

PROJECT MANUAL

FILMORE THOMAS PARK

For MBC PARKS AND RECREATION

3793 Log Cabin Dr, Macon, GA 31204

Project No: 2024-081

November 1st 2024

100% CDs
FOR CONSTRUCTION

PREPARED BY:

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CD DRAWING LIST

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SECTION 00 0015 - LIST OF DRAWINGS

END OF SECTION 00 0015

SECTION 00 0060 - GUARANTY BONDS

PART 1 - GENERAL

1.1 GUARANTY BOND FORMS

- A. Guaranty Bonds shall be executed on the AIA Standard Performance Bond and Payment Bond.

1.2 AMOUNT OF BOND

- A. Amount shown in each part of Guaranty Bond shall be equal to 100% of the contract sum.

1.3 SURETY

- A. Surety shall be a company licensed to do business in the State of Georgia and acceptable to the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 00 0060

SECTION 00 0100 - GENERAL CONDITIONS

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

- A. The AIA, ***STANDARD AGREEMENT AND GENERAL CONDITIONS BETWEEN OWNER AND GENERAL CONTRACTOR***, inclusive, hereinafter referred to as General Conditions, are hereby made a part of these Specifications and shall apply to all work executed under this contract. A copy of this document is on file at the office of the Architect. Copies can be obtained by General Contractors and Subcontractors, submitting bona fide bids on this project, upon receipt of written request submitted to the Architect.

1.2 DEFINITIONS

- A. The use of the term "General Contractor" within these specifications shall refer to the "Contractor" as defined in the agreement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 00 0100

SECTION 00 0120 - SPECIAL CONDITIONS

PART 1 - GENERAL

1.1 SCOPE

- A. These special conditions apply equally to all sections of these specifications.
- B. Nothing in any of the Contract Documents shall be interpreted as being contrary to law or local and state ordinances and all codes and laws of governing agencies (local and state) shall be followed as though they were herein bound.

1.2 SPECIAL CONDITIONS

- A. **CONSTRUCTION LIMITS:** The Contractor shall conduct all his activities within an area defined as the project site. Any damage to public or private property beyond this area shall be repaired at the Contractor's cost and in a manner satisfactory to the Owner.
 - 1. The Owner will establish areas for storage of materials, staging and other construction activities that take place outside of the building.
- B. **SAFETY CODE COMPLIANCE:** Rules and regulations governing construction, demolition and all excavation shall comply with the rules and regulations for the prevention of accidents as issued by the local city or county having jurisdiction.
- C. **STANDARDS:**
 - 1. Wherever reference is made to the standard specifications of nationally known organizations, the latest edition in effect on the date of this specification, shall govern unless otherwise stated herein. Where specific articles, sections, divisions or headings are not given, such specifications shall apply in full. Standard specifications when included herein, by abbreviation, or otherwise, shall form a part of this specification the same as if quoted in full.
- D. The Architect may require, and the Contractor shall furnish, if required to do so, certificates from manufacturers to the effect that the products or materials furnished by them for use in the work comply with applicable specified requirements of the materials or products being furnished.
- E. **GENERAL EQUIPMENT REQUIREMENTS - FIELD DIMENSIONS:** The drawings accompanying these Specifications generally indicate the design and arrangement of all equipment, apparatus, fixtures, accessories, etc., as necessary to complete the installation of all systems. The exact location or arrangement of equipment, unless otherwise dimensioned, is subject to minor changes necessitated by

SECTION 00 0120 - SPECIAL CONDITIONS

field conditions and shall be made as required without additional cost to the Owner. Measurements shall be verified by actual observation at construction site and each respective Contractor shall be responsible for all of his work fitting into place in a satisfactory and workmanlike manner to the approval of the Owner.

- F. **RULES AND REGULATIONS - CODE COMPLIANCE:** The Contractor and Subcontractor shall comply with all local, state, and applicable Federal agencies in regards to Code requirements, Ordinances, and Laws.
- G. **FIRE EXTINGUISHERS:** The Contractor shall furnish, during all phases of construction, fire extinguishers in accordance with OSHA and the local Fire Marshal's requirements.
- H. **PERMITS:** The Contractor and his Subcontractors shall be responsible for obtaining all building permits and pay all fees as required to complete their work shown on the drawings and as specified herein.
- I. **WEATHER PROTECTION:** The Contractor or his subcontractors shall furnish and install any temporary enclosures, doors, and plastic covered windows and openings to protect the construction from weather. All openings through roof shall be protected.
- J. **SPECIFICATION EXPLANATION:**
 - 1. Attention is directed to the fact that the detailed specification and separate sections may be written in short or abridged form. In regard to every section of the specifications and all parts thereof, mention therein or indications on the drawings of articles, materials, operations, or methods required that the Contractor: Provide each item mentioned and indicated; Perform each operation prescribed; Provide therefore all necessary labor, equipment and incidentals.
 - 2. Whenever in these specifications or on the drawings the words "directed", "required", "permitted", "ordered", or words of like import are used, it shall be understood that the direction, requirements, permission or order of the Architect is intended; and similar words "approved", "acceptable", "satisfactory", or words of like shall mean approved by, or acceptable to, or satisfactory to the Architect.
 - 3. For convenience of reference and to facilitate the letting of contracts and subcontracts, these specifications are separated into titled sections. Such separation shall not, however, operate to make the Architect an arbiter to establish limits to the contracts between the Contractor and Subcontractor, nor shall such separation be interpreted as superseding normal union jurisdiction.
- K. **SCAFFOLDING:** Erect and maintain scaffolding, ramps, runways, platforms, guards, rails, stairs and ladders as necessary to protect the safety of all those involved with this work.
- L. **MATERIAL STORAGE:** Store materials in a secure and dry manner. Do not leave any materials exposed to weather.

SECTION 00 0120 - SPECIAL CONDITIONS

1.3 TESTING

- A. GENERAL: The Owner shall employ an independent Testing Agency to inspect the materials and workmanship and perform as a minimum the tests described herein. The Agency shall submit inspection reports, certification and instances of noncompliance to the Architect, Owner and Structural Engineer. The Testing Agency shall immediately notify the Architect whenever the materials or the workmanship is not in compliance with the construction documents.
- B. QUANTITIES: The Owner shall furnish to the Testing Agency the anticipated volume of earthwork, material quantities and construction schedule for the project. The Agency shall use this information as a basis to establish a scope of work and cost proposal to the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 00 0120

SECTION 01 1000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Owner-furnished products.
 - 4. Contractor-furnished, Owner-installed products.
 - 5. Access to site.
 - 6. Work restrictions.
 - 7. Specification and drawing conventions.
 - 8. Miscellaneous provisions.

- B. Related Requirements:

- 1. Section 01 5000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification: Memorial Park Recreation

- 1. Project Location: 2465 2ND ST, MACON, GA 31206

- B. Owner: Macon-Bibb County.

- C. Architect: WM2A Architects; 348 Cotton Avenue, Suite 500; Macon, GA 31201; 478-745-4945

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

- 1. MEP Engineering: Total Engineers -478-741-4632/ EDC – 478-781-1833
 - 2. Structural Engineering: Pi Tech 478-743-5600
 - 3. Civil Engineering: Traverse Land Services 478-922-7724

SECTION 01 1000 - SUMMARY

- E. Contractor: Will be engaged after award.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
 - 1. Site upgrades, pavilion and Pump house. The scope of work is as indicated within the contract documents for the project.
- B. Type of Contract:
 - 1. Project will be constructed under a single prime contract.

1.5 PHASED CONSTRUCTION

- A. The Work shall be conducted in a Single phase:
- B. Before commencing Work, submit an updated copy of Contractor's construction schedule showing the sequence, commencement and completion dates, and move-out and -in dates of Owner's personnel for all phases of the Work.

1.6 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1.7 WORK UNDER SEPARATE CONTRACTS

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

1.8 OWNER-FURNISHED PRODUCTS

- A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products.
- B. Owner-Furnished Products:
 - 1. As indicated within the drawings.

SECTION 01 1000 - SUMMARY

1.9 CONTRACTOR-FURNISHED, OWNER-INSTALLED PRODUCTS

- A. Contractor shall furnish products indicated. The Work includes unloading, handling, storing, and protecting Contractor-furnished products as directed and turning them over to Owner at Project closeout.

1.10 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Limits: Limit site disturbance, including earthwork and clearing of vegetation, to 40 feet beyond building perimeter; 10 feet beyond surface walkways, patios, surface parking, and utilities less than 12 inches in diameter; 15 feet beyond primary roadway curbs and main utility branch trenches; and 25 feet beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities, and playing fields) that require additional staging areas in order to limit compaction in the constructed area.
 - 2. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.11 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy site and existing adjacent building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or

SECTION 01 1000 - SUMMARY

used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.

2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

1.12 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 6 a.m. to 8 p.m., Monday through Friday, unless otherwise indicated.
 1. Weekend Hours: Same as times permitted for weekday work.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 1. Notify Owner not less than two days in advance of proposed utility interruptions.
 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 1. Notify Owner not less than two days in advance of proposed disruptive operations.
 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.
- F. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.
- G. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- H. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
 1. Maintain list of approved screened personnel with Owner's representative.

SECTION 01 1000 - SUMMARY

1.13 SPECIFICATION AND DRAWING CONVENTIONS

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 1000

SECTION 01 2100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
 - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.
 - 2. Quantity allowances.
 - 3. Testing and inspecting allowances.
- C. Related Requirements:
 - 1. Section 01 4000 "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.

1.3 SELECTION AND PURCHASE

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

1.4 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the

form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

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

1.6 COORDINATION

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

1.7 LUMP-SUM ALLOWANCES

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

1.8 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
- B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.

- C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.
- D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.9 ADJUSTMENT OF ALLOWANCES

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 SCHEDULE OF ALLOWANCES:

- A. Allowance **No. 1:** Provide cost allowance for relocation of existing water line if 811 shows the existing location is under the new proposed footprint. Re routing should be done in a was that allows the water line to be accessed. Refer to note on civil plans.

END OF SECTION 01 2100

SECTION 01 2100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
 - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.
 - 2. Quantity allowances.
 - 3. Testing and inspecting allowances.
- C. Related Requirements:
 - 1. Section 01 4000 "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.

1.3 SELECTION AND PURCHASE

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

1.4 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the

form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

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

1.6 COORDINATION

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

1.7 LUMP-SUM ALLOWANCES

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

1.8 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
- B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.

- C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.
- D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.9 ADJUSTMENT OF ALLOWANCES

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 SCHEDULE OF ALLOWANCES:

- A. Allowance **No. 1:** Quantity Allowance: Include in the base bid, 2000 cu. yd. of unsatisfactory soil excavation and disposal off-site and replacement with satisfactory structural soil material from off-site, as specified in Section 31 2300 "Earthwork."
 - 1. Coordinate quantity allowance adjustment with unit-price requirements in Section 01 2200 "Unit Prices."

