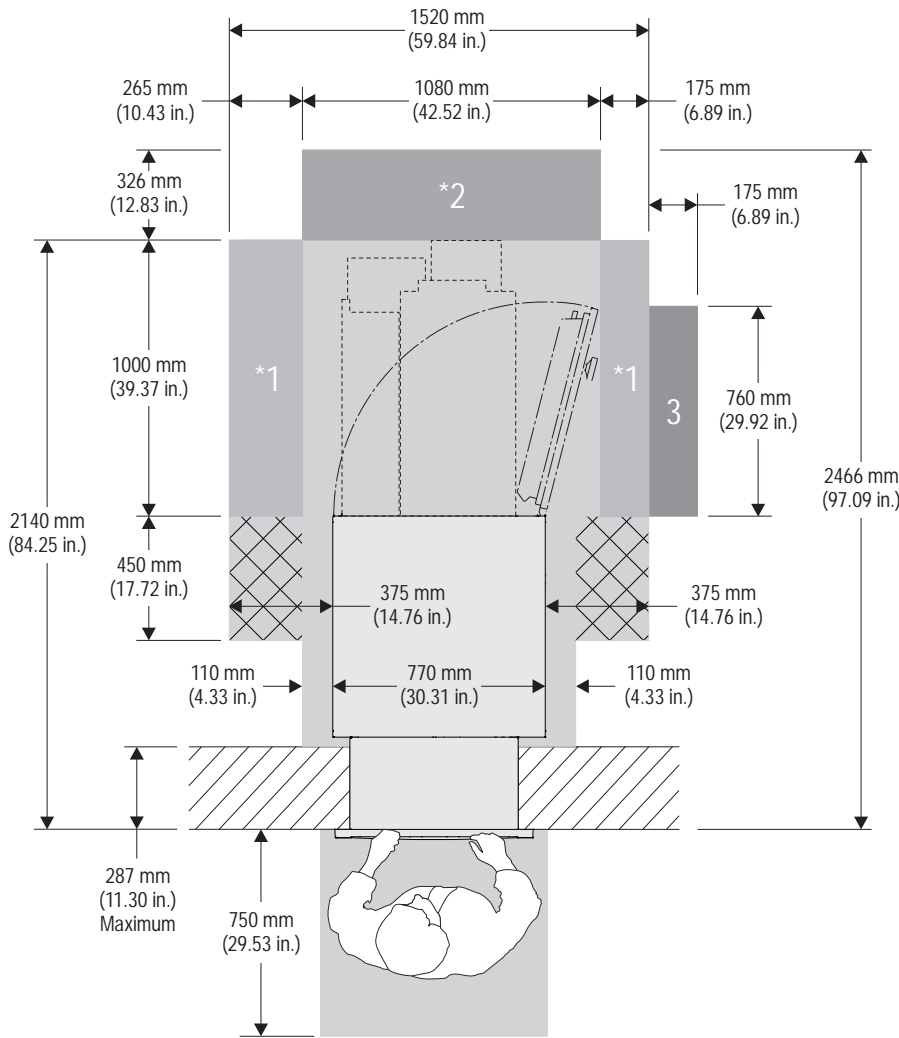


* denotes small (<10% volume) infringements permitted in these areas

Standard Collar - Long Sleeve

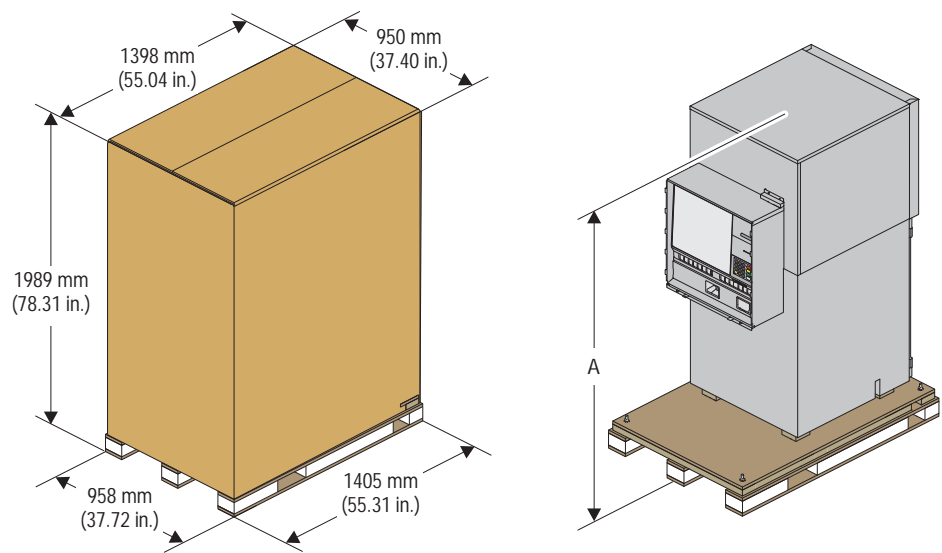
Minimum clearance area is composed of:

- Basic clearance
- Mandatory left OR right
- 1 OR 2
- 3 If the UPS is located in the safe enclosure



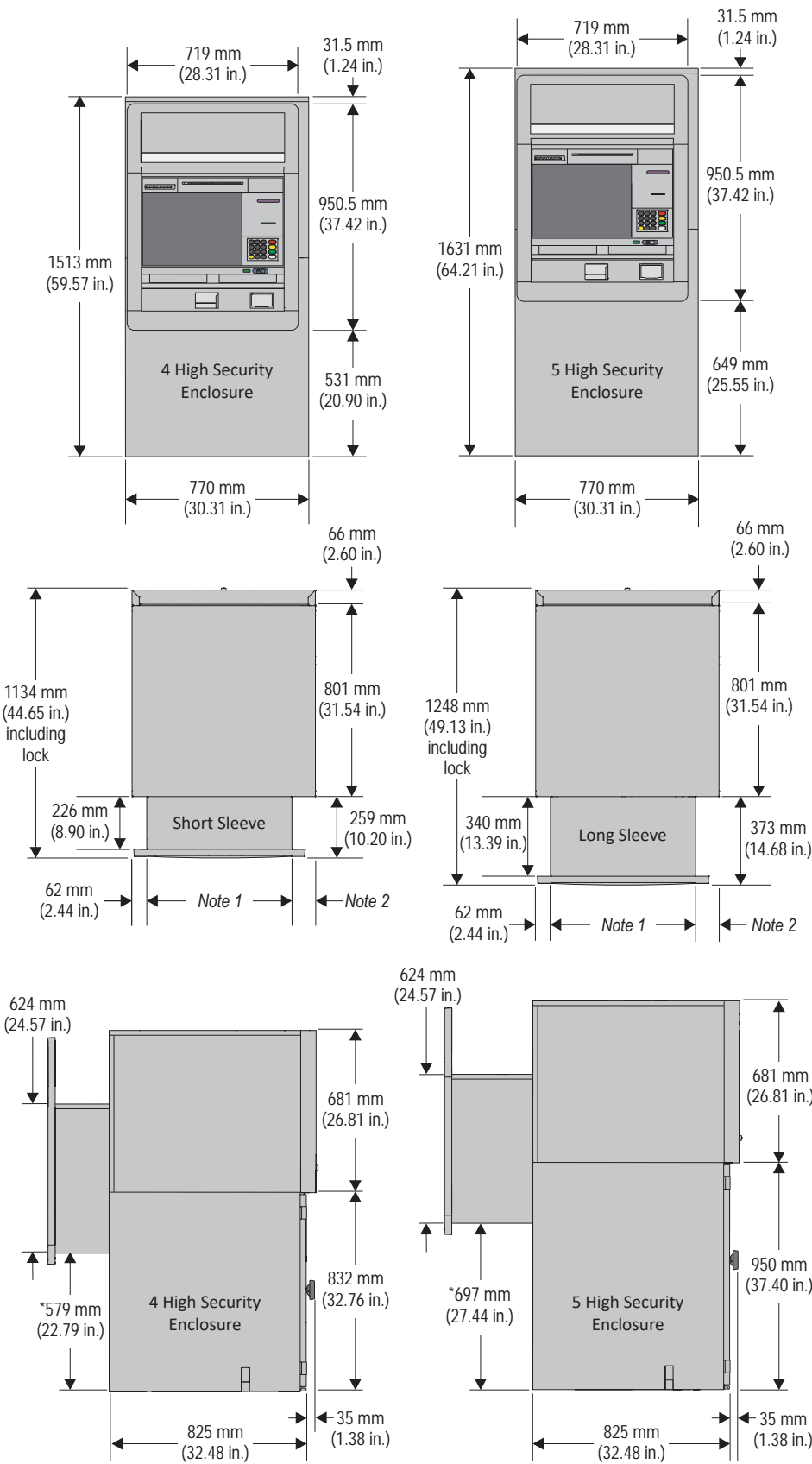
* denotes small (<10% volume) infringements permitted in these areas

PACKAGE DIMENSIONS



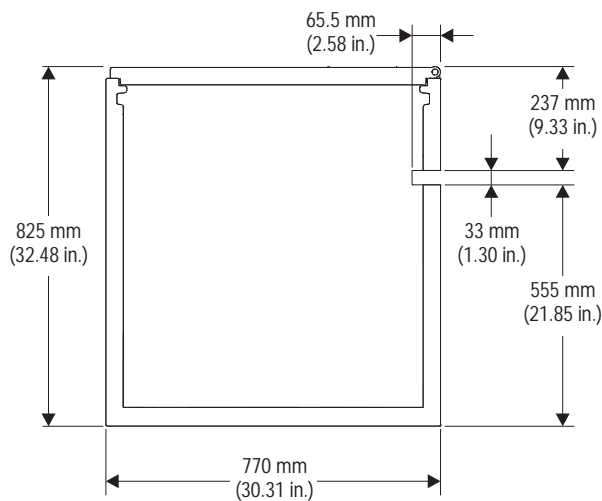
A - 1847 mm (72.72 in.) with a 5 High Security Enclosure
1729 mm (68.07 in.) with a 4 High Security Enclosure

ATM DIMENSIONS



* Dimensions are the same for short or long sleeve options
Note 1: 610 mm (24.02 in.) without cash camera
617.3 mm (24.30 in.) including cash camera
Note 2: 98 mm (3.86 in.) without cash camera option
90.7 mm (3.57 in.) with cash camera option

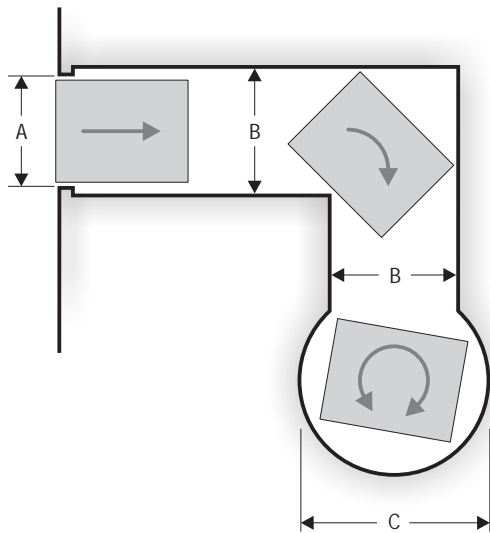
CABLE ENTRY



CLEARANCES - CORRIDOR

The dimensions shown assume the ATM is being moved using equipment that does not extend beyond the ATM or packaging.

A surrounding clearance of 6 mm (0.24 in.) has been allowed in the dimensions.

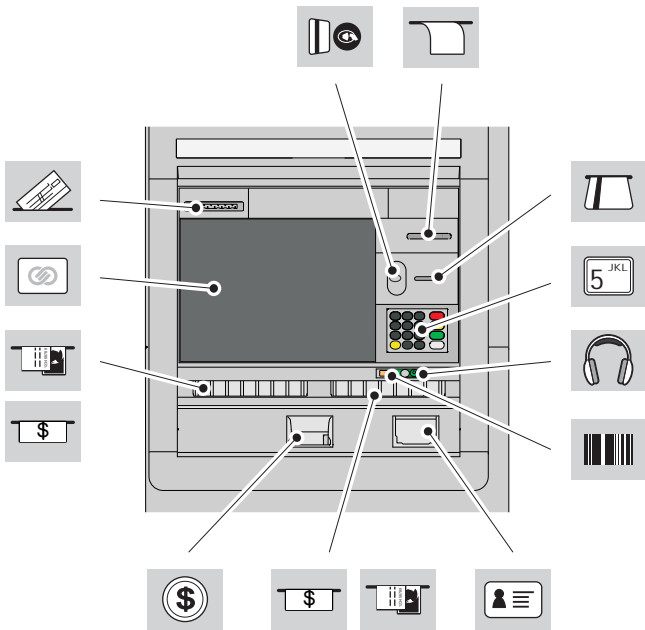


		Packaged ATM (pallet and carton)	Unpackaged ATM
A	Doorway or straight corridor	970 mm (38.19 in.)	782 mm (30.79 in.)
B	Corridor with corner	1186 mm (46.69 in.)	998 mm (39.29 in.)
C	Rotation about centre	1713 mm (67.44 in.)	1478 mm (58.19 in.)