END OF SECTION 01 2100

SECTION 01 2200 - UNIT PRICES

SECTION 01 2200 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

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

1.4 PROCEDURES

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

SECTION 01 2200 - UNIT PRICES

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

- A. Unit Price 1: Removal of unsatisfactory soil and replacement with satisfactory soil material. Per cubic yard price \$_____.
1. Description: Unsatisfactory soil excavation and disposal off site and replacement with satisfactory fill material or engineered fill from off site, as required, according to Section 31 2300 "Earthwork"
 2. Unit of Measurement: Cubic yard of soil excavated, based on survey of volume removed.
 3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 01 2100 "Allowances."

END OF SECTION 01 2200

SECTION 01 2500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

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

SECTION 01 2500 - SUBSTITUTION PROCEDURES

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

1.5 QUALITY ASSURANCE

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

SECTION 01 2500 - SUBSTITUTION PROCEDURES

1.6 PROCEDURES

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

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
 - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Requested substitution provides sustainable design characteristics that specified product provided.
 - c. Substitution request is fully documented and properly submitted.
 - d. Requested substitution will not adversely affect Contractor's construction schedule.
 - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution has been coordinated with other portions of the Work.
 - h. Requested substitution provides specified warranty.
 - i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received 10 days or more prior to bid date. Requests received after that time shall be rejected by the Architect. Approval of such requests shall be issued as an addendum to all bidders prior to bid date.
 - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

SECTION 01 2500 - SUBSTITUTION PROCEDURES

- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
- b. Requested substitution does not require extensive revisions to the Contract Documents.
- c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
- d. Substitution request is fully documented and properly submitted.
- e. Requested substitution will not adversely affect Contractor's construction schedule.
- f. Requested substitution has received necessary approvals of authorities having jurisdiction.
- g. Requested substitution is compatible with other portions of the Work.
- h. Requested substitution has been coordinated with other portions of the Work.
- i. Requested substitution provides specified warranty.
- j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2500

SECTION 01 2600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 MINOR CHANGES IN THE WORK

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

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request or 10 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail."

SECTION 01 2600 - CONTRACT MODIFICATION PROCEDURES

- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 4. Include costs of labor and supervision directly attributable to the change.
 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 6. Comply with requirements in Section 01 2500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
 7. Proposal Request Form: Use CSI Form 13.6A, "Change Order Request (Proposal)," with attachments CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail."

1.5 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 01 2100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Unit-Price Adjustment: See Section 01 2200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Changes Proposal Request, Construction Manager will issue a Change Order for signatures of Architect and Contractor on ConsensusDocs 525.

1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

SECTION 01 2600 - CONTRACT MODIFICATION PROCEDURES

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2600

SECTION 01 2900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
 - 3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
 - 4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.

SECTION 01 2900 - PAYMENT PROCEDURES

5. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract as described in Section 01 1000 "Summary."
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 1. Arrange schedule of values consistent with format of AIA Document G702.
 2. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
 - a. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment.
 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
 - a. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
 6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

SECTION 01 2900 - PAYMENT PROCEDURES

8. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.
9. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
10. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Application for Payment Forms: Use AIA Document G702 as form for Applications for Payment.
- D. Application for Payment Forms: Use forms acceptable to Architect and Owner for Applications for Payment. Submit forms for approval with initial submittal of schedule of values.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.

SECTION 01 2900 - PAYMENT PROCEDURES

3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- F. **Stored Materials:** Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- G. **Transmittal:** Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. **Waivers of Mechanic's Lien:** With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. **Waiver Forms:** Submit executed waivers of lien on forms, acceptable to Owner.
- I. **Initial Application for Payment:** Administrative actions and submittals that must

SECTION 01 2900 - PAYMENT PROCEDURES

precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
 5. Products list (preliminary if not final).
 6. Schedule of unit prices.
 7. Submittal schedule (preliminary if not final).
 8. List of Contractor's staff assignments.
 9. List of Contractor's principal consultants.
 10. Copies of building permits.
 11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 12. Initial progress report.
 13. Report of preconstruction conference.
 14. Certificates of insurance and insurance policies.
 15. Performance and payment bonds.
 16. Data needed to acquire Owner's insurance.
- J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707, "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.
 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

SECTION 01 2900 - PAYMENT PROCEDURES

9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2900

SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. Requests for Information (RFIs).
 - 4. Project meetings.

1.3 DEFINITIONS

- A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
 - 1. Post copies of list in project meeting room, in temporary field office, and by each

SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

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

SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

1.6 COORDINATION DRAWINGS

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

SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

- a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
 6. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
 7. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
 8. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
 9. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 3300 "Submittal Procedures."
- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format: DWG, Version , operating in Microsoft Windows operating system.
 2. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.
 3. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Digital Data Software Program: Drawings are available in Revit and Autocad.

SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

1.7 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 - 1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 - 1. Project name.
 - 2. Project number.
 - 3. Date.
 - 4. Name of Contractor.
 - 5. Name of Architect.
 - 6. RFI number, numbered sequentially.
 - 7. RFI subject.
 - 8. Specification Section number and title and related paragraphs, as appropriate.
 - 9. Drawing number and detail references, as appropriate.
 - 10. Field dimensions and conditions, as appropriate.
 - 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 - 12. Contractor's signature.
 - 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: ConsensusDocs 204 Software-generated form with substantially the same content as indicated above, acceptable to Architect.
 - 1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
 - 1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.

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- b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 2600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
 - E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use CSI Log Form 13.2B. Include the following:
 1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 - F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
 1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- 1.8 PROJECT MEETINGS
- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and

SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

- Architect of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
- 1. Conduct the conference to review responsibilities and personnel assignments.
 - 2. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Lines of communications.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for RFIs.
 - h. Procedures for testing and inspecting.
 - i. Procedures for processing Applications for Payment.
 - j. Distribution of the Contract Documents.
 - k. Submittal procedures.
 - l. Preparation of record documents.
 - m. Use of the premises and existing building.
 - n. Work restrictions.
 - o. Working hours.
 - p. Owner's occupancy requirements.
 - q. Responsibility for temporary facilities and controls.
 - r. Procedures for moisture and mold control.
 - s. Procedures for disruptions and shutdowns.
 - t. Construction waste management and recycling.
 - u. Parking availability.
 - v. Office, work, and storage areas.
 - w. Equipment deliveries and priorities.
 - x. First aid.
 - y. Security.
 - z. Progress cleaning.

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4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, Construction Manager of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility requirements.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written instructions.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

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5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of record documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Submittal of written warranties.
 - d. Requirements for preparing operations and maintenance data.
 - e. Requirements for delivery of material samples, attic stock, and spare parts.
 - f. Requirements for demonstration and training.
 - g. Preparation of Contractor's punch list.
 - h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - i. Submittal procedures.
 - j. Coordination of separate contracts.
 - k. Owner's partial occupancy requirements.
 - l. Installation of Owner's furniture, fixtures, and equipment.
 - m. Responsibility for removing temporary facilities and controls.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at weekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

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3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site utilization.
 - 9) Temporary facilities and controls.
 - 10) Progress cleaning.
 - 11) Quality and work standards.
 - 12) Status of correction of deficient items.
 - 13) Field observations.
 - 14) Status of RFIs.
 - 15) Status of proposal requests.
 - 16) Pending changes.
 - 17) Status of Change Orders.
 - 18) Pending claims and disputes.
 - 19) Documentation of information for payment requests.
 4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- F. Coordination Meetings: Conduct Project coordination meetings at weekly intervals.

SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site utilization.
 - 9) Temporary facilities and controls.
 - 10) Work hours.
 - 11) Hazards and risks.
 - 12) Progress cleaning.
 - 13) Quality and work standards.
 - 14) Change Orders.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3100

SECTION 01 3200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- C. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:

WM2A Architects
WM2A Project No. 2024-081

01 3200 - 1

FILMORE THOMAS
PARK MACON, GA

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1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.

B. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

- A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01 3100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
1. Discuss constraints, including phasing work stages interim milestones and partial Owner occupancy.

1.6 COORDINATION

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

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for commencement of the Work to date of final completion.
1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

SECTION 01 3200 - CONSTRUCTION PROGRESS DOCUMENTATION

3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 3300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 1000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 3. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Fabrication.
 - d. Installation.
 - e. Tests and inspections.
 - f. Startup and placement into final use and operation.
 4. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Permanent space enclosure.
 - c. Completion of mechanical installation.
 - d. Completion of electrical installation.
 - e. Substantial Completion.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion, and the following interim milestones:
1. Temporary enclosure and space conditioning.
- E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

SECTION 01 3200 - CONSTRUCTION PROGRESS DOCUMENTATION

1. See Section 01 2900 "Payment Procedures" for cost reporting and payment procedures.
- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
 1. Unresolved issues.
 2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and Contract Time.
- G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
 1. Use Microsoft Project, for Windows operating system.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

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

2.3 REPORTS

- A. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

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1. Material stored prior to previous report and remaining in storage.
 2. Material stored prior to previous report and since removed from storage and installed.
 3. Material stored following previous report and remaining in storage.
- B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 3200

SECTION 01 3300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those

SECTION 01 3300 - SUBMITTAL PROCEDURES

submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
 - g. Scheduled date of fabrication.
 - h. Scheduled dates for purchasing.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
 1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. The following digital data files will be furnished for each appropriate discipline:
 - 1) Floor plans.
 - 2) Reflected ceiling plans.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

SECTION 01 3300 - SUBMITTAL PROCEDURES

3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 10 days for review of each resubmittal.
 4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 10 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Name of subcontractor.
 - f. Name of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01).

SECTION 01 3300 - SUBMITTAL PROCEDURES

Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

- i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review submittals received from sources other than Contractor.
- a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
 - 1) Project name.
 - 2) Date.
 - 3) Destination (To:).
 - 4) Source (From:).
 - 5) Name and address of Architect.
 - 6) Name of Contractor.
 - 7) Name of firm or entity that prepared submittal.
 - 8) Names of subcontractor, manufacturer, and supplier.
 - 9) Category and type of submittal.
 - 10) Submittal purpose and description.
 - 11) Specification Section number and title.
 - 12) Specification paragraph number or drawing designation and generic name for each of multiple items.
 - 13) Drawing number and detail references, as appropriate.
 - 14) Indication of full or partial submittal.
 - 15) Transmittal number, numbered consecutively.
 - 16) Remarks.
 - 17) Signature of transmitter.
- E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
- 1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.

SECTION 01 3300 - SUBMITTAL PROCEDURES

2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Contractor.
 - e. Name of firm or entity that prepared submittal.
 - f. Names of subcontractor, manufacturer, and supplier.
 - g. Category and type of submittal.
 - h. Submittal purpose and description.
 - i. Specification Section number and title.
 - j. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Related physical samples submitted directly.
 - n. Indication of full or partial submittal.
 - o. Transmittal number, numbered consecutively.
 - p. Submittal and transmittal distribution record.
 - q. Remarks.
- F. Options: Identify options requiring selection by Architect.
- G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.

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3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, and installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 1. Post electronic submittals as PDF electronic files directly to Architect's shared folder site specifically established for Project.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 2. Submit electronic submittals via email as PDF electronic files.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 3. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return two copies.
 4. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
 5. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

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- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples.
 6. Submit Product Data in the following format:
 - a. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.