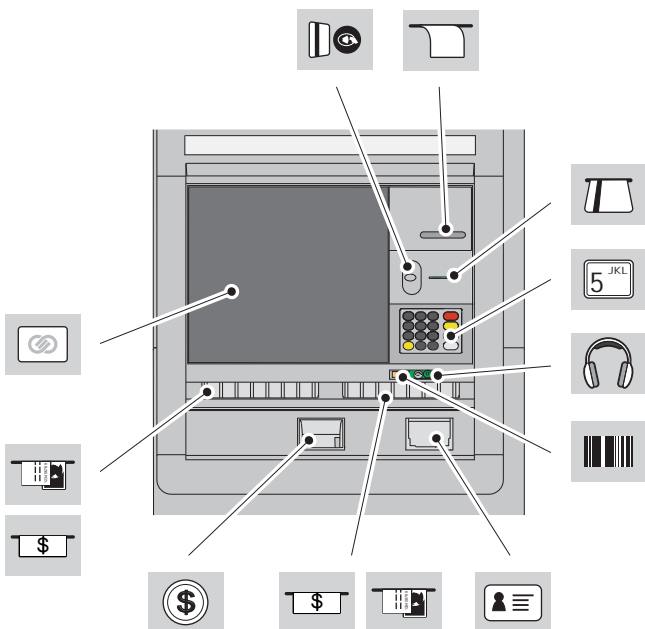
Variant Details - Advert Collar

FACIA ITEMS

15" Touchscreen



19" Touchscreen




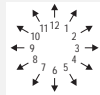














Touchscreen Dimensions

Touchscreen Size	Touchscreen Height x Width	Touchscreen Angle
15 inch	234 mm x 310 mm 9.21 in. x 12.20 in.	3 degrees from vertical
19 inch	305 mm x 380 mm 12.01 in. x 14.96 in.	3 degrees from vertical

Heights and Depths

Facia Item	Height from base of ATM (4-High Dispenser Safe)	Height from base of ATM (5-High Dispenser Safe)	Depth from front of shelf
Cheque Entry	1133 mm (44.61 in.)	1251 mm (49.25 in.)	71 mm (2.80 in.)
Touchscreen - Top 483 mm (19.0 in.)	1123 mm (44.21 in.)	1241 mm (48.86 in.)	71 mm (2.80 in.)
Touchscreen - Top 381 mm (15.0 in.)	1064 mm (41.89 in.)	1182 mm (46.54 in.)	68 mm (2.68 in.)
Receipt	1063 mm (41.85 in.)	1181 mm (46.50 in.)	62 mm (2.44 in.)
Card Reader	980 mm (38.58 in.)	1098 mm (43.23 in.)	63 mm (2.48 in.)
Contactless Card Reader (behind Facia)	980 mm (38.58 in.)	1098 mm (43.23 in.)	63mm (2.48 in.)
PIN Pad - Number 5 Key	880 mm (34.65 in.)	998 mm (39.29 in.)	57 mm (2.24 in.)
Private Audio	780 mm (30.71 in.)	898 mm (35.35 in.)	59 mm (2.32 in.)
Barcode Reader - Activation Point	757 mm (29.80 in.)	875 mm (34.45 in.)	33 mm (1.30 in.)
Cash Exit/Entry	747 mm (29.41 in.)	865 mm (34.05 in.)	73 mm (2.87 in.)
Scalable Deposit Module	747 mm (29.41 in.)	865 mm (34.05 in.)	73 mm (2.87 in.)
ID Scanner	656 mm (25.83 in.)	774 mm (30.47 in.)	66 mm (2.60 in.)
Coin Exit	628 mm (24.72 in.)	746 mm (29.37 in.)	80 mm (3.15 in.)

Distance for Voice Guidance

				No. 5 Key	Audio Jack	
Facia Item				Distance to Facia Item		Distance to Facia Item
	Receipt		1	188 mm (7.40 in.)	1	284 mm (11.18 in.)
	Card Reader		1	110 mm (4.33 in.)	1	202 mm (7.95 in.)
	ID Scanner		6	225 mm (8.86 in.)	6	125 mm (4.92 in.)
	Private Audio		6	100 mm (3.94 in.)	-	-
	Barcode Reader - Activation Point		7	134 mm (5.28 in.)	8	73 mm (2.87 in.)
	Cash Exit/Entry	Right hand	7	140 mm (5.51 in.)	8	65 mm (2.56 in.)
	Scalable Deposit Module	Right hand	7	140 mm (5.51 in.)	8	65 mm (2.56 in.)
	Coin Exit		7	327 mm (12.87 in.)	8	269 mm (10.59 in.)
	Scalable Deposit Module	Left hand	8	359 mm (14.13 in.)	9	349 mm (13.74 in.)
	Cash Exit/Entry	Left hand	8	359 mm (14.13 in.)	9	349 mm (13.74 in.)
	Touchscreen 381 mm (15.0 in.)	Centre	10	283 mm (11.14 in.)	10	333 mm (13.11 in.)
	Touchscreen 483 mm (19.0 in.)	Centre	10	290 mm (11.42 in.)	10	346 mm (13.62 in.)
	Cheque Entry		10	482 mm (18.98 in.)	10	551 mm (21.69 in.)
	Contactless Card Reader (behind Facia)		11	104 mm (4.09 in.)	11	203 mm (7.99 in.)

SECURITY BOLTS

Bolts and anchors must be supplied by the owning organisation.

To meet security standards the ATM must be bolted to the floor, through all of the bolt holes, using bolts with anchor washers as specified below. Bolts and anchor washers are to be supplied by the owning organisation.

Make sure that the floor or plinth is capable of withstanding the loading imposed by the anchor points for these bolts.

If an adjustable plinth is used, it must be bolted to the floor to the same specification as the ATM.

The minimum specification for bolts and washers to secure the ATM to a concrete floor is:

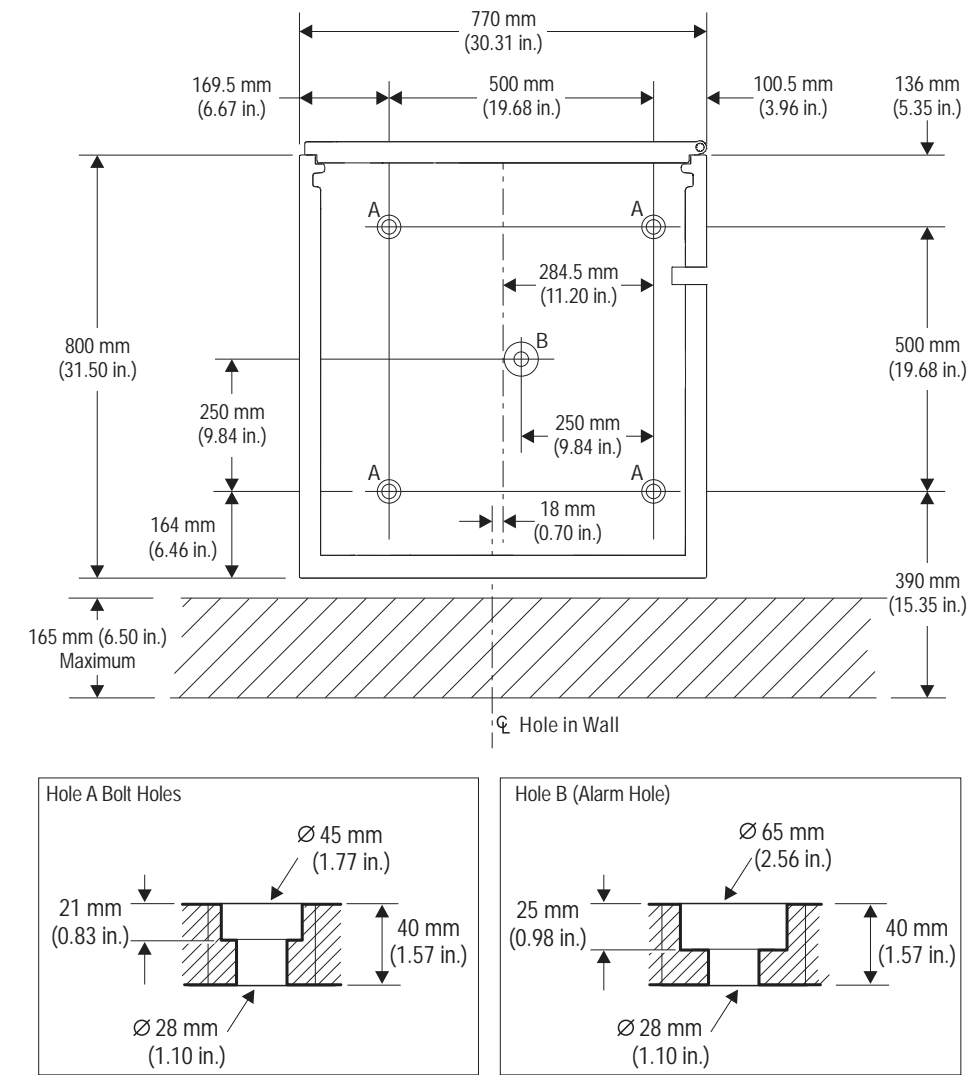
- Bolts
 - Type - either resin anchor or shield anchor bolts
 - Size - **M16** (5/8 in.)
 - Minimum Length - **150 mm** (5.9 in.)
 - Strength - high tensile (minimum ISO property class **8,8**).
- Washers
 - Type - flat, steel (as per DIN7349 or equivalent)
 - Size - **M16** (5/8 in.)
 - Outer diameter - no greater than **40 mm** (1.58 in.)
 - Minimum thickness - **6 mm** (0.2 in.).

BOLT HOLES

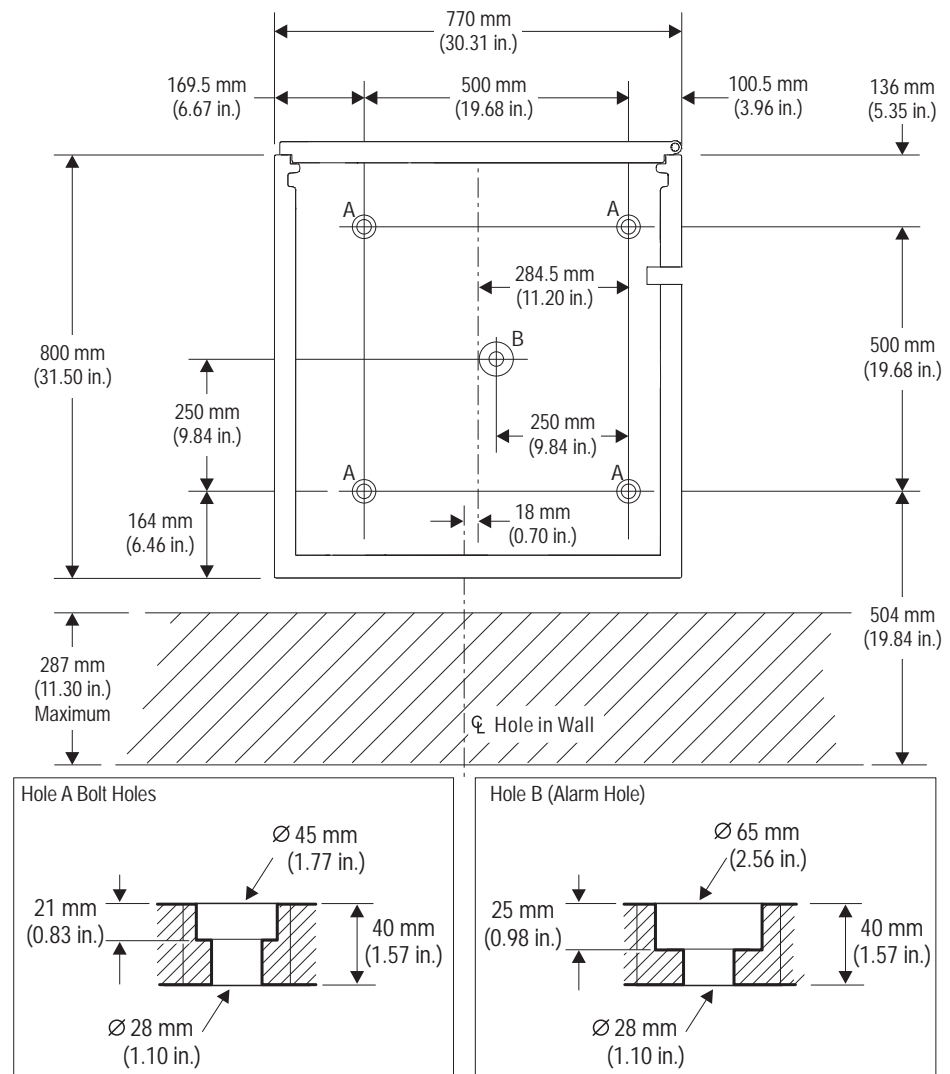
The ATM should be bolted to the floor or plinth, through all the holes marked 'A', using four bolts with anchor washers.