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2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file.
 - b. Two opaque (bond) copies of each submittal. Architect will return one copy(ies).
 - c. Three opaque copies of each submittal. Architect will retain two copies; remainder will be returned.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with

SECTION 01 3300 - SUBMITTAL PROCEDURES

options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
 5. Submit product schedule in the following format:
 - a. PDF electronic file.
 - b. Three paper copies of product schedule or list unless otherwise indicated. Architect will return two copies.
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 01 3100 "Project Management and Coordination."
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 01 3200 "Construction Progress Documentation."
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 2900 "Payment Procedures."

SECTION 01 3300 - SUBMITTAL PROCEDURES

- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 4000 "Quality Requirements."
- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 7700 "Closeout Procedures."
- K. Maintenance Data: Comply with requirements specified in Section 01 7823 "Operation and Maintenance Data."
- L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.

SECTION 01 3300 - SUBMITTAL PROCEDURES

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

2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

SECTION 01 3300 - SUBMITTAL PROCEDURES

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 7700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 01 3300

SECTION 01 4000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size physical assemblies that are constructed on-site per 5/A2-1. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances.

SECTION 01 4000 - QUALITY REQUIREMENTS

Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies. See detail on drawings.
- D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- I. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

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

SECTION 01 4000 - QUALITY REQUIREMENTS

numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
 - 2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

SECTION 01 4000 - QUALITY REQUIREMENTS

1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
 3. Owner-performed tests and inspections indicated in the Contract Documents.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

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

SECTION 01 4000 - QUALITY REQUIREMENTS

13. Recommendations on retesting and re-inspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.
- 1.9 QUALITY ASSURANCE
- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

SECTION 01 4000 - QUALITY REQUIREMENTS

- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Pre-construction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Testing Agency Responsibilities: Submit a certified written report of each test,

SECTION 01 4000 - QUALITY REQUIREMENTS

inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of as directed by the drawings. See 5/A2-1.
 2. Notify Architect days in advance of dates and times when mockups will be constructed.
 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 7. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.

1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
 3. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 3300 "Submittal Procedures."

SECTION 01 4000 - QUALITY REQUIREMENTS

- C. **Manufacturer's Technical Services:** Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in pre-installation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- D. **Retesting/Re-inspecting:** Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. **Testing Agency Responsibilities:** Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect, Commissioning Authority, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - 6. Do not perform any duties of Contractor.
- F. **Associated Services:** Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Delivery of samples to testing agencies.
 - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. **Coordination:** Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

SECTION 01 4000 - QUALITY REQUIREMENTS

1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
 1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections and in Statement of Special Inspections attached to this Section, and as follows:
 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and re-inspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Architect.
 4. Identification of testing agency or special inspector conducting test or inspection.

SECTION 01 4000 - QUALITY REQUIREMENTS

- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 7300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 4000

SECTION 01 4100 - SPECIAL STRUCTURAL TESTING AND INSPECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 INTENT AND CONDITIONS

A. Intent

1. Define and coordinate structural testing and special inspection services.
2. Define and coordinate conventional testing and inspection services.
3. Provide greater confidence that the specified work is constructed in compliance with the contract documents and Chapter 17 of the 2018 International Building Code.
4. Testing and Inspection services are intended to assist in determining probable compliance of the work with requirements specified. These services do not relieve the Contractor of responsibility for compliance with the requirements of the contract documents.

B. Conditions

1. Special inspection reports and a final report in the accordance with Section 1704.1.2 of the Georgia State Minimum Standard Building Code shall be available at the time the building is approved for occupancy.
2. If inspection of fabricator's work is required, the Owner's representative may require testing and inspection of the work at the plant, before shipment. Owner, Architect and Structural Engineer of Record (SER) reserve the right to reject material not complying with the contract documents.
3. Testing and inspection shall be performed in accordance with the industry standard used as the reference for the specific material or procedure unless other criteria are specified. In the absence of a referenced standard, tests shall be accomplished in accordance with generally accepted industry standards.
4. Work shall be checked as it progresses, but failure to detect any defective work or materials shall in no way prevent later rejection if defective work or materials are discovered, nor shall it obligate Owner to accept such work.

1.3 Related Requirements

- A. Refer to PART 2 for technical scope sections regarding specific qualifications, inspections, tests, frequency and standards required.

SECTION 01 4100 - SPECIAL STRUCTURAL TESTING AND INSPECTION

1.4 Definitions

- A. Testing – Evaluation of systems, primarily requiring physical manipulation and analysis of materials, in accordance with approved standards.
- B. Inspection – Evaluation of systems, primarily requiring observation and engineering judgment.
- C. Structural Testing and Special Inspection – Structural Testing and Special Inspection Services herein include items required by the 2018 IBC as adopted by the current Georgia State Building Code, and other items which in the professional judgment of the Structural Engineer of Record, are critical to the integrity of the building structure.
- D. Conventional Testing and Inspection – Conventional Testing and Inspection Services herein describe those items not specially required by Code but may be considered essential to the proper performance of the building systems.
- E. Architect of Record – The prime consultant in charge of overall design and coordination of the project.
- F. Structural Engineer of Record (SER) – The Licensed Engineer in responsible charge of the structural design for the project.
- G. Licensed Structural Engineer: – A professional engineer with education and experience in the design of structures similar to this project licensed to practice in the state in which the project is located.
- H. Testing Agency (TA) – The properly qualified firm performing testing services.
- I. Special Inspector (SI) – A properly qualified individual or firm performing special inspections.
- J. Building Official – The Officer or his duly authorized representative charged with the administration and enforcement of the Georgia State Building Code.
- K. Continuous –The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.
- L. Periodic –The part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.

SECTION 01 4100 - SPECIAL STRUCTURAL TESTING AND INSPECTION

1.5 References

- A. ASTM E329-02 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
- B. ASTM E43-02 - Standard Practice for Agencies Performing Nondestructive Testing.
- C. ASTM C1077-02 - Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
- D. ASTM C1093-95 - Practice for Accreditation of Testing Agencies for Unit Masonry.
- E. ASTM D3740-01 - Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- F. SBCCI Standard Building Code (International Building Code), 2006 Edition, with Georgia Amendments referred herein as the Georgia State Building Code
- G. See technical sections of PART 2 for specific references.

1.6 Qualifications

- A. Testing Agency (TA) – The testing agency shall be an approved independent testing agency acceptable to the Owner, Architect, SER and as noted below:
 - 1. Authorized to operate in the state in which the project is located and experienced with the requirements and testing methods specified in the technical scope sections of PART 2.
 - 2. Meeting applicable requirements of Section 1.04 "References".
 - 3. Testing equipment shall be calibrated at reasonable intervals by devices of accuracy traceable to either the National Bureau of Standards, or to accepted values of natural physical constants.
- B. Guidelines for Qualifications of Special Inspectors:
 - 1. Any individual offering to perform special inspections or testing shall submit a registration or for approval by the building official.
 - 2. Except for professional engineers and architects registered in the state of the project, special inspectors shall meet the following criteria. Work experience shall be related to the field for which the inspector is being qualified and may be obtained by for an engineering firm specializing in the field in which registration is being sought.
 - 3. An individual shall meet a minimum of one of the requirements identified below, for each category in which approval is sought.

SECTION 01 4100 - SPECIAL STRUCTURAL TESTING AND INSPECTION

- a. Reinforced Concrete (RC)
 - 1) Current International Code Council (ICC) Reinforced Concrete Special Inspector, or,
 - 2) Engineer in Training (EIT) with one year related experience under supervision of a Licensed PE
- b. Prestressed Concrete (PC), Pretension tendons (PC1)
 - 1) Current ICC Prestressed Concrete Special Inspector Certification
 - 2) EIT with one year related experience including plan reading under supervision of a Licensed PE
- c. Post-tension tendons (PC2)
 - 1) Current Post-Tensioning Institute (PTI) Certification Level 1
- d. Post-Tension Slabs-on-Ground (PTS)
 - 1) Current PTI Certification Level 1
- e. Welding (SW)
 - 1) Current American Welding Society (AWS) Certified Welding Inspector
 - 2) Current Canadian Welding Bureau Certified Welding Inspector
- f. Nondestructive Testing of Welds (SN), Nondestructive Testing of Welds (SN)
 - 1) Current Nondestructive Testing Level II and/or Level III (MT, PT & UT)
 - a) The applicant must be Level II certified by the American Society of Nondestructive Testing (ASNT) to perform Magnetic Particle Testing (MT) Liquid Penetrant Testing (PT) and Ultrasonic Testing (UT), or
 - 2) The applicant must be Level II certified by an ASNT Level III examiner to perform MT, PT and UT.
 - a) The Level III examiner shall be certified by ASNT and must submit a copy of his certification with the Level II certification.
- g. High-Strength Bolting/ Steel Frame (SS)
 - 1) Current ICC Structural Steel and Bolting Special Inspector

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- h. Structural Masonry (SM)
 - 1) EIT with one year related experience including plan reading under supervision of a Licensed PE
 - 2) Current ICC Structural Masonry Special Inspection
- i. Sprayed Fire-Resistant Materials (FP)
 - 1) Current ICC Spray-Applied Fireproofing Special Inspector
- j. Deep Foundations (PDP)
 - 1) Current National Institute for Certification in Engineering Technologies (NICET) Level II certification in geotechnical engineering technology/construction
 - 2) EIT with one year related experience under supervision of a Licensed PE
 - 3) Current SCDOT Foundation Inspector Certification
- k. Excavation and Filling (EF)/Verification of Soils (VS)
 - 1) Current NICET Level II certification in geotechnical engineering technology/construction
 - 2) Current NICET Level II in Soils
 - 3) EIT with one year related experience under supervision of a Licensed PE
 - 4) Soils Special Inspector
 - 5) Current SCDOT Earthwork, Drainage and Base Certification
- l. Modular Retaining Walls (MRW)
 - 1) EIT with one year related experience under supervision of a Licensed PE
- m. Precast Concrete Erection (PCE) (Not a separate registration)
 - 1) The special inspector shall be registered for Reinforced Concrete (RC) or Welding (SW) as required based on the type of inspection being performed.
- n. Exterior Insulation and Finish System (EIFS)
 - 1) EIT with one year related experience
- o. Smoke Control (SC)
 - 1) Current NICET N-II-FPAS

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- 2) Current NICET N-II-FPFA
- 3) Current National Environmental Balancing Bureau
- 4) Current Associated Air Balance Council

p. Inspection of Fabricators

- 1) Precast
 - a) Current ICC Reinforced Concrete Certification
 - b) Precast/Prestressed Concrete Institute Level II
- 2) Bar Joist
 - a) See welding/bolting requirements
- 3) Metal Building
 - a) See welding/bolting requirements
- 4) Structural Steel
 - a) See welding/bolting requirements
- 5) Lateral Force Resistance (SR)
 - a) EIT with two years related experience under supervision of a Licensed PE
- 6) Detention Basin (DB)
 - a) Professional land surveyor
 - b) EIT with two years related experience under supervision of a Licensed PE
- 7) Special Cases (XX)
 - a) BCC registration is limited to categories listed above. Special inspectors for special cases shall be approved by the jurisdictional building official.