The hole marked 'B' enables an alarm to be fitted.

Advert Collar - Short Sleeve



Advert Collar - Long Sleeve



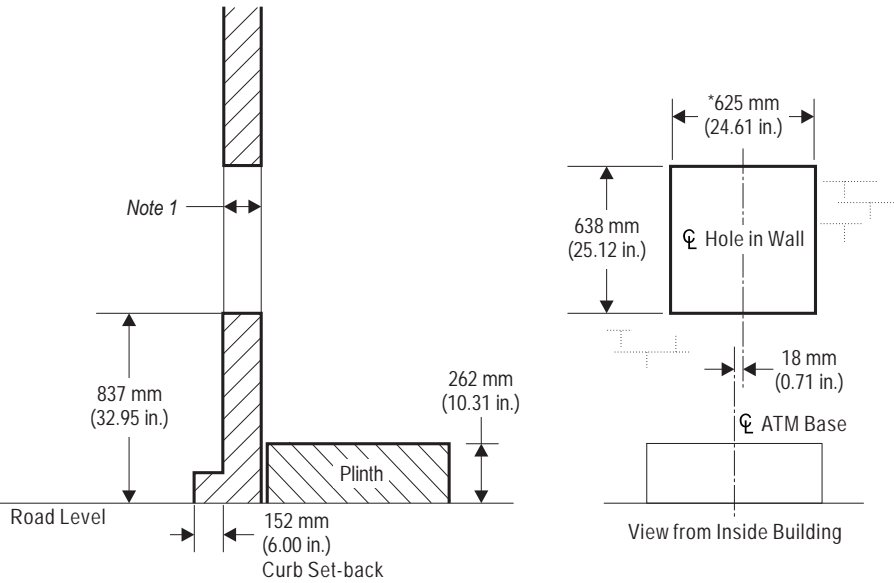
Variant Details - Advert Collar

HOLE IN THE WALL

It is the responsibility of the owning institution to ensure that the heights from the sidewalk level to the facia items comply with any local regulations.

For correct installation height you must consider the difference in height between the sidewalk and the interior floor. If there is no difference then the plinth must have the height specified in the illustrations below.

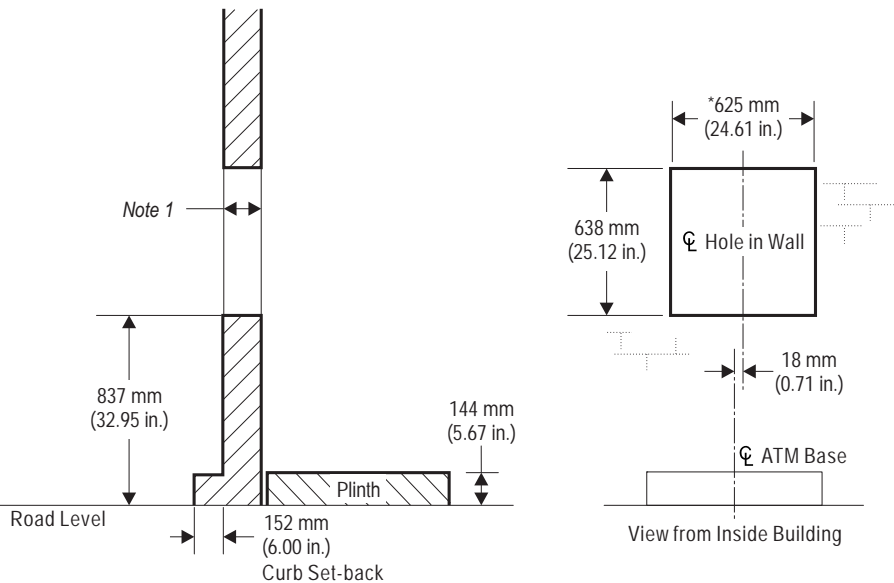
Short Sleeve - Advert Collar - 4 High Security Enclosure



*increase to 635 mm (25.00 in.) if ATM installed with cash camera

Note 1 : Short Sleeve - maximum 165 mm (6.50 in.)
Long Sleeve - maximum 287 mm (11.30 in.)

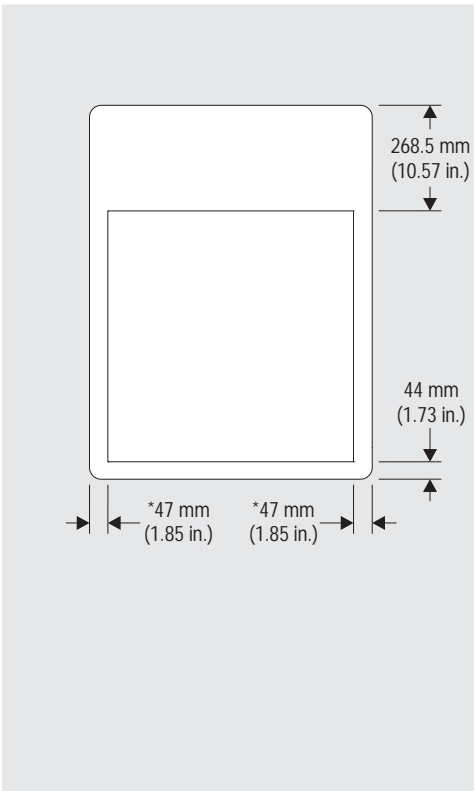
Short Sleeve - Advert Collar - 5 High Security Enclosure



*increase to 635 mm (25.00 in.) if ATM installed with cash camera

Note 1 : Short Sleeve - maximum 165 mm (6.50 in.)
Long Sleeve - maximum 287 mm (11.30 in.)

Hole in the Wall Overlap - Advert Collar

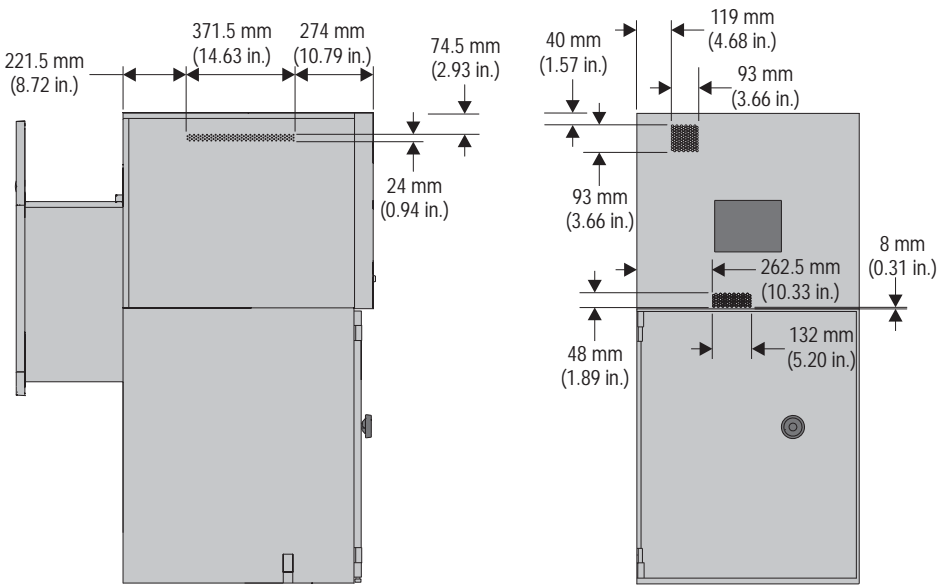


*decreased to 42 mm (1.65 in.) if ATM installed with cash camera

VENTS LOCATION - AIR FLOW

Unrestricted air flow is required on both the left and right hand side and at the rear of the ATM. There must be no obstruction of the vents at any time.

If a third-party surround/topper is fitted then equivalent venting, or a hot air extraction system must be installed within the surround/topper.



Variant Details - Advert Collar

SERVICING AREAS - OPTIMUM - SINGLE ATM

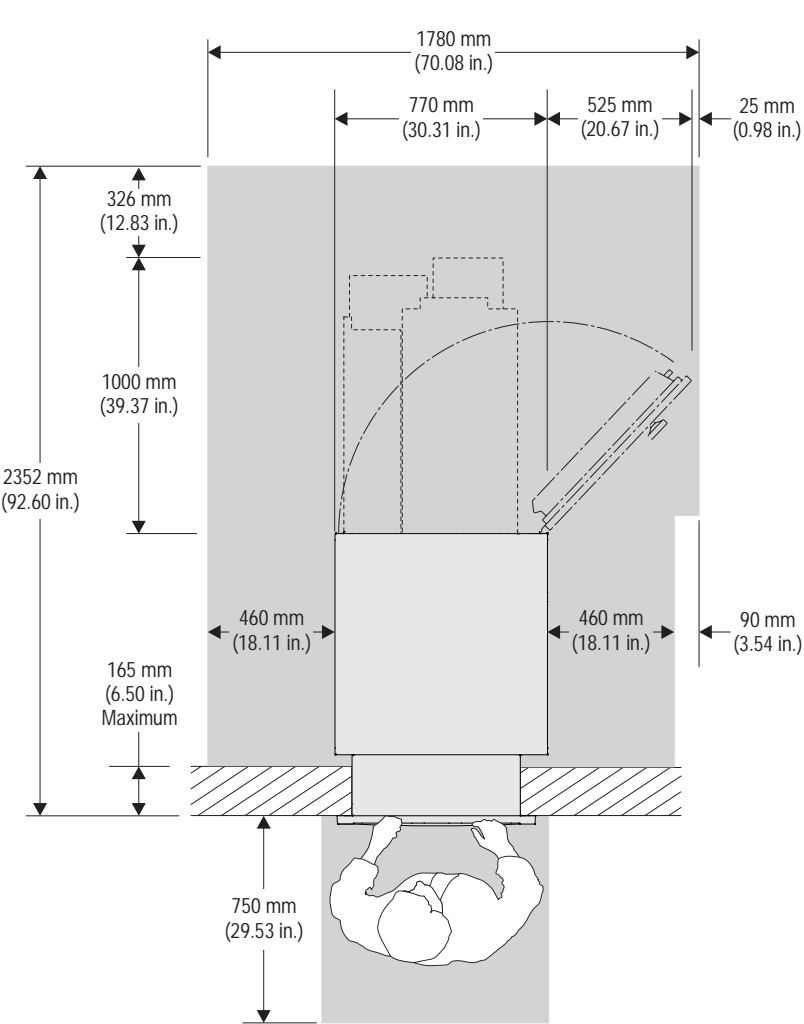
The optimum servicing area provides the best access to the ATM for all servicing and operation tasks.

Wherever possible the ATM should be installed within the optimum servicing area.

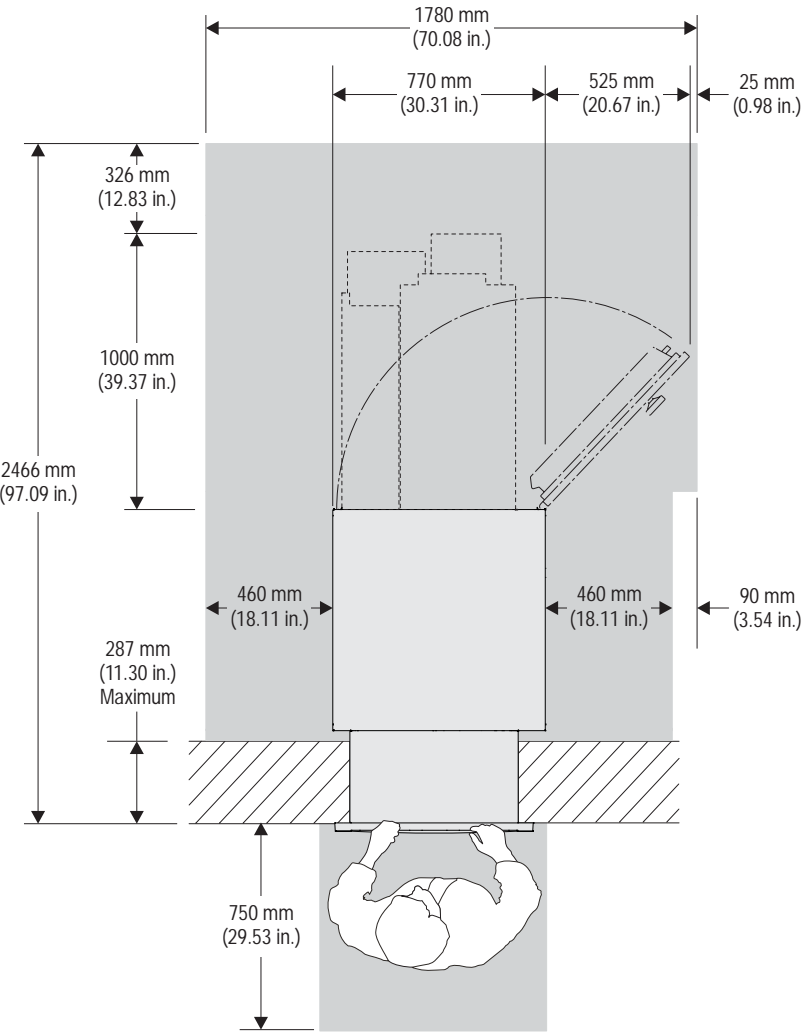
If the optimum area is not available then refer to Servicing Areas - Minimum. However note that installing the ATM in the minimum servicing area may increase the servicing and/or upgrading time over a ATM installed using the optimum area.

Always leave as much space as possible around the ATM to facilitate safe operation and servicing.

Advert Collar - Short Sleeve



Advert Collar - Long Sleeve



SERVICING AREAS - MINIMUM - SINGLE ATM

This is the **minimum** area required for operating and servicing the ATM.

Wherever possible the ATM should be installed within the optimum servicing area. Installing the ATM in the minimum servicing area may increase the servicing and/or upgrading time.

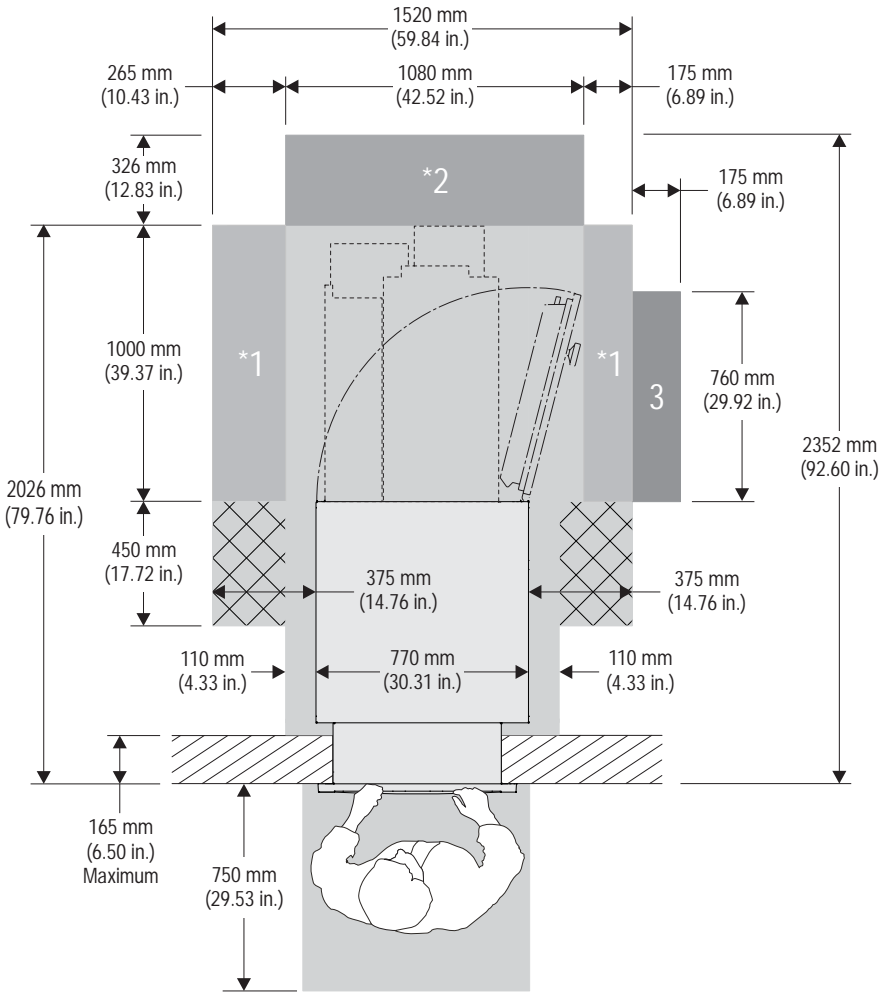
If the minimum area is not available then consult your local service representative. Every site is different and you may still be able to install the ATM but with further increases to servicing and/or upgrading time.

If you install in the minimum area then note that doors can open, and devices rack out, beyond the area shown. Always leave as much space as possible around the ATM to facilitate safe operation and servicing.

Advert Collar - Short Sleeve

Minimum clearance area is composed of:

- Basic clearance
- Mandatory left OR right
- 1 OR 2
- 3 If the UPS is located in the safe enclosure

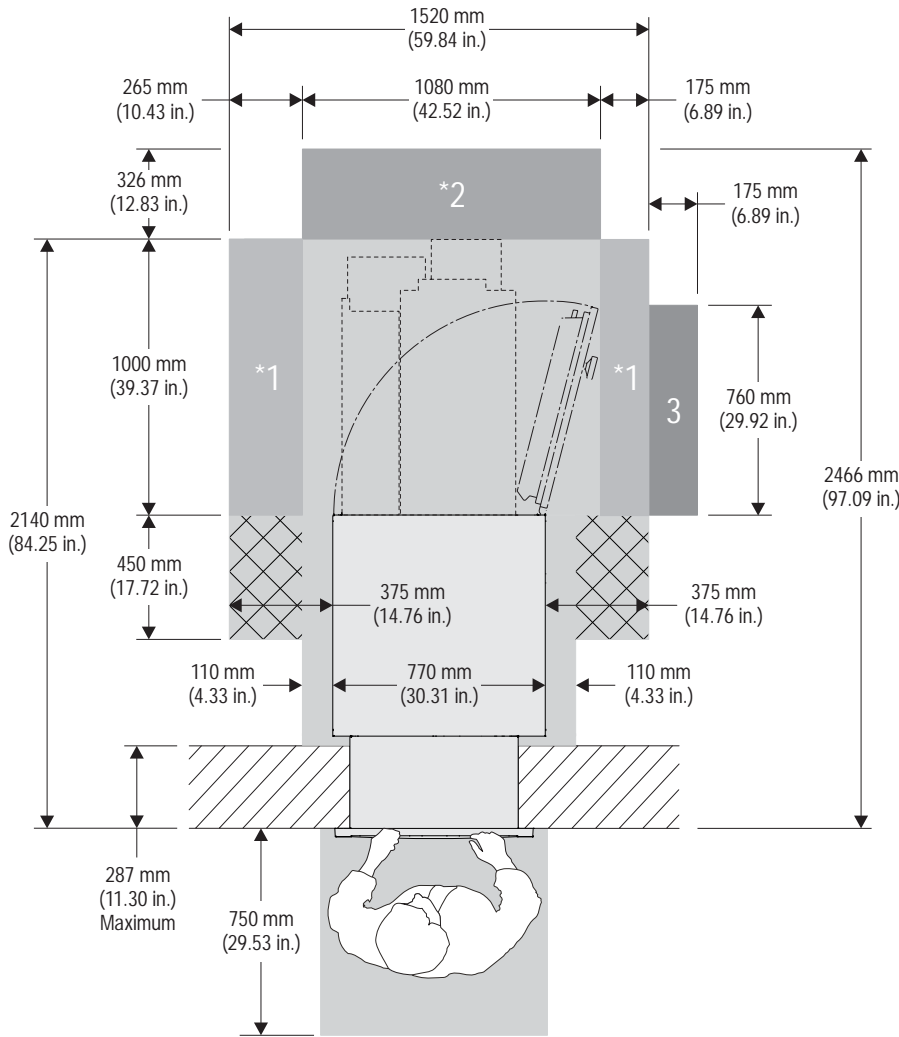


* denotes small (<10% volume) infringements permitted in these areas

Advert Collar - Long Sleeve

Minimum clearance area is composed of:

- Basic clearance
- Mandatory left OR right
- 1 OR 2
- 3 If the UPS is located in the safe enclosure



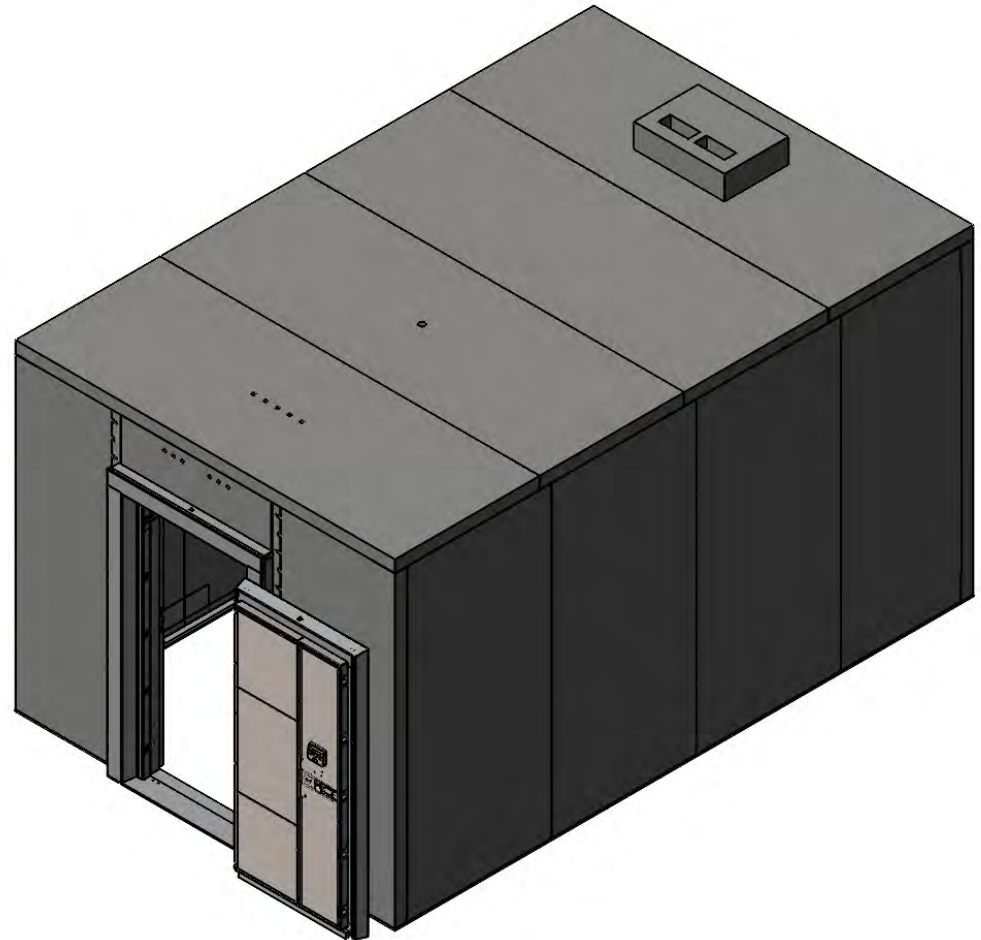
* denotes small (<10% volume) infringements permitted in these areas

Class 1 Vault

- 16'0" D x 10'6" W x 8'10" H (Outside Dimensions)
- 15'4" D x 9'10" W x 8'6" H (Inside Dimensions)
- 5 Sided
- (1) Vent Panel(s)
- (1) Conduit Panel(s)
- (1) Sprinkler Panel(s)

Class 1 Hyde Park Vault Door

- Right Swing
- Grill Daygate



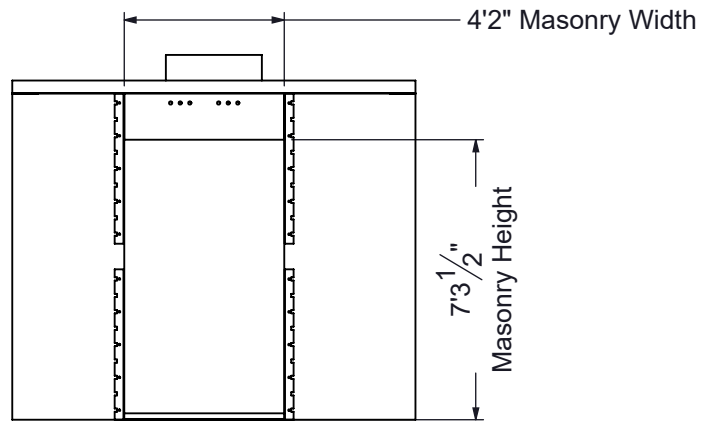
Approval Signature: _____

By signing this drawing you acknowledge that everything on the drawing and quote match your request. Hamilton will not be able to send this order through production without a signature.