1.7 Responsibilities

A. Structural Testing and Special Inspection

1. Special Inspectors:

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- a. Sign the Schedule of Special Inspection Services in conjunction with other responsible parties prior to commencement of construction.
 - b. If requested, attend a pre-construction meeting to review the scope of structural testing and special inspection.
 - c. Use the approved design drawings and specifications, supplemented by the approved shop drawings for review of the work.
 - d. Test and/or inspect the work assigned for conformance with the building department approved design drawings, specifications and applicable material and workmanship provisions of the Code. Perform testing and inspection in a timely manner to avoid delay of work.
 - e. Bring discrepancies to the immediate attention of the contractor for correction, confirm that they are corrected and, if uncorrected after a reasonable period of time, bring to the attention of the Structural Engineer of Record, the Building Official, and to the Architect.
 - 1) A "SPECIAL INSPECTION DISCREPANCY NOTICE" form is included at the end of this section.
 - f. Submit test and/or inspection reports to the Building Official, Contractor, the Structural Engineer of Record, and other designated persons in accordance with the Schedule of Special Inspection Services.
 - 1) A "SPECIAL INSPECTION DAILY REPORT" form is included at the end of this section.
 - 2) A "SPECIAL INSPECTION INTERIM REPORT " form is included at the end of this section.
 - g. Submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans, specifications and the applicable workmanship provisions of the Code.
 - 1) The "FINAL REPORT OF SPECIAL INSPECTIONS" form is included at the end of this section.
2. Testing Agency:
- a. Sign the Schedule of Special Inspection Services in conjunction with other responsible parties prior to commencement of construction.
 - b. If requested, attend a pre-construction meeting to review the scope of structural testing and special inspection.
 - c. When engaged as a special inspector, provide structural testing and special inspection services as previously described.
3. Architect of Record (or other prime consultant):

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- a. Complete and sign the Schedule of Special Inspection Services in conjunction with other responsible parties prior to commencement of construction. Provide a completed copy of the schedule to all signed parties including Building Official.
 - 1) The " STATEMENT OF SPECIAL INSPECTIONS " form is included at the end of this section.
 - b. If appropriate, arrange and attend a pre-construction meeting to review the scope of structural testing and special inspection. Include Contractor, Building Official, SER, Testing Agency and other parties concerned.
 - c. Coordinate the flow of reports and related information to expedite resolution of construction issues.
4. Structural Engineer of Record (SER):
- a. Identify items requiring structural testing and special inspection including special cases.
 - b. Define "type" of special inspector required for "description" of work indicated on the structural testing and special inspection schedule.
 - c. Complete and sign the Schedule of Special Inspection Services prior to commencement of construction.
 - d. If requested, attend a pre-construction meeting to review the scope of structural testing and special inspection.
 - e. Review reports submitted by special inspectors.
 - f. If engaged as a special inspector, provide structural testing and special inspection services as previously described.
5. Contractor:
- a. Sign the Schedule of Special Inspection Services in conjunction with other responsible parties prior to commencement of construction.
 - b. Sign the Contractor's Statement Of Responsibility.
 - 1) The " CONTRACTOR'S STATEMENT OF RESPONSIBILITY " form is included at the end of this section.
 - c. If requested, attend a pre-construction meeting to review the scope of structural testing and special inspection.
 - d. Post or make available the Schedule of Special Inspection Services within its office at the job site. Also, provide adequate notification to those parties designated on the schedule so they may properly prepare for and schedule their work.
 - e. Provide the special inspectors access to the approved design drawings, approved shop drawings and specifications at the job site.
 - f. Review reports submitted by special inspectors.

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- g. Retain at the job site all reports submitted by the special inspectors for review by the building official upon request.
 - h. Correct in a timely manner, deficiencies identified in inspection and/or testing reports.
 - i. Provide the special inspector safe access to the work requiring inspection and/or testing.
 - j. Provide labor and facilities to provide access to the work and to obtain, handle and deliver samples, to facilitate testing and inspection and for storage and curing of test samples.
 - k. Verification of conformance of the work within specified construction tolerances is solely the Contractor's responsibility.
- 6. Fabricator:
 - a. Sign the Schedule of Special Inspection Services in conjunction with other responsible parties prior to commencing construction.
 - b. Sign the Fabricator's Certificate Of Compliance.
 - 1) The " FABRICATOR'S CERTIFICATE OF COMPLIANCE " form is included at the end of this section.
 - c. Submit a Certificate of Compliance to the Building Official, Special Inspector, and Structural Engineer of Record that the work was performed in accordance with the approved plans and specifications.
- 7. Building Official (Typical responsibilities noted for information only):
 - a. Determine work, which in the Building Officials opinion, involves unusual hazards or conditions in accordance with the IBC.
 - b. Review special inspector qualifications.
 - c. Accept and sign the completed Schedule of Special Inspection Services.
 - d. Review all fabricators who perform work in their shop, which requires special inspection.
 - e. Review reports and recommendations submitted by the special inspectors.
 - f. Review the "final signed reports" submitted by the special inspector(s). These documents should be accepted and approved by the building department prior to issuance of a Certificate of Occupancy.
- 8. Owner:
 - a. Establish direct funding to provide for cost of structural testing and special inspection services.
 - b. Provide special inspector with approved design drawings, specifications and approved shop drawings.
 - c. Provide special inspectors and testing agencies with full access to site at all times.

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- d. Sign the Schedule of Special Inspection Services in conjunction with other responsible parties prior to commencement of construction.
- B. Conventional Testing and Inspection
 - 1. Testing Agency:
 - a. Test or inspect the work assigned, for conformance with building department approved plans, specifications and applicable workmanship provisions of the IBC.
 - b. Bring non-conforming items to the immediate attention of the Contractor, and if uncorrected to the Architect of Record.
 - c. Submit test and/or inspection reports to the Architect of Record, the Contractor and other designated persons.
 - 2. Contractor:
 - a. Provide adequate notification to testing agency so they may properly prepare for and schedule their work.
 - b. Provide testing agency with access to the approved design drawings, approved shop drawings and specifications at the job site.
 - c. Correct in a timely manner, deficiencies identified in test and/or inspection reports.
 - d. Provide testing agency with safe access to the work requiring testing and inspection.
 - e. Provide labor and facilities to provide access to the work and to obtain and handle samples, to facilitate testing and inspection and for storage and curing of test samples.
 - f. Verification of conformance of the work within specified construction tolerances is solely the Contractor's responsibility.
 - 3. Architect of Record (or other prime consultant):
 - a. Coordinate the flow of reporting and related information to expedite resolution of construction issues.
- C. Inspections by Building Official
 - 1. Contractor shall provide adequate notice for inspections performed by the Building Official, as required by the 2012 IBC, the Georgia State Building Code, and local ordinance.
- D. Periodic Site Observations by Design Consultant
 - 1. Special structural testing and inspection, conventional testing and inspection, and periodic inspections by the Building Official do not preclude the normal field involvement and site observations by Architect or Structural Engineer of Record,

SECTION 01 4100 - SPECIAL STRUCTURAL TESTING AND INSPECTION

nor shall it relieve the Contractor of any responsibility to complete the work in accordance with the approved drawings and specifications.

E. Limits of Authority

1. Testing agents and/or special inspectors may not waive or alter contract requirements, or approve or accept any portion of the work unless specifically authorized by the Architect or Structural Engineer of Record. They may not assume any duties of the Contractor, and they have no authority to stop or reject "Work".

1.8 Payment

- A. Owner shall directly employ and pay for services of the special inspectors to perform required Structural Testing and Special Inspection.
- B. Owner shall employ and pay for services of the testing agency to perform required Conventional Testing and Inspection.
- C. Unless noted otherwise, the Contractor shall provide and pay for all materials, samples, mock-ups, and assemblies required for testing and inspection and shall pay for all shipping costs related to delivery of this work. Testing agency will pay for shipping costs of samples transported from site to lab.
- D. If exploratory work is required to determine the cause of defects, the cost of such work shall be paid by the Contractor, if the work is found to be defective, in the judgment of the Architect/Engineer. Contractor shall reimburse the Owner for all costs incurred in this event.
- E. Any tests required to qualify the Contractor, or the workmen for any phase of the work, shall be performed at no additional cost to the Owner.

1.9 Inspection Notice

- A. Contractor shall provide minimum of 24 hours notice for all items requiring testing or inspection. Items requiring testing and inspection services prior to or during placement shall not be placed until testing and inspection services are available. Items requiring testing and inspection services after placement shall not be enclosed or obscured until testing and inspection services are performed.

1.10 Reports

- A. Testing agency and/or special inspectors shall submit reports in accordance with the Schedule of Special Inspection Services and shall conduct and interpret tests and

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inspections and state in each report whether; (1) test specimens and observations comply with Contract Documents, and specifically state any deviations, (2) record types and locations of defects found in work, (3) record work required and performed, to correct deficiencies.

- B. Reports for structural testing and special inspection, shall be submitted in timely manner to the Contractor, Building Official, SER, and Architect of Record.
 - 1. Submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans, specifications and the applicable workmanship provisions of the code.
- C. Reports for conventional testing and inspection shall be submitted in a timely manner to the Contractor and the Architect of Record.

1.11 Frequency of Testing and Inspection

- A. For detailed requirements see Schedule of Special Inspection Services.

1.12 Protection and Repair

- A. Upon completion of testing, sample-taking, or inspection, the Contractor shall repair damaged work and restore substrates and finishes to eliminate deficiencies, including deficiencies in the visual qualities of exposed surfaces, as judged solely by the Architect/Engineer of Record. Protect work exposed by or for testing and/or inspection and protect repaired work. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for testing and/or inspection.

1.13 Tests to Demonstrate Qualification

- A. If the Contractor proposes a product material, method, or other system that has not been pre-qualified, the Architect may require applicable tests, to establish a basis for acceptance or rejection. These tests will be paid for by the Contractor.
- B. The Architect/Engineer of Record reserves the right to require certification or other proof that the system proposed, is in compliance with any tests, criteria or standards called for. The certificate shall be signed by a representative of an independent testing agency.

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PART 2 - MATERIALS (NOT USED)

PART 3 - SCOPE OF TESTING AND INSPECTION

3.1 Schedule of Special Inspection Services

- A. The parties involved shall complete and sign the Schedule of Special Inspection Services. The Program, including Summary Schedule, shall be submitted to the building official for approval prior to issuance of a building permit. The completed schedule includes the following:
 - 1. A specific listing of the items requiring inspection and testing.
 - 2. The associated technical scope sections that define the applicable standards by which to judge conformance with the approved plans and specifications in accordance with the IBC, as adopted by the Georgia State Building Code. The technical scope sections should also include the degree or basis of inspection and testing; i.e., intermittent/will-call or full-time/continuous.
 - 3. The frequency of reporting, i.e., weekly, monthly, per test/inspection, per floor, etc.
 - 4. The parties responsible for performing the inspection and testing work.
 - 5. The required acknowledgments by each designated party.

3.2 Conventional Testing and Inspection

- A. Schedule of Special Inspection Services
 - 1. See attached form at end of section.

3.3 Technical Sections

- A. Section 02080 - Trench Excavation, Bedding, Backfill And Compaction
 - 1. IBC Code Section 1704.7 Soils
 - 2. Definitions
 - a. Refer to PART 1 for standard definitions.
 - b. Refer to PART 1 for Guidelines for Qualifications of Special Inspectors.
 - 3. Structural Testing and Special Inspection Requirement
 - Item and Frequency
 - a. Classification of materials used and encountered during construction per ASTM:D2488 and ASTM:D2487.