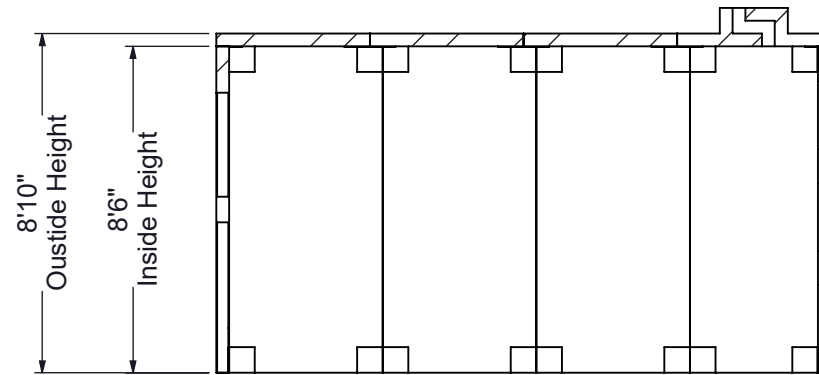


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SALE OF APPARATUS WITHOUT
PERMISSION

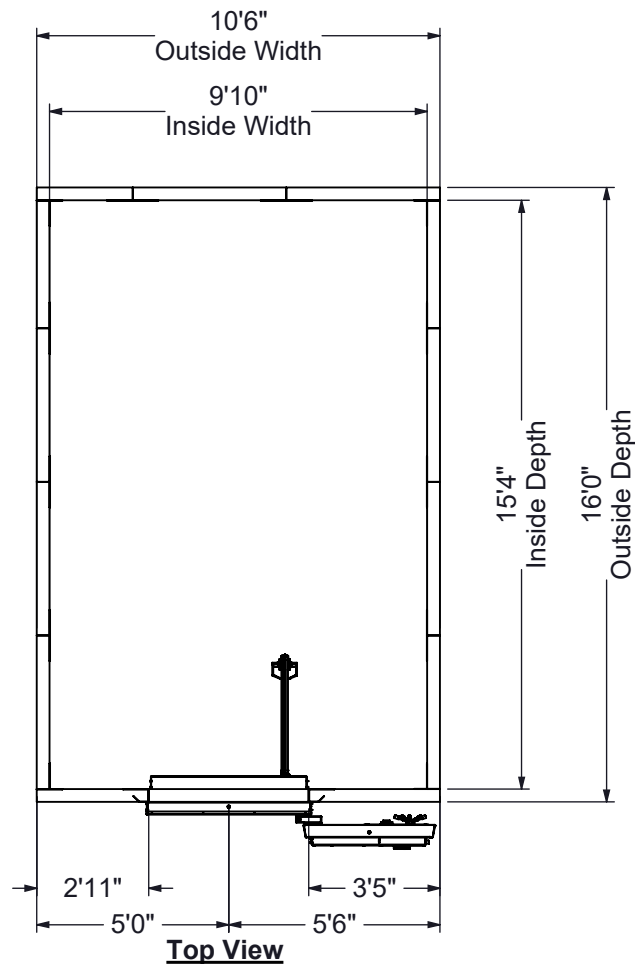
Customer: Red River Bank Metairie , LA United States of America (USA)	
Dealer: Hamilton Vaultronics	P.O. Number:
Date: January 11 2023	Quote Number: 499468Q6024
Drawn By: Adam Barber	Sales Order Number: 499468



Front View



Section View



Top View

Class 1 Vault

- 16'0" D x 10'6" W x 8'10" H (O.D.)
- 15'4" D x 9'10" W x 8'6" H (I.D.)
- 5 Sided
- (1) Vent Panel(s)
- (1) Conduit Panel(s)
- (1) Sprinkler Panel(s)

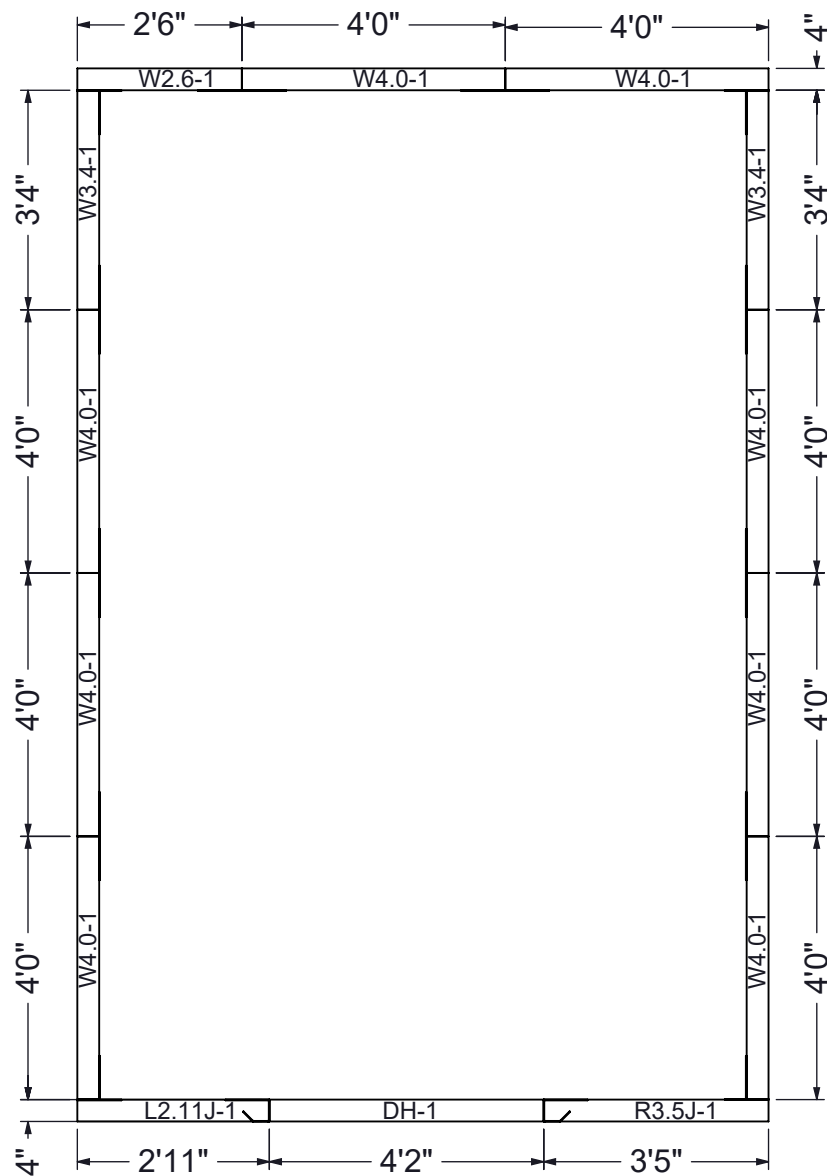
Class 1 Hyde Park Vault Door

- Right Swing
- Grill Daygate

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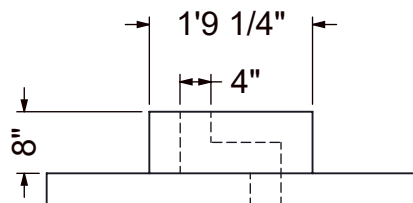


Panel Layout

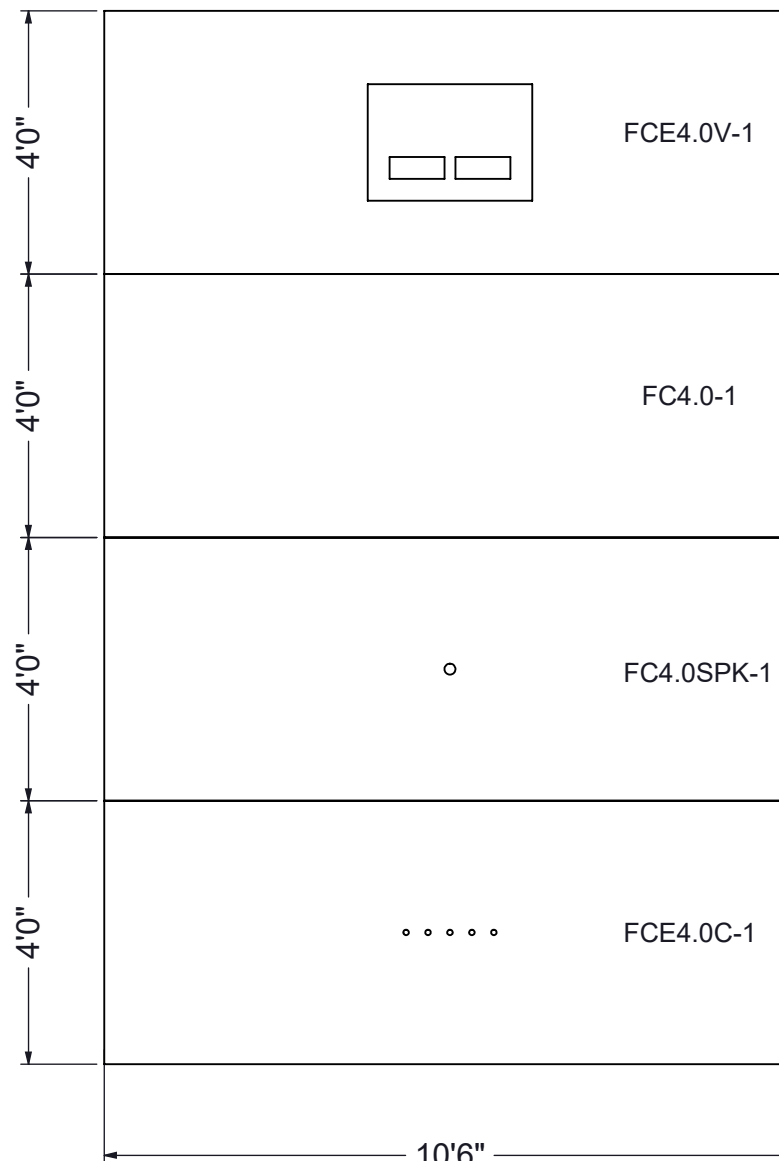
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Class1VentDetail
SCALE 1 : 25



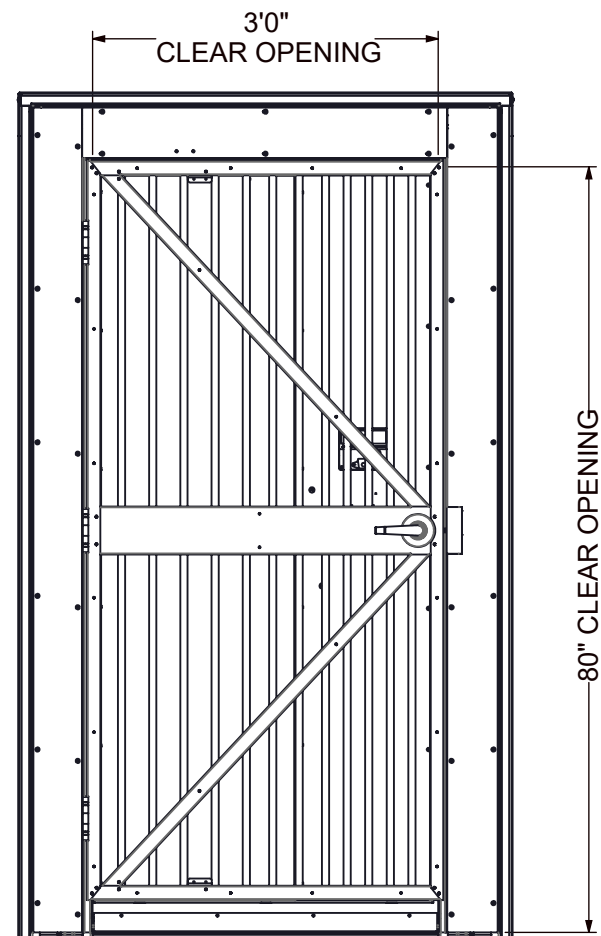
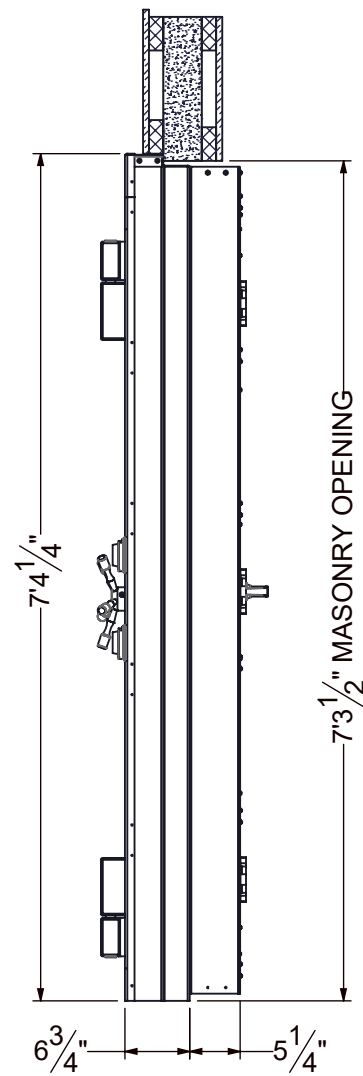
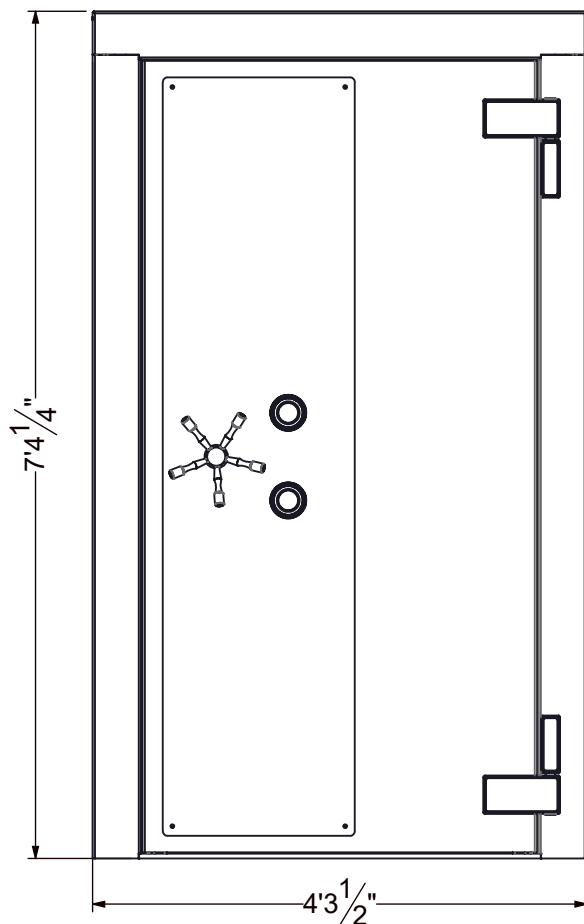
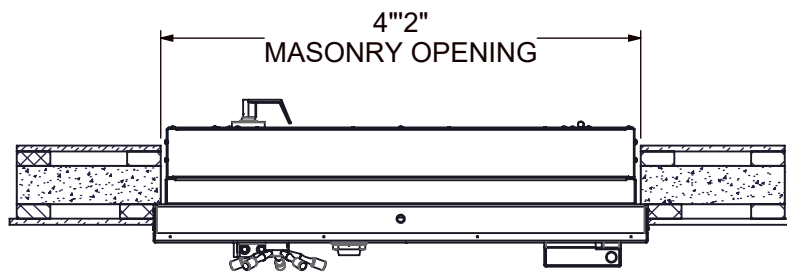
Ceiling Panel Layout