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- b. Performance of laboratory testing of materials, as needed (Proctor, Sieve Analysis, Atterberg Limits, Consolidation Test, etc.).
 - c. Field Density Tests:
 - d. Provide periodic results of field compaction and laboratory work for general compliance with Contract Documents and Geotechnical Reports.
 - e. Observe all subgrades/excavation bases below footings and slabs and verify design bearing capacity is achieved.
 - f. Document presence of groundwater within excavations.
 - g. Provide reports of subgrade observations for general compliance with Contract Documents and Geotechnical Report.
 - h. Verify cut and fill slopes as specified in the contract documents.
4. Conventional Testing and Inspections Requirements
- a. Contractor shall verify that footings comply with frost depth requirements and shall report any variances to the SER in a timely manner.

B. Section 03 3000 - Concrete

- 1. IBC Code Section 1704.4 Concrete Construction
- 2. General
 - a. Refer to Section 05 1200 - Structural Steel for inspections involving welding reinforcing steel.
- 3. Definitions
 - a. Refer to PART 1 for standard definitions.
 - b. Refer to PART 1 for Guidelines for Qualifications of Special Inspectors.
- 4. Structural Testing and Special Inspection Requirements
 - a. Verify formwork dimensions for all concrete, excluding:
 - 1) Isolated spread footings of buildings three stories or less in height that are fully supported on earth or rock
 - 2) Strip footings of buildings three stories or less in height that are fully supported on earth or rock, where the footings support walls of light frame construction, the footings are designed in accordance with Table 1805.4.2, or the footing structural design is based on a f'_c no greater than 2500 psi.
 - 3) Non-structural slabs on grade, including prestressed slabs on grade when effective prestress in concrete is less than 150 pounds per square inch.

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- 4) Concrete foundation walls constructed in accordance with Table 1805.5(2), Table 1805.5(3) or Table 1805.5(4).
 - 5) Concrete patios, driveways and sidewalks on grade.
- b. Inspect reinforcement in all cast in place concrete, excluding:
- 1) Isolated spread footings of buildings three stories or less in height that are fully supported on earth or rock
 - 2) Strip footings of buildings three stories or less in height that are fully supported on earth or rock, where the footings support walls of light frame construction, the footings are designed in accordance with Table 1805.4.2, or the footing structural design is based on a f'_c no greater than 2500 psi.
 - 3) Non-structural slabs on grade, including prestressed slabs on grade when effective prestress in concrete is less than 150 pounds per square inch.
- c. Verify the following:
- 1) Verify reinforcing bar grade.
 - 2) Verify reinforcing bars are free of dirt, excessive rust, and damage.
 - 3) Verify reinforcing bars are adequately tied, chaired, and supported to prevent displacement during concrete placement.
 - 4) Verify proper clear distances between bars and to surfaces of concrete.
 - 5) Verify reinforcing bar size and placement.
 - 6) Verify bar laps for proper length and stagger.
 - 7) Verify mechanical splices are placed in accordance with the plans, specifications and reviewed shop drawings.
 - 8) Verify weldability of reinforcing steel, other than ASTM A706. Verify welding of reinforcing bars meets requirements set forth in Section 05100.
 - 9) Verify epoxy coating is present at locations noted on the plans and specifications, include tie wires, chairs, bolsters, etc. Verify coating damage is repaired in accordance with the contract documents.
- d. Sample and test all cast in place concrete.
- 1) Prepare compression test specimens (ASTM C31), one set of four standard cylinders of concrete for each compressive strength test, mold and store cylinders for laboratory-cured specimens.
 - 2) Perform compressive strength tests (ASTM C39). One set of four cylinders for each day's pour between one and 25 cubic yards. If a day's pour exceeds 25 cubic yards, one set of four cylinders for each additional 50 cubic yards, or fraction thereof. One specimen at seven days, two at 28 days, and one specimen retained in reserve

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for later testing if required. For post tensioned concrete, make and test an additional cylinder at three days to verify strength prior to stressing. (When frequency of testing will provide less than five strength tests for a given class of concrete, conduct at least five strength tests from randomly selected batches. If fewer than five batches are used, conduct one test from each batch.)

- 3) Slump (ASTM C143): One test at point of discharge for each set of compression test specimens; additional tests when concrete consistency appears to have changed.
 - 4) Air entrainment (ASTM C231): Test the first batch of air entrained concrete and one additional test for each set of compression test specimens.
 - 5) Concrete Temperature: Test concrete temperature hourly when air temperature is 40F and below and when 80F and above, and each time a set of compression test specimens is made.
- e. Perform concrete mix verification.
- 1) Verify mixer truck trip ticket conforms to approved mix design.
 - 2) Verify that total water added to mix on site does not exceed that allowed by concrete mix design.
 - 3) Verify that concrete quality is indicative of adequate mixing time, consistency, and relevant time limits.
- f. Inspect preparation and placement of all concrete, excluding:
- 1) Isolated spread footings of buildings three stories or less in height that are fully supported on earth or rock
 - 2) Strip footings of buildings three stories or less in height that are fully supported on earth or rock, where the footings support walls of light frame construction, the footings are designed in accordance with Table 1805.4.2, or the footing structural design is based on a f'_c no greater than 2500 psi.
 - 3) Non-structural slabs on grade, including prestressed slabs on grade when effective prestress in concrete is less than 150 pounds per square inch.
 - 4) Concrete foundation walls constructed in accordance with Table 1805.5(2), Table 1805.5(3) or Table 1805.5(4).
 - 5) Verify the following:
 - a) Verify acceptable general condition of concrete base prior to placement.
 - b) Verify that concrete conveyance and depositing avoids segregation and contamination.
 - c) Verify that concrete is properly consolidated.

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- d) Verify reinforcement remains at proper location.
 - g. Observe protection and curing methods for all concrete, excluding:
 - 1) Isolated spread footings of buildings three stories or less in height that are fully supported on earth or rock
 - 2) Strip footings of buildings three stories or less in height that are fully supported on earth or rock, where the footings support walls of light frame construction, the footings are designed in accordance with Table 1805.4.2, or the footing structural design is based on a f 'c no greater than 2500 psi.
 - 3) Non-structural slabs on grade, including prestressed slabs on grade when effective prestress in concrete is less than 150 pounds per square inch.
 - 4) Concrete foundation walls constructed in accordance with Table 1805.5(2), Table 1805.5(3) or Table 1805.5(4).
 - 5) Verify the following:
 - a) Verify specified curing procedures are followed.
 - b) Verify that specified hot and cold weather procedures are followed.
 - h. Inspect all bolts installed in concrete.
 - 1) Verify specified size, type, spacing, configuration, embedment, and quantity.
 - 2) Verify proper concrete placement and means have been taken to achieve consolidation around all bolts.
5. Conventional Testing and Inspection Requirements
- a. (Not Used)
- C. Section 05 1200 - Structural Steel
- 1. IBC Code Section 1704.3 Steel Construction
 - 2. General
 - a. If special inspection of fabricators work is required, testing agent may test and inspect structural steel at plant before shipment. Owner and SER reserve right to reject material not complying with Contract Documents at any time before final acceptance.
 - 3. Definitions
 - a. Refer to PART 1 for standard definitions.

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- b. Refer to PART 1 for Guidelines for Qualifications of Special Inspectors.
 - c. A.S.N.T: The American Society for Non-destructive Testing.
 - d. N.D.E.: Non-destructive Evaluation.
 - e. A.W.S./C.A.W.I. : American Welding Society/Certified Associate Weld Inspector.
 - f. A.W.S./C.W.I.: American Welding Society/Certified Weld Inspector.
 - g. R.C.S.C: Research Council On Structural Connections
4. Structural Testing and Special Inspection Requirements
- Item and Frequency
- a. High Strength Bolting (Field Installed):
 - 1) General
 - a) On a periodic basis, visually inspect mating surfaces and bolt type for all slip-critical bolted connections for general conformance with the contract documents prior to bolting.
 - b) Determine the requirements for bolts, nuts, washers, paint and installation/tightening standards are met.
 - c) Observe calibration procedures when such procedures are required in the contract documents and verify that selected procedure is used to tighten bolts.
 - 2) Slip Critical Bolts and Tension Bolts
 - a) Test bolt tightening in 10% of all bolts. Test a minimum of two bolts in each connection. Verify that all plies of connected elements have been brought into contact, at 100% of connections. Verify all tips are removed from "twist"-off bolts.
 - 3) Bearing Bolts
 - a) On a periodic basis, visually inspect to confirm all plies of connected elements have been brought into contact, at 100% of connections. (Applies only to bolts designed for values not requiring exclusion of threads from failure plane, all other bolts require testing as for tension bolts.)
 - 4) Standard
 - a) Test High Strength bolted connections per R.C.S.C. "Specifications for Structural Joints Using ASTM A325 or A490 Bolts."

SECTION 01 4100 - SPECIAL STRUCTURAL TESTING AND INSPECTION

- b) High Strength Bolting (Shop Installed): For shop fabricated work, perform tests required for field installation, except that bolt testing may be reduced or deleted, if fabrication shop satisfies AISC Quality Certification Program - Category I, or more stringent criteria, or is approved by building official and SER.
- c) Welding (General): The Special Inspector shall perform the following on a periodic basis:
 - 1)) Prior to start of fabrication determine if fabrication shop meets the criteria for exempting shop welds from inspection and confirm in writing to building official and SER.
 - 2)) Verify qualifications of all welders as AWS certified.
 - 3)) Verify Manufacturer's certificate of compliance for weld filler materials.
 - 4)) Verify proposed welding procedures and materials.
 - 5)) Verify adequate preparation of faying surfaces.
 - 6)) Verify preheat and interpass temperatures of steel, proper technique and sequence of welding, and cleaning and number of passes are provided as required.
- d) Welding (Field):
 - 1)) Fillet Welds: On a periodic basis, visually inspect 100% of all fillet welds, for size, length, and quality, per AWS D1.1.
 - 2)) Partial Penetration Welds: Test 100% of all partial penetration welds exceeding 5/16inch, using Ultrasonic Testing per A.W.S. D1.1. Test 25% of all partial penetration welds less than 5/16 inch, using Magnetic Particle Testing per ASTM E-109, performed on root pass and on finished weld.
 - 3)) Welding (Exceptions): Refer to IBC 1704.3, exception 2) for exceptions to continuous inspection for items including:
 - a)) Single pass fillet welds not exceeding 5/16" size.
 - b)) Welded studs when used for structural diaphragm.
 - c)) Sheet metal or cold formed framing.
 - d)) Stairs and railing systems.
 - 4)) Full Penetration Welds: Test 100% of all full penetration welds exceeding 5/16 inch, using Ultrasonic Testing per A.W.S. D1.1 Test 25% of all full penetration welds less than 5/16 inch, using Magnetic Particle testing per ASTM E-109, performed on root pass and on finished weld.
 - 5)) Stud Shear Connector Welds: Visually inspect 100% of installed studs for full 360° flash. Test all questionable studs, not showing full 360° flash by bending studs to 15°

SECTION 01 4100 - SPECIAL STRUCTURAL TESTING AND INSPECTION

from vertical, away from welds continuity, per AWS D1.1. All ceramic welding ferrules shall be removed by contractor. Randomly test all other studs by bending to 15° from vertical as noted:

- a)) Studs welded thru deck 15%
- b)) Studs welded to bare steel 5%. Alternatively, sound 100% of installed studs, for full penetration weld, using an 8 lb. maul. Test questionable studs as noted above. Welding ferrules need not be removed.
- 6)) Steel Joist/Joist Girder Welds: Provide testing and inspection for field welds previously described.
- 7)) Deck Welds: On a periodic basis, visually inspect size, location, length and burn thru for 100% of puddle welds on metal deck designed as a structural element, per AWS D1.3.
- 8)) Cold Formed Metal Framing Welds: On a periodic basis, visually inspect 100% of welds for specified length, size, and continuity in accordance with AWS D1.3 for metal less than 1/8" in thickness, for work designed as a structural element.
- 9)) Welding of Reinforcing Bars: Visually inspect 100% of all reinforcing bar welds as the welding is performed, per AWS D1.4.
 - a)) Verify weldability of reinforcing steel other than ASTM A706.
 - b)) Verify proper joint preparation is provided and proper electrodes are used and properly stored and dried.
- 10)) Miscellaneous Metals, Inserts and Prefabricated Components: Where integrity of the connections impact life safety or performance of the building structure, provide testing and inspection as for typical welds previously specified.
- e) Welding (Shop):
 - 1)) Perform inspections as for field welding except weld testing may be reduced or deleted, if fabrication shop satisfies AISC Quality Certification Program - Category I, or more stringent criteria, and is approved by building official and SER.
- f) Mechanical Fasteners (Misc.):
 - 1)) Fasteners: Visually inspect specified size, spacing, embedment, and location.
- g) Structural Configuration:
 - 1)) Submittals: Verify mill test reports and other submitted documentation, for compliance with contract document.
 - 2)) Materials: Verify materials delivered to site comply with contract documents and approved shop drawings. Materials include:

SECTION 01 4100 - SPECIAL STRUCTURAL TESTING AND INSPECTION

- a)) Structural Steel
 - b)) Bolts
 - c)) Electrodes
 - d)) Mechanical fasteners
 - e)) Deck gauge
 - 3)) Detail Compatibility. On a periodic basis:
 - a)) Review project documents affecting integrity of the structure, including contract documents and pertinent submittals (approved shop drawings).
 - b)) Visit site, at intervals appropriate to the stage of construction, to perform review of the structure and visually confirm general compliance with the project documents.
 - c)) Inspect the following to verify member orientation, configuration, type, and size complies with details indicated on the contract documents an approved shop drawings:
 - 1))) Bracing and stiffening members.
 - 2))) Proper applications of joint details at connections for structural members.
 - 3))) Other work critical to the integrity of the building structure.
 - 4)) Conventional Testing and Inspection Requirements
 - a)) High Strength Bolting
 - 1))) Bolt Material Test: Test a minimum of two bolts of each ASTM class specified, for bolt hardness and tensile properties.
 - 2))) Fabrication and Erection Tolerances: Verify in-place structure satisfies specified tolerances.
- 3.4 Refer to attached Appendix – Section 01 4100 Schedule of Special Inspections Schedule.

STATEMENT OF SPECIAL INSPECTIONS

PROJECT: Filmore Thomas Park Renovation

LOCATION: 3793 Log Cabin Dr. Macon, GA 31204-3753

PERMIT APPLICANT: _____

APPLICANT'S ADDRESS: _____

ARCHITECT OF RECORD: Brandon Fairbanks, WM2A Architects, GA License #RA016919

STRUCTURAL ENGINEER OF RECORD: Matt Ellis, GA SE License #SE000061

MECHANICAL ENGINEER OF RECORD: Krunal Patel, Total Engineers

ELECTRICAL ENGINEER OF RECORD: Jeff McGee, Electrical Design Consultants, Inc.

REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE: Brandon Fairbanks, WM2A Architects

This Statement of Special Inspections is submitted in accordance with Section 1704.3 of the 2018 International Building Code. It includes a *Schedule of Special Inspection Services* applicable to the above-referenced Project as well as the identity of the individuals, agencies, or firms intended to be retained for conducting these inspections. If applicable, it includes *Special Inspections for Seismic Resistance* and/or *Special Inspections for Wind Resistance*.

Are *Special Inspections for Seismic Resistance* included in the *Statement of Special Inspections*?

☐ Yes ☒ No

Are *Special Inspections for Wind Resistance* included in the *Statement of Special Inspections*?

☐ Yes ☒ No

The Special Inspector(s) shall keep records of all inspections and shall furnish interim inspection reports to the Building Official and to the Registered Design Professional in Responsible Charge at a frequency agreed upon by the Design Professional and the Building Official prior to the start of work. Discrepancies shall be brought to the immediate attention of the Contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the Registered Design Professional in Responsible Charge prior to completion of that phase of work. A *Final Report of Special Inspections* documenting required special inspections and corrections of any discrepancies noted in the inspections shall be submitted to the Building Official and the Registered Design Professional in Responsible Charge at the conclusion of the project.

Frequency of interim report submittals to the Registered Design Professional in Responsible Charge:

___ Weekly ___ Bi-Weekly x Monthly Other; specify: _____

The Special Inspection program does not relieve the Contractor of the responsibility to comply with the Contract Documents. Jobsite safety and means and methods of construction are solely the responsibility of the Contractor.

Statement of Special Inspections Prepared by:

Matt Ellis

Type or print name

Matt Ellis

Signature

10/30/24

Date

Building Official's Acceptance:

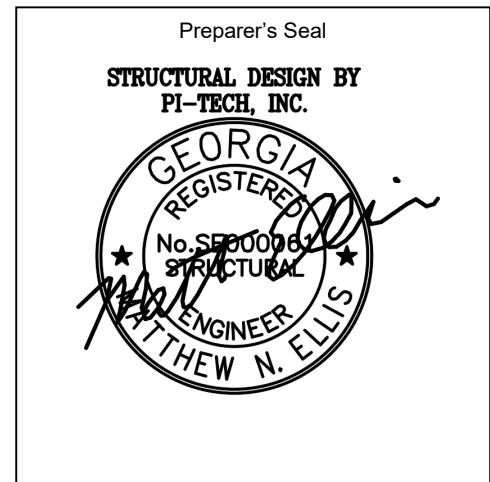
Signature

Date

Permit Number:

Frequency of interim report submittals to the Building Official:

___ Monthly ___ Bi- Monthly ___ Upon Completion Other; specify: _____



Special Inspections for Wind Resistance

See the Schedule of Special Inspections for inspection and testing requirements

Allowable Stress Design Wind Speed, V_{asd} : 85 m.p.h.

Wind Exposure Category: C

Special Inspection for Wind Resistance Required (Yes/No): NO

(Required in wind exposure Category B, where the allowable stress design wind speed, V_{asd} , is 120 miles per hour or greater. Required in wind exposure Category C or D, where the allowable stress design wind speed, V_{asd} , is 110 miles per hour or greater.)

Description of structural wood and cold-formed steel light frame construction main windforce-resisting system subject to special inspections for wind resistance:

(Required for systems noted in IBC Section 1705.11.1 and 1705.11.2).

N/A

Description of windforce-resisting components subject to special inspections for wind resistance:

(Required for systems and components noted in IBC Section 1705.11.3)

N/A

Statement of Responsibility:

Each contractor responsible for the construction or fabrication of a system or component described above must submit a Statement of Responsibility.

Special Inspections for Seismic Resistance

See the Schedule of Special Inspections for inspection and testing requirements

Seismic Design Category: B

Special Inspections for Seismic Resistance Required (Yes/No): NO

Description of seismic force-resisting system subject to special inspection and testing for seismic resistance:

(Where required per IBC Sections 1705.12.1, 1705.12.2, and 1705.12.3) (Special inspections for seismic resistance of structural steel, where required, shall be in accordance with AISC 341)

N/A

Description of designated seismic systems subject to special inspection and testing for seismic resistance:

(Required for architectural, electrical and mechanical systems and their components that require design in accordance with Chapter 13 of ASCE 7, have a component importance factor, I_p , greater than one and are in Seismic Design Categories C, D, E or F.)

N/A

Description of additional seismic systems and components requiring special inspections:

(Required for systems noted in IBC Section 1705.12.5, 1705.12.6, 1705.12.7, and 1705.12.8.)

N/A

Description of additional seismic systems and components requiring testing:

(Where required per IBC Section 1705.13)

N/A

Statement of Responsibility:

Each contractor responsible for the construction or fabrication of a system or component described above must submit a Statement of Responsibility.

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT					
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
1705.1.1 Special Cases (work unusual in nature, including but not limited to alternative materials and systems, unusual design applications, materials and systems with special manufacturer's requirements - add additional rows as needed.)	Submittal review, shop (3) and/or field inspection				
1. Inspection of anchors post-installed in solid grouted masonry: Per research reports including verification of anchor type, anchor dimensions, hole dimensions, hole cleaning procedures, anchor spacing, edge distances, masonry unit, grout, masonry compressive strength, anchor embedment and tightening torque	Field inspection	N	Periodic or as required by the research report issued by an approved source	N/A	
2. Aggregate Pier Inspection: The special inspector's responsibilities include, but are not limited to, review of the aggregate pier designer's use of soil parameters as presented in the project soils report, and during construction, verification of aggregate properties, type and number of lifts of aggregate, hole size and depths and top elevations of the pier elements, and applied energy. Additionally, results of qualitative tests on production aggregate pier elements such as modulus load testing, uplift pull-out testing, bottom stabilization tests and dynamic cone penetration tests, shall be reviewed to verify compliance with design specifications.	Field inspection	N	Periodic or as required by the research report issued by an approved source	N/A	
1705.2.1 Structural Steel Construction					
1. Fabricator and erector documents (Verify reports and certificates as listed in AISC 360, Section N 3.2 for compliance with construction documents)	Submittal Review	N	Each submittal	N/A	
2. Material verification of structural steel	Shop (3) and field inspection	N	Periodic	N/A	
3. Structural steel welding:					
a. Inspection tasks Prior to Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-1)	Shop (3) and field inspection	N	Observe or Perform as noted (4)	N/A	
b. Inspection tasks During Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-2)	Shop (3) and field inspection	N	Observe (4)	N/A	
c. Inspection tasks After Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-3)	Shop (3) and field inspection	N	Observe or Perform as noted (4)	N/A	
d. Nondestructive testing (NDT) of welded joints: <i>see Commentary</i>					
1) Complete penetration groove welds 5/16" or greater in <i>risk category III or IV</i>	Shop (3) or field ultrasonic testing - 100%	N	Periodic	N/A	
2) Complete penetration groove welds 5/16" or greater in <i>risk category II</i>	Shop (3) or field ultrasonic testing - 10% of welds minimum	N	Periodic	N/A	