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Customer: Red River Bank
Metairie , LA United States of America (USA)

Dealer: Hamilton Vaultronics	P.O. Number:
Date: January 11 2023	Quote Number: 499468Q6024
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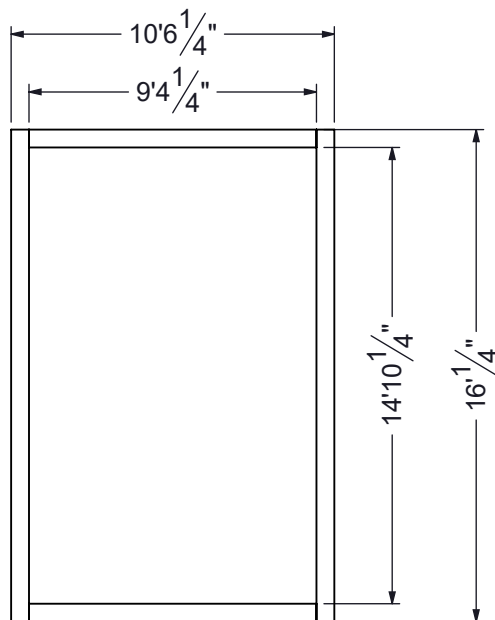


Hyde Park Class 1 Door Right Hand Swing
Stainless Steel & Charcoal Grey Powder Coat Finish
Estimated Weight: 2,500 LBS
Grill Daygate
Set up for 4" Wall Thickness

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Dealer: Metairie, LA United States of America (USA) Hamilton Vaulttronics	
Date: January 11 2023	Quote Number: 499468Q6024
Drawn By: Adam Barber	Sales Order Number: 499468



Plan - Anchor Plates (By Others)

PLATE MUST BE INSTALLED LEVEL IN THE FLOOR BEFORE CONCRETE POUR.

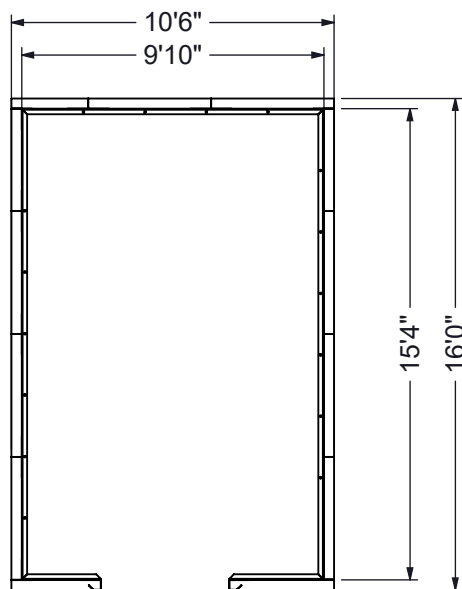
RECOMMENDED TO USE 1/2" ANCHOR PLATES

IT IS RECOMMENDED TO HAVE TWO 3/4" AIR HOLES AT THE VAULT DOOR OPENING.

VAULT & VAULT DOOR CAN NOT BE INSTALLED PROPERLY IF THESE CONDITIONS ARE NOT MET.

ALL CORRECTIONS MUST BE MADE PRIOR TO VAULT INSTALLATION AT THE EPENSE OF THE GENERAL CONTRACTOR.

FORCING PLATES AFTER POUR CAN CAUSE AIR POCKETS AND UNEVEN PLATES



Plan - Vault Attachment to Slab

2in x 2in x 1/8in ANGLE SUPPLIED FOR ALL HORIZONTAL CORNERS THE ANGLES ARE PRE-DRILLED WITH 5/8in DIAMETER HOLES ON 24in CENTERS FOR ANCHORING TO SLAB.
(1/2in ANCHORS BY OTHERS)

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Metairie , LA United States of America (USA)	
Dealer: Hamilton Vaultronics	P.O. Number:
Date: January 11 2023	Quote Number: 499468Q6024
Drawn By: Adam Barber	Sales Order Number: 499468

NOTES:

1. PANELS ARE CONSTRUCTED OF HIGH STRENGTH FIBROUS CONCRETE REINFORCED WITH REBAR. FLAT SIDED JOINTS FOR ADDED STRENGTH. WELD PADS CAST INTO ALL FOUR CORNERS ON INTERIOR OF PANEL.
2. WELD RECOMMENDATIONS ARE ON PAGE 6 , IN SOME AREAS DIFFERENT WELDING REQUIREMENTS MAY BE REQUIRED.
3. ALL ELECTRIC / UTILITY CONNECTIONS (BY OTHERS).
4. ALL STRUCTURAL DESIGN OF THE SUPPORTING FLOOR TO BE DEVELOPED BY STRUCTURAL ENGINEER AT PURCHASERS' EXPENSE.
5. SEISMIC CALCULATIONS (BY OTHERS), IF REQUIRED.
6. PANELS ARE SHIPPED ON A FLATBED TRUCK. LIFTING INSERTS IN EACH END OF PANEL FACILITATES LIFTING AND INSTALLATION.
7. WALL COVERINGS (BY OTHERS)
8. FOR PROPER INSTALLATION, ALLOW 12" OF CLEARANCE AROUND PERIMETER OF VAULT.

9. ALLOWANCE FOR GROWTH OF APPROXIMATELY 1" PER 15'-0" OF VAULT SHOULD BE CONSIDERED.
10. FOR A SIX SIDED APPLICATION 3/8" PLYWOOD UNDERLAYMENT IS RECOMMENDED (MATERIAL & LABOR BY GENERAL CONTRACTOR)
11. PANELS ARE NON-LOAD BEARING AND ARE NOT ENGINEERED TO SUPPORT THE BUILDING STRUCTURE, HEATING/COOLING UNITS, SIX SIDED FLOORS CANNOT FREE SPAN, ETC.
12. VAULT DOOR HAS AN OPTIONAL ELECTRIC POWERED VENTILATOR , ADAPTER PLUG WITH 25FT CORD EXTENDS OUT THE TOP OF VAULT DOOR TRIM. (BY OTHERS) PROVIDE 110V SERVICE / 24HR. SERVICE DUPLEX OUTLET. 110V / 60HZ / 2AMP.
13. IT IS THE RESPONSIBILITY OF THE OWNER/ARCHITECT/GENERAL CONTRACTOR TO ENSURE THAT ALL LOCAL, STATE, & FEDERAL ADA REGULATIONS ARE IN COMPLIANCE.
14. VAULT DOOR FLOOR PLATE IS 5/8" THICK, IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO FLOAT THE FLOOR TO THE TOP OF THE DOOR PLATE FOR A SMOOTH TRANSITION. A RAMPED TRANSITION PLATE IS AVAILABLE AS AN OPTION IF THIS CAN NOT BE COMPLETED

NOTE: PANELS HAVE LIFTING INSERTS CAST INTO EACH END
PART # 15-074 : 3/4"-10 THREAD HOIST RING (1 1/2" LONG GR8 BOLT)
TO BE RATED FOR 5,000 LBS. LIVE LOAD
FOLLOW DIRECTIONS STRAPPED TO HOIST RING
INSTALLATION TORQUE 100-FT-LB

NOTE: VAULT DOOR HAS A INSERT CAST INTO TOP
PART # 15-075 : 3/4"-10 THREAD HOIST RING (8" LONG GR7 BOLT)
TO BE RATED FOR 5,000 LBS. LIVE LOAD
FOLLOW DIRECTIONS STRAPPED TO HOIST RINGINSTALLATION TORQUE 100-FT-LB



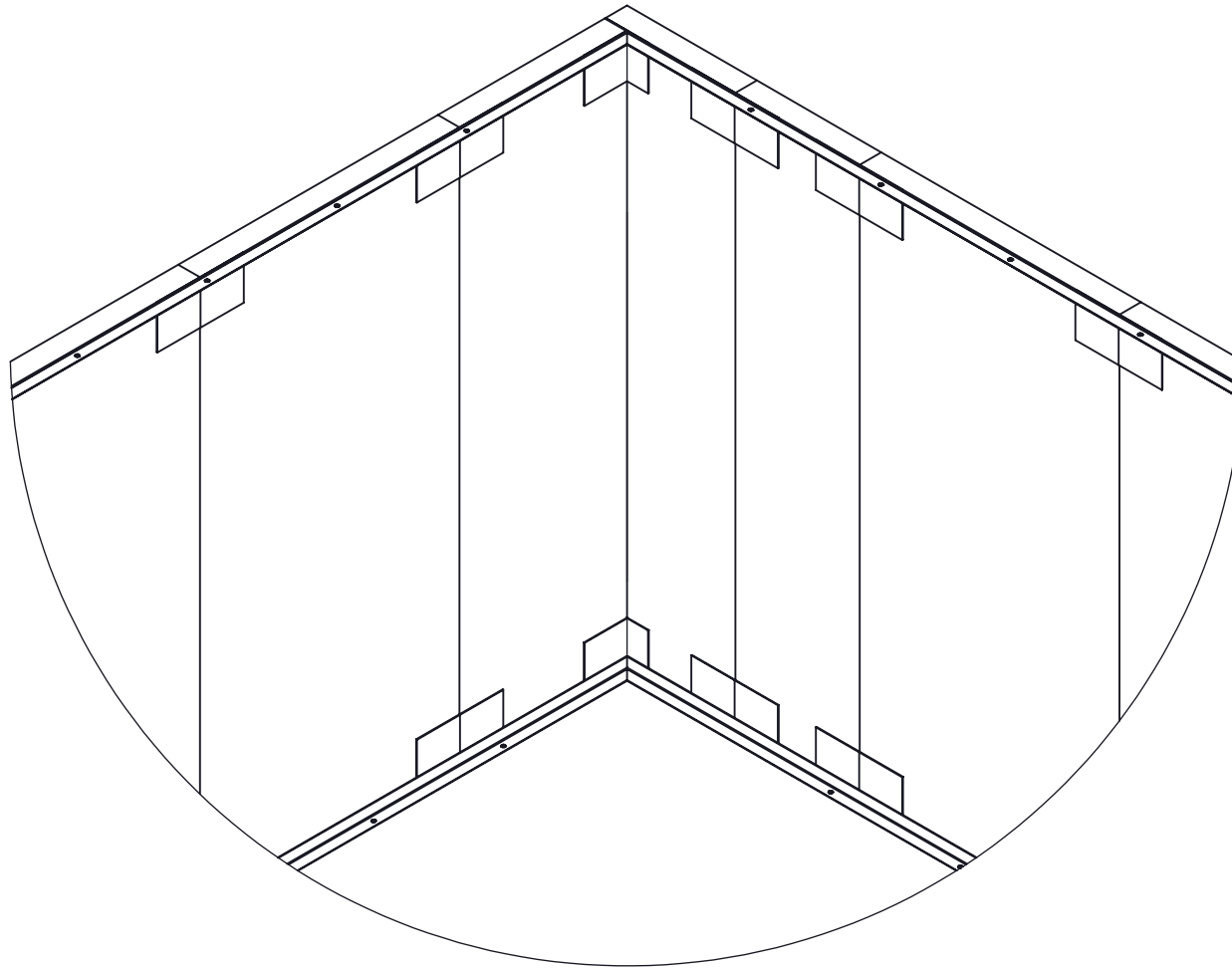
HOIST RING FOR PANELS (PICTURE)

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Date: January 11 2023	Quote Number: 499468Q6024
Drawn By: Adam Barber	Sales Order Number: 499468

NOTE: CEILING / FLOOR PANELS ARE NOT DESIGNED FOR THE WELD PADS TO LINE UP WITH THE WALL PANEL WELD PADS
CEILING / FLOOR WELD PADS ARE TO BE WELDED TO EACH OTHER THEN WELDED TO THE SUPPLIED ANGLE.
THE ANGLE WILL THEN BE WELDED TO THE WALL PANEL WELD PADS



VAULT PANEL ATTACHMENT

NOTE: U.L. DOES NOT SPECIFY HOW A VAULT IS TO BE ATTACHED
THE ABOVE IS A SUGGESTION BASED ON A TYPICALLY INSTALLATION.
STRUCTURAL / SEISMIC CALCULATIONS MAY BE REQUIRED PER JOB SITE.
CALCULATIONS MUST BE DONE BY AN STRUCTURAL ENGINEER THAT IS LICENSED IN THE LOCATION OF THE INSTALLATION
IN CERTAIN AREAS OF THE WORLD THE WELD OR ANGLE SPECS MY DIFFER THEN WHAT IS SHOWN IN A TYPICAL INSTALLATION
HAMILTON SAFE IS NOT RESPONSIBLE FOR THE COST OF OTHER ATTACHMENT ANGLES / MATERIALS OR COST OF ANY CALCULATIONS.

The panels should be attached to each other & to the 2" x 2" x 1/8" angle by a min. 3" of weld. This can be one 3" long weld or 3 - 1" beads

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Panel Name	Number Required	Width Feet	Width Inches	Height Feet	Height Inches	Weight per Panel (LBS)	Total Panel Weight (LBS)	Description	Checklist
W4.0-1	8	4	0	8	6	1836	14688	Wall Panel	
W3.4-1	2	3	4	8	6	1530	3060	Wall Panel	
W2.6-1	1	2	6	8	6	1147.5	1147.5	Wall Panel	
R3.5J-1	1	3	5	8	6	1568.25	1568.25	Right Jamb Panel	
L2.11J-1	1	2	11	8	6	1338.75	1338.75	Left Jamb Panel	
FCE4.0V-1	1	4	0	10	6	2268	2268	Vent End Panel	
FCE4.0C-1	1	4	0	10	6	2268	2268	Conduit End Panel	
FC4.0SPK-1	1	4	0	10	6	2268	2268	Sprinkler Panel	
FC4.0-1	1	4	0	10	6	2268	2268	Ceiling Panel	
DH-1	1	4	2	1	2.5	271.875	271.875	Header	
Total Amount of Panels	18					Total Weight of All Panels	31146.375		

Additional Equipment		
Description	Number Required	Weight (LBS)
2" x 2" x 1/8" Angles	13	221
Boxes of Shim Stock	1	50
Cases of Grey Caulk	1	14
Class 1 Hyde Park Door	1	2500
	Total Equipment Weight	2785

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		Dealer: Hamilton Vaultronics	P.O. Number:
		Date: January 11 2023	Quote Number: 499468Q6024
		Drawn By: Adam Barber	Sales Order Number: 499468

Grid Quantity	Panel Name	Height FT	Height Remainder IN	VertQTY	Vert DIM	HorizQTY	Horiz DIM
8	W4.0-1	8	6	112	99	160	44
2	W3.4-1	8	6	26	99	40	36
1	W2.6-1	8	6	11	99	20	26
1	R3.5J-1	8	6	13	99	20	37
1	L2.11J-1	8	6	12	99	20	31
1	FCE4.0V-1	10	6	14	123	25	44
1	FCE4.0C-1	10	6	14	123	25	44
1	FC4.0SPK-1	10	6	14	123	25	44
1	FC4.0-1	10	6	14	123	25	44
1	DH-1	1	2.5	15	10	3	41

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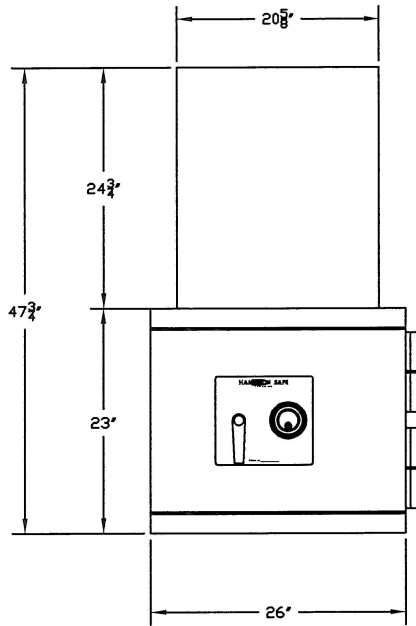
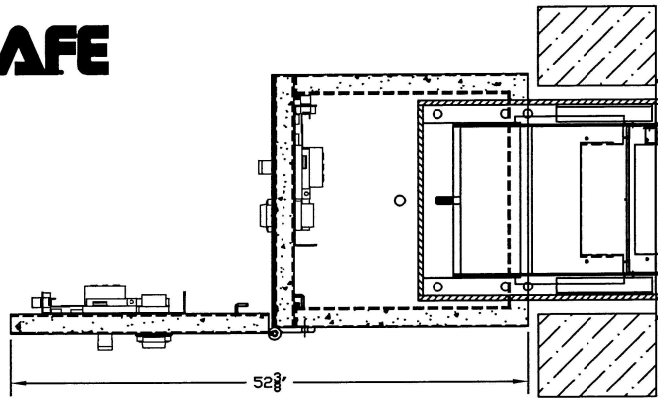
Drawn By: Adam Barber

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Quote Number: 499468Q6024

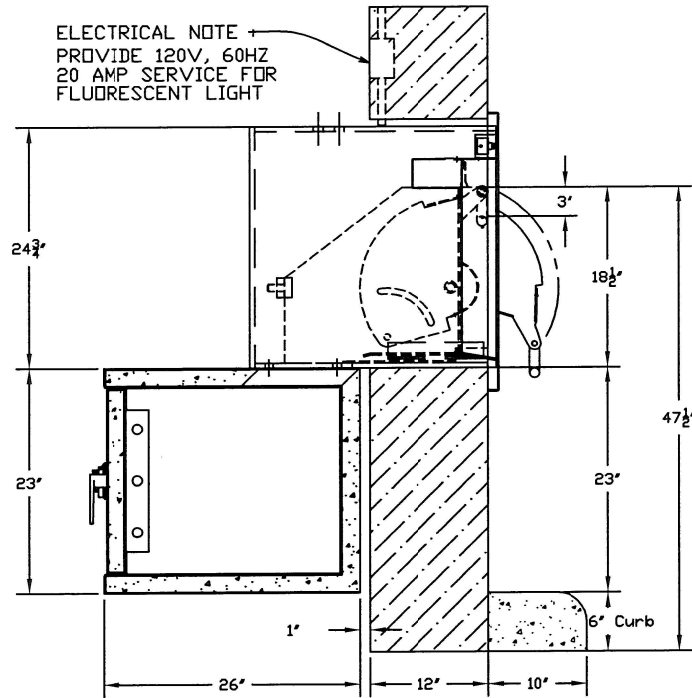
Sales Order Number: 499468

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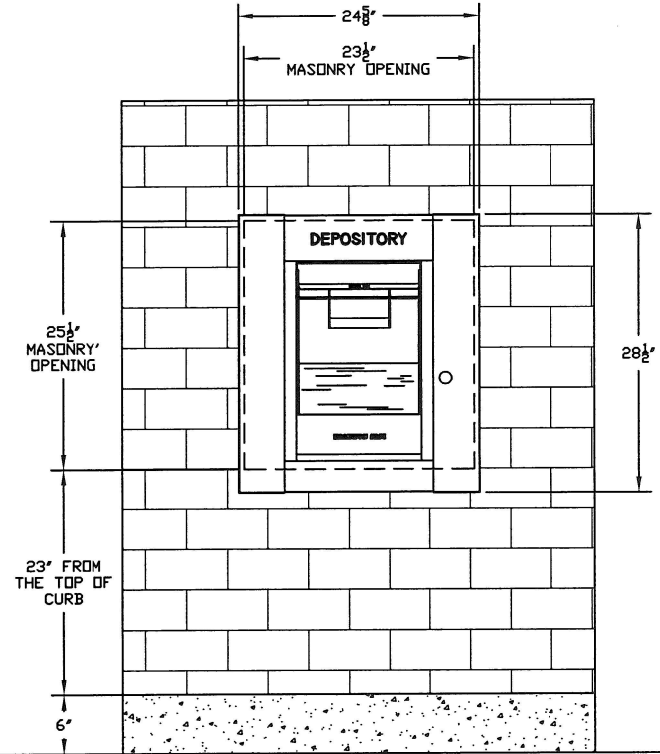


INTERIOR

ELECTRICAL NOTE
PROVIDE 120V, 60HZ
20 AMP SERVICE FOR
FLUORESCENT LIGHT



SECTION



MASONRY DETAIL

EQUIPMENT:
80UC HEAD W/ 5LB PULL ASSIST
SECURE STEEL HOUSING
24 ADDITIONAL HEAD KEYS
TL-15 COMPOSITE CHEST 23"H X 26"W X 26"D (RIGHT SWING)
KLD COMBINATION LOCK
HEAT SENSOR & DOOR CONTACT
UNIT COLOR: BLACK

REVISION # 1	
REVISION # 2	
REVISION # 3	

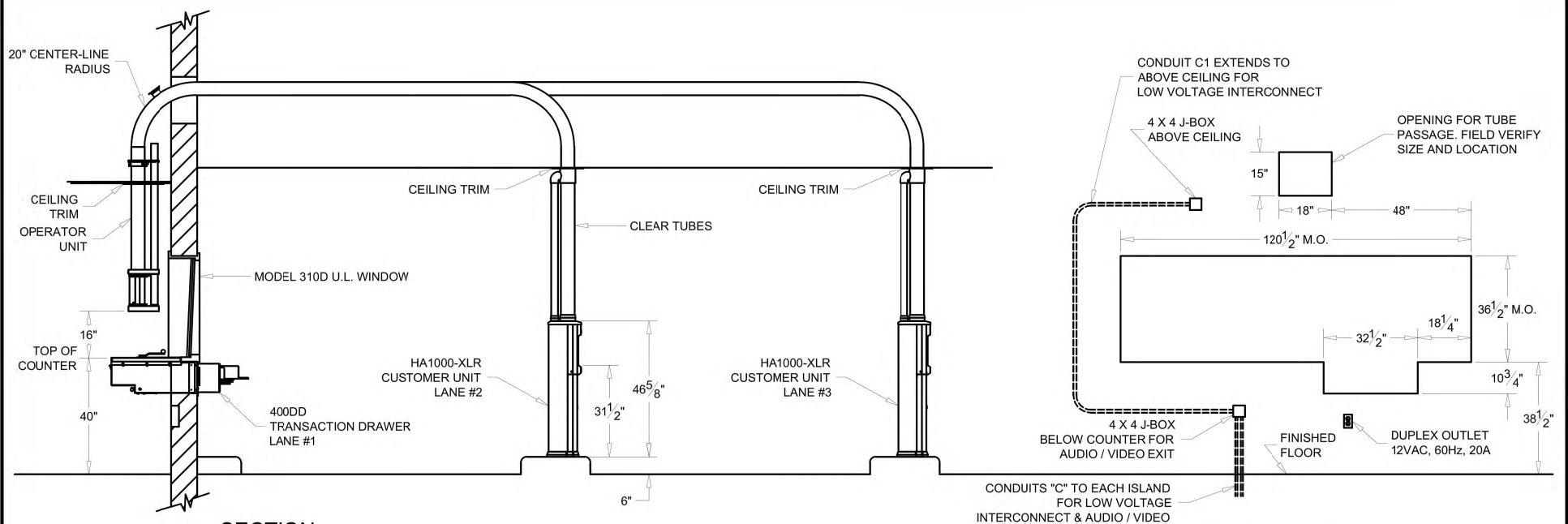
ESTIMATED WEIGHT: 1,535LBS.