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT					
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
3) Welded joints subject to fatigue when required by AISC 360, Appendix 3, Table A-3.1	Shop (3) or field radiographic or Ultrasonic testing	N	Periodic	N/A	
4) Fabricator's NDT reports when fabricator performs NDT	Verify reports	N	Each submittal (5)	N/A	
4. Structural steel bolting:	Shop (3) and field inspection				
a. Inspection tasks Prior to Bolting (Observe, or perform tasks for each bolted connection, in accordance with QA tasks listed in AISC 360, Table N5.6-1)		N	Observe or Perform as noted (4)	N/A	
b. Inspection tasks During Bolting (Observe the QA tasks listed in AISC 360, Table N5.6-2)		N	Observe (4)	N/A	
1) Pre-tensioned and slip-critical joints					
a) Turn-of-nut with matching markings		N	Periodic	N/A	
b) Direct tension indicator		N	Periodic	N/A	
c) Twist-off type tension control bolt		N	Periodic	N/A	
d) Turn-of-nut without matching markings		N	Continuous	N/A	
e) Calibrated wrench		N	Continuous	N/A	
2) Snug-tight joints		N	Periodic	N/A	
c. Inspection tasks After Bolting (Perform tasks for each bolted connection in accordance with QA tasks listed in AISC 360, Table N5.6-3)		N	Perform (4)	N/A	
5. Visual inspection of exposed cut surfaces of galvanized structural steel main members and exposed corners of the rectangular HSS for cracks subsequent to galvanizing	Shop (3) or field inspection	N	Periodic	N/A	
6. Embedments (Verify diameter, grade, type, length, embedment. See 1705.3 for anchors)	Field inspection	N	Periodic	N/A	
7. Verify member locations, braces, stiffeners, and application of joint details at each connection comply with construction documents	Field inspection	N	Periodic	N/A	
1705.2.2 Cold-Formed Steel Deck					
1. Manufacturer documents (Verify reports and certificates as listed in SDI QA/QC, Section 2, Paragraphs 2.1 and 2.2 for compliance with construction documents)	Submittal Review	N	Each submittal	N/A	
2. Material verification of steel deck, mechanical fasteners and welding materials	Shop (3) and field inspection	N	Periodic	N/A	
3. Cold-formed steel deck placement:	Shop (3) and field inspection				
a. Inspection tasks Prior to Deck Placement (Perform the QA tasks listed in SDI QA/QC, Appendix 1 Table 1.1)		N	Perform (4)	N/A	
b. Inspection tasks After Deck Placement (Perform the QA tasks listed in SDI QA/QC, Appendix 1 Table 1.2)		N	Perform (4)	N/A	
4. Cold-formed steel deck welding:	Shop (3) and field inspection				
a. Inspection tasks Prior to Welding (Observe the QA tasks listed in SDI QA/QC, Appendix 1 Table 1.3)		N	Observe (4)	N/A	
b. Inspection tasks During Welding (Observe the QA tasks listed in SDI QA/QC, Appendix 1 Table 1.4)		N	Observe (4)	N/A	
c. Inspection tasks After Welding (Perform the QA tasks listed in SDI QA/QC, Appendix 1 Table 1.5)		N	Perform (4)	N/A	

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT					
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
5. Cold-formed steel deck mechanical fastening:	Shop (3) and field inspection				
a. Inspection tasks Prior to Mechanical Fastening (Observe the QA tasks listed in SDI QA/QC, Appendix 1 Table 1.6)		N	Observe (4)	N/A	
b. Inspection tasks During Mechanical Fastening (Observe the QA tasks listed in SDI QA/QC, Appendix 1 Table 1.7)		N	Observe (4)	N/A	
c. Inspection tasks After Mechanical Fastening (Perform the QA tasks listed in SDI QA/QC, Appendix 1 Table 1.8)		N	Perform (4)	N/A	
1705.2.3. Open-Web Steel Joists and Joist Girders					
1. Installation of open-web steel joists and joist girders.					
a. End connections - welding or bolted.	per SJI CJ or SJI 100	N	Periodic	N/A	
b. Bridging - horizontal or diagonal.					
1) Standard bridging.	per SJI CJ or SJI 100	N	Periodic	N/A	
2) Bridging that differs from the specifications listed in SJI CJ or SJI 100.		N	Periodic	N/A	
1705.2.4. Cold-Formed Steel Trusses Spanning 60 feet or Greater					
Verify temporary and permanent restraint/bracing are installed in accordance with the approved truss submittal package	Field inspection	N	Periodic	N/A	
1705.3 Concrete Construction					
1. Inspection and placement verification of reinforcing steel and prestressing tendons.	Shop (3) and field inspection	Y	Periodic	3	
2. Reinforcing bar welding:		N		N/A	
a. Verification of weldability of bars other than ASTM A706.			Periodic		
b. Inspection of single-pass fillet welds 5/16 or less in size.			Periodic		
c. Inspection of all other welds.			Continuous		
3. Inspection of anchors cast in concrete.	Shop (3) and field inspection	Y	Periodic	3	
4. Inspection of anchors post-installed in hardened concrete members per research reports, or, if no specific requirements are provided, requirements shall be provided by the registered design professional and approved by the building official, including verification of anchor type, anchor dimensions, hole dimensions, hole cleaning procedures, anchor spacing, edge distances, concrete minimum thickness, anchor embedment and tightening torque	Field inspection	Y	Periodic or as required by the research report issued by an approved source	3	
a. Adhesive anchors installed in horizontal or upward-inclined orientation that resist sustained tension loads.		N	Continuous	N/A	
b. Mechanical and adhesive anchors not defined in 4a.		Y	Periodic	3	
5. Verify use of approved design mix	Shop (3) and field inspection	Y	Periodic	3	
6. Prior to placement, fresh concrete sampling, perform slump and air content tests and determine temperature of concrete and perform any other tests as specified in construction documents.	Shop (3) and field inspection	Y	Continuous	3	
7. Inspection of concrete and shotcrete placement for proper application techniques	Shop (3) and field inspection	Y	Continuous	3	
8. Verify maintenance of specified curing temperature and techniques	Shop (3) and field inspection	Y	Periodic	3	

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT					
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
9. Inspection of prestressed concrete:	Shop (3) and field inspection	N		N/A	
a. Application of prestressing force		N	Continuous	N/A	
b. Grouting of bonded prestressing tendons		N	Continuous	N/A	
10. Inspect erection of precast concrete members		N	Periodic	N/A	
11. Verification of in-situ concrete strength, prior to stressing of tendons in post tensioned concrete and prior to removal of shores and forms from beams and structural slabs	Review field testing and laboratory reports	N	Periodic	N/A	
12. Inspection of formwork for shape, lines, location and dimensions	Field inspection	Y	Periodic	3	
13. Concrete strength testing and verification of compliance with construction documents	Field testing and review of laboratory reports	Y	Periodic	3	
1705.4 Masonry Construction					
MINIMUM VERIFICATION REQUIREMENTS					
(A) Level 1, 2 and 3 Quality Assurance:					
1. Prior to construction, verification of compliance of submittals	Submittal Review	Y	Prior to Construction	3	
(B) Level 2 & 3 Quality Assurance:					
1. Prior to construction verification of f_m and f_{AAC} except where specifically required by the code	Testing by unit strength method or prism test method	Y	Prior to Construction	3	
2. During construction, verification of Slump Flow and Visual Stability Index (VSI) when self-consolidating grout is delivered to project site.	Testing by unit strength method or prism test method	Y	Periodic	3	
(C) Level 3 Quality Assurance:					
1. During construction, verification of f_m and f_{AAC} for every 5,000 SF	Testing by unit strength method or prism test method	N	Periodic	N/A	
2. During construction, verification of proportions of materials as delivered to the project site for premixed or preblended mortar, prestressing grout, and grout other than self-consolidating grout.	Field inspection	N	Periodic	N/A	
MINIMUM SPECIAL INSPECTION REQUIREMENTS					
(D) Levels 2 and 3 Quality Assurance:					
1. As masonry construction begins, verify that the following are					
a. Proportions of the site-prepared mortar	Field inspection	Y	Periodic	3	
b. Grade and size of prestressing tendons and anchorages	Field Inspection	N	Periodic	N/A	
c. Grade, type, and size of reinforcement, anchor bolts, and prestressing tendons and anchorages	Field Inspection	Y	Periodic	3	

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT					
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
d. Prestressing technique	Field Inspection	N	Periodic	N/A	
e. Properties of thin-bed mortar for AAC masonry	Field Inspection	N	Level 2 - Continuous ^(b) Level 2 - Periodic ^(c)	N/A	
(b) Required for the first 5,000 square feet (c) Required after the first 5,000 square feet		N	Level 3 - Continuous	N/A	
f. Sample panel construction	Field Inspection	N	Level 2 - Periodic	N/A	
		N	Level 3 - Continuous	N/A	
2. Prior to grouting, verify that the following are in compliance:					
a. Grout space	Field Inspection	Y	Level 2 - Periodic	3	
		N	Level 3 - Continuous	N/A	
b. Placement of prestressing tendons and anchorages	Field Inspection	N	Periodic	N/A	
c. Placement of reinforcement, connectors, and anchor bolts	Field inspection	Y	Level 2 - Periodic	3	
		N	Level 3 - Continuous	N/A	
d. Proportions of site-prepared grout and prestressing grout for bonded tendons	Field Inspection	Y	Periodic	3	
3. Verify compliance of the following during construction:					
a. Materials and procedures with the approved submittals	Field inspection	Y	Periodic	3	
b. Placement of masonry units and mortar joint construction	Field Inspection	Y	Periodic	3	
c. Size and location of structural members	Field inspection	N	Periodic	N/A	
d. Type, size, location of anchors, including other details of anchorage of masonry to structural members, frames, or other construction	Field inspection	Y	Level 2 - Periodic	3	
		N	Level 3 - Continuous	N/A	
e. Welding of reinforcement	Field inspection	N	Continuous	N/A	
f. Preparation, construction, and protection of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90°F)	Field inspection	Y	Periodic	3	
g. Application and measurement of prestressing force	Field testing	N	Continuous	N/A	
h. Placement of grout and prestressing grout for bonded tendons is in compliance	Field inspection	Y	Continuous	3	
i. Placement of AAC masonry units and construction of thin-bed mortar joints	Field inspection	N	Level 2 - Continuous ^(b) Level 2 - Periodic ^(c)	N/A	
		N	Level 3 - Continuous	N/A	
(b) Required for the first 5,000 square feet (c) Required after the first 5,000 square feet					
4. Observe preparation of grout specimens, mortar specimens, and/or prisms	Field inspection	Y	Level 2 - Periodic	3	
		N	Level 3 - Continuous	N/A	
1705.5 Wood Construction					
1. For prefabricated wood structural elements, inspection of the fabrication process and assemblies in accordance with Section 1704.2.5.	In-plant review (3)	N	Periodic	N/A	
2. For high-load diaphragms, verify grade and thickness of structural panel sheathing agree with approved building plans.	Field inspection	N	Periodic	N/A	
3. For high-load diaphragms, verify nominal size of framing members at adjoining panel edges, nail or staple diameter and length, number of fastener lines, and that spacing between fasteners in each line and at edge margins agree with approved building plans.	Field inspection	N	Periodic	N/A	