STANDARD DEPOSITORY DRAWING

DEALER :
DATE : 2-17-14
ORDER NUMBER : QUOTE
DRAWING NUMBER : 14-053
DRAWN BY : DEREK BEAVERS
SHEET : 10F1

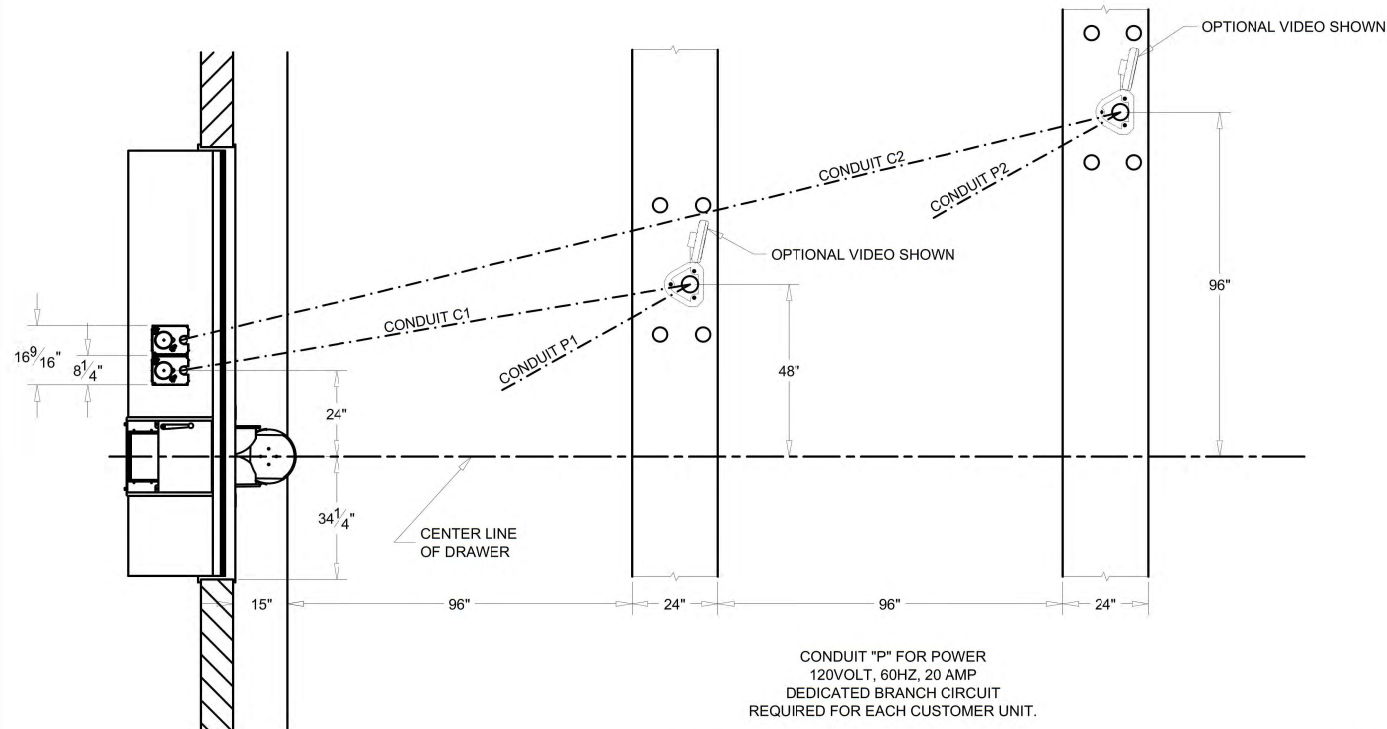
14-053

HAMILTON SAFE



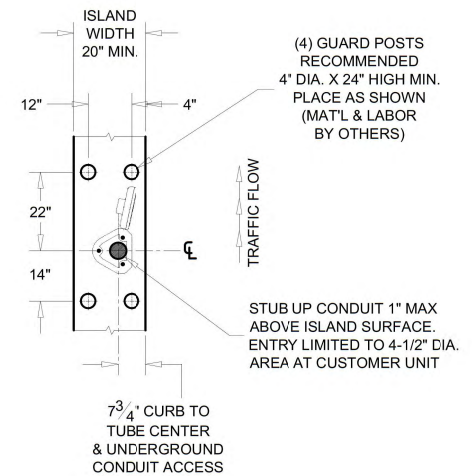
SECTION

MASONRY DETAIL
(FOR MODEL 310D U.L. WINDOW)



PLAN

NOTE: CONDUIT "P" TO BUILDING POWER PANEL
CONDUIT "C" TO JUNCTION BOX BELOW COUNTER
AND EXTENDED ABOVE CEILING TO TELLER AREA



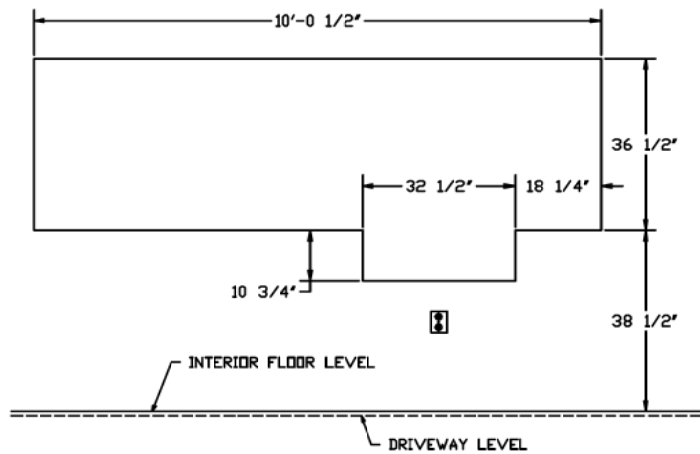
ISLAND DETAIL

ADDITIONAL DRAWINGS TO REFERENCE:
95-696, 99-915, & 99-1140

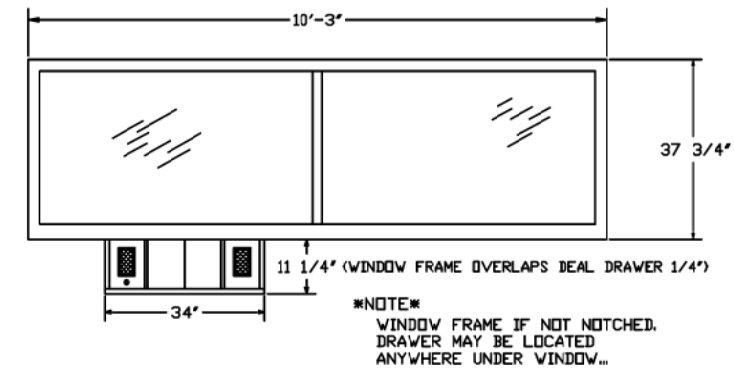
HAMILTON AIR®			
PNEUMATIC TUBE SYSTEMS			
MODEL HA1000-XLR			
"212" SYSTEM - OVERHEAD TUBING			
DATE:	DRAWING NUMBER:	REVISION	
2/12/2015	99-1148	--	

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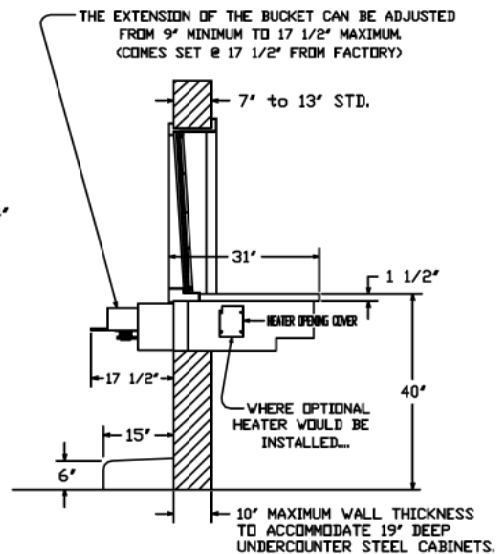
Rev - 1	
Rev - 2	



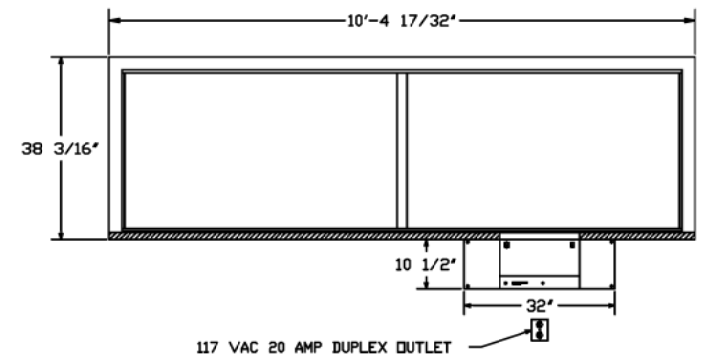
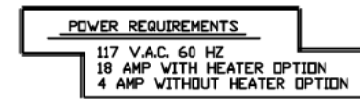
MASONRY OPENING - INTERIOR DETAIL



EXTERIOR ELEVATION



VERTICAL SECTION



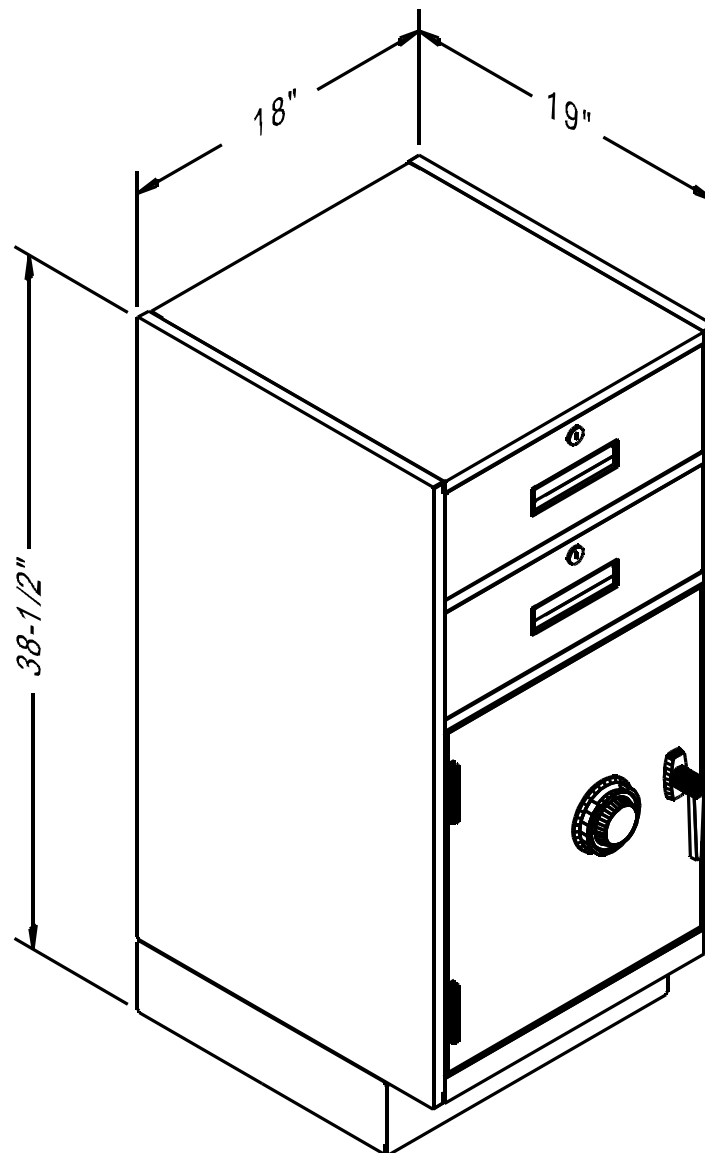
INTERIOR ELEVATION

HAMILTON SAFE

310D WINDOW WITH
400DD DEAL DRAWER
U.L. LISTED

Drawing Number : 95-696 Date : 5-18-99

PART NO.:	TITLE:	USED BY:	SCALE: NTS	ORDER NO: -	PACKAGE SHEET: OF
SHEET: OF:	220 - 19	DATE:	DRN BY: Bolton T. DATE: 03/03/05	CUSTOMER: FENCO	



Last Update: 12/11/2007 - BOLTON T.



Fenco

Undercounter & Forecounter Equipment
P.O. BOX 1238 BURLINGTON, NJ 08016-0516
www.fencobankequipment.com