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT					
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
4. Metal-plate-connected wood trusses:		N		N/A	
a. Verification that permanent individual truss member restraint/bracing has been installed in accordance with the approved truss submittal package when the truss height is greater than or equal to 60".	Field inspection		Periodic		
b. For trusses spanning 60 feet or greater: verify temporary and permanent restraint/bracing are installed in accordance with the approved truss submittal package	Field inspection		Periodic		
1705.6 Soils					
1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity.	Field inspection	Y	Periodic	3	
2. Verify excavations are extended to proper depth and have reached proper material.	Field inspection	Y	Periodic	3	
3. Perform classification and testing of compacted fill materials.	Field inspection	Y	Periodic	3	
4. Verify use of proper materials, densities, and lift thicknesses during placement and compaction of controlled fill	Field inspection	Y	Continuous	3	
5. Prior to placement of controlled fill, inspect subgrade and verify that site has been prepared properly	Field inspection	Y	Periodic	3	
1705.7 Driven Deep Foundations					
1. Verify element materials, sizes and lengths comply with requirements	Field inspection	N	Continuous	N/A	
2. Determine capacities of test elements and conduct additional load tests, as required	Field inspection	N	Continuous	N/A	
3. Inspect driving operations and maintain complete and accurate records for each element	Field inspection	N	Continuous	N/A	
4. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document any damage to foundation element	Field inspection	N	Continuous	N/A	
5. For steel elements, perform additional inspections per Section 1705.2	See Section 1705.2	N	See Section 1705.2	N/A	
6. For concrete elements and concrete-filled elements, perform tests and additional inspections per Section 1705.3	See Section 1705.3	N	See Section 1705.3	N/A	
7. For specialty elements, perform additional inspections as determined by the registered design professional in responsible charge	Field inspection	N	In accordance with construction documents	N/A	

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT					
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
1705.8 Cast-in-Place Deep Foundations					
1. Inspect drilling operations and maintain complete and accurate records for each element	Field inspection	N	Continuous	N/A	
2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes	Field inspection	N	Continuous	N/A	
3. For concrete elements, perform tests and additional inspections in accordance with Section 1705.3	See Section 1705.3	N	See Section 1705.3	N/A	
1705.9 Helical Pile Foundations					
Verify installation equipment, pile dimensions, tip elevations, final depth, final installation torque and other installation data as required by construction documents.	Field inspection	N	Continuous	N/A	
1705.10 Fabricated items					
1. List of fabricated items requiring special inspection during fabrication:	Shop inspection		As noted in each applicable shop activity		
2. List of fabricated items to be fabricated on the premises of a fabricator approved to perform such work without special inspection (including name of approved agency providing periodic auditing):		N		N/A	
1705.11.1 Structural Wood Special Inspections For Wind Resistance					
1. Inspection of field gluing operations of elements of the main windforce-resisting system	Field inspection	N	Continuous	N/A	
2. Inspection of nailing, bolting, anchoring and other fastening of components within the main windforce-resisting system, including wood shear walls, wood diaphragms, drag struts, braces and hold-downs.	Shop (3) and field inspection	N	Periodic	N/A	
1705.11.2 Cold-formed Steel Special Inspections For Wind Resistance					
1. Inspection during welding operations of elements of the main windforce-resisting system	Shop (3) and field inspection	N	Periodic	N/A	
2. Inspection of screw attachment, bolting, anchoring and other fastening of components within the main windforce-resisting system, including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs.	Shop (3) and field inspection	N	Periodic	N/A	
1705.11.3 Wind-resisting Components					
1. Roof covering, roof deck and roof framing connections.	Shop (3) and field inspection	N	Periodic	N/A	
2. Exterior wall covering and wall connections to roof and floor diaphragms.	Shop (3) and field inspection	N	Periodic	N/A	
1705.12.1 Structural Steel Special Inspections for Seismic Resistance					
1. Seismic force-resisting systems in SDC B, C, D, E, or F.	Shop (3) and field inspection	N	In accordance with AISC 341	N/A	
2. Structural steel elements in SDC B, C, D, E, or F other than those in Item 1. including struts, collectors, chords and foundation elements.	Shop (3) and field inspection	N	In accordance with AISC 341	N/A	

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT					
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
1705.12.2 Structural Wood Special Inspections for Seismic Resistance					
1. Field gluing operations of elements of the seismic-force resisting system for SDC C, D, E or F.	Field inspection	N	Continuous	N/A	
2. Nailing, bolting, anchoring and other fastening of components within the seismic-force-resisting system including wood shear walls, wood diaphragms, drag struts, shear panels and hold-downs for SDC C, D, E or F.	Shop (3) and field inspection	N	Periodic	N/A	
1705.12.3 Cold-formed Steel Light-Frame Construction Special Inspections for Seismic Resistance					
1. During welding operations of elements of the seismic-force-resisting system for SDC C, D, E or F.	Shop (3) and field inspection	N	Periodic	N/A	
2. Screw attachment, bolting, anchoring and other fastening of components within the seismic-force-resisting system including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs for SDC C, D, E or F.	Shop (3) and field inspection	N	Periodic	N/A	
1705.12.4 Designated Seismic Systems Verification Special Inspections for Seismic Resistance					
For SDC C, D, E or F, inspect and verify that that the component label, anchorage or mounting conforms to the certificate of compliance in accordance with ASCE 7 Section 13.2.2.	Field inspection	N	Periodic	N/A	
1705.12.5 Architectural Components Special Inspections for Seismic Resistance					
1. For SDC D, E or F, inspection during the erection and fastening of exterior cladding and interior or exterior veneer more than 30 feet above grade or walking surface and weighing more than 5 psf.	Field inspection	N	Periodic	N/A	
2. For SDC D, E or F, inspection during the erection and fastening of interior nonbearing walls more than 30 feet above grade or walking surface and weighing more than 15 psf.	Field inspection	N	Periodic	N/A	
3. For SDC D, E or F, inspection during the erection and fastening of exterior nonbearing walls more than 30 feet above grade or walking surface.		N		N/A	
4. For SDC D, E or F, inspection during anchorage of access floors	Field inspection	N	Periodic	N/A	
1705.12.6 Plumbing, Mechanical and Electrical Components Special Inspections for Seismic Resistance					
1. Inspection during the anchorage of electrical equipment for emergency or standby power systems in SDC C, D, E or F	Field inspection	N	Periodic	N/A	
2. Inspection during the anchorage of other electrical equipment in SDC E or F	Field inspection	N	Periodic	N/A	
3. Inspection during installation and anchorage of piping systems designed to carry hazardous materials, and their associated mechanical units in SDC C, D, E or F	Field inspection	N	Periodic	N/A	

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT					
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
4. Inspection during the installation and anchorage of HVAC ductwork designed to contain hazardous materials in SDC C, D, E or F.	Field inspection	N	Periodic	N/A	
5. Inspection during the installation and anchorage of vibration isolation systems in SDC C, D, E or F where nominal clearance of 1/4 inch or less is required by the approved construction documents.	Field inspection	N	Periodic	N/A	
6. Inspection during installation of mechanical and electrical equipment, including duct work, piping systems and their structural supports, where automatic fire sprinkler systems are installed in structures assigned to SDC C, D, E, or F to verify one of the following unless flexible sprinkler hose fittings are used:		N		N/A	
a. ASCE/SEI 7, Section 13.2.3 minimum required clearances have been provided.	Field inspection		Periodic		
b. A three inch or greater nominal clearance has been provided between fire protection sprinkler system drops and sprigs and: structural members not used collectively or independently to support the sprinklers; equipment attached to the building structure; and other systems' piping.	Field inspection		Periodic		
1705.12.7 Storage Racks Special Inspections for Seismic Resistance					
Inspection during the anchorage of storage racks 8 feet or greater in height in structures assigned to SDC D, E or F.	Field inspection	N	Periodic	N/A	
1705.12.8 Seismic Isolation Systems					
Inspection during the fabrication and installation of isolator units and energy dissipation devices used as part of the seismic isolation system in structures assigned to SDC B, C, D, E or F.	Shop and field inspection	N	Periodic	N/A	
1705.12.9 Cold-formed Steel Special Bolted Moment Frames					
Inspection of installation of cold-formed steel special bolted moment frames in the seismic force-resisting systems in structures assigned to SDC D, E or F.	Field inspection	N	Periodic	N/A	
1705.13.1 Structural Steel Testing for Seismic Resistance					
1. Nondestructive testing of structural steel in the seismic force-resisting systems in accordance with AISC 341 in structures assigned to SDC B, C, D, E or F.	Field test	N	Periodic	N/A	
2. Nondestructive testing of structural steel elements in the seismic force-resisting systems not covered in 1 above including struts, collectors, chords and foundation elements in accordance with AISC 341 in structures assigned to SDC B, C, D, E or F.	Field test	N	Periodic	N/A	

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT					
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
1705.13.2 Seismic Certification of Nonstructural Components					
Review certificate of compliance for designated seismic system components in structures assigned to SDC B, C, D, E or F.	Certificate of compliance review	N	Each submittal	N/A	
1705.13.3 Seismic Certification of Designated Seismic Systems					
Review certificate of compliance for designated seismic system components in structures assigned to SDC C, D, E or F	Certificate of compliance review	N	Each submittal	N/A	
1705.13.4 Seismic Isolation Systems					
Test seismic isolation system in accordance with ASCE 7 Section 17.8 in structures assigned to SDC B, C, D, E or F.	Prototype testing	N	Per ASCE 7	N/A	
1705.14 Sprayed Fire-resistant Materials					
1. Verify surface condition preparation of structural members	Field inspection	N	Periodic	N/A	
2. Verify minimum thickness of sprayed fire-resistant materials applied to structural members	Field inspection	N	Periodic	N/A	
3. Verify density of the sprayed fire-resistant material complies with approved fire-resistant design	Field inspection and testing	N	Per IBC Section 1705.14.5	N/A	
4. Verify the cohesive/adhesive bond strength of the cured sprayed fire-resistant material	Field inspection and testing	N	Per IBC Section 1705.14.6	N/A	
5. Condition of finished application	Field inspection	N	Periodic	N/A	
1705.15 Mastic and Intumescent Fire-Resistant Coatings					
Inspect and test mastic and intumescent fire-resistant coatings applied to structural elements and decks per AWCI 12-B	Field inspection and testing	N	Periodic	N/A	
1705.16 Exterior Insulation and Finish Systems (EIFS)					
Inspection of water-resistive barrier over sheathing substrate	Field inspection	N	Periodic	N/A	
1705.17 Fire-Resistant Penetrations and Joints					
1. Inspect penetration firestop	Field testing	N	Per ASTM E2174	N/A	
2. Inspect fire-resistant joint systems	Field testing	N	Per ASTM E2393	N/A	
1705.18 Smoke Control Systems					
1. Leakage testing and recording of device locations prior to concealment	Field testing	N	Periodic	N/A	
2. Prior to occupancy and after sufficient completion, pressure difference testing, flow measurements, and detection and control verification	Field testing	N	Periodic	N/A	
* INSPECTION AGENTS					
FIRM	ADDRESS			TELEPHONE NO.	
1. Pi-Tech, Inc.	115 Forest Hill Road, Macon GA 31210			478-743-5600	
2. WM2A Architects	348 Cotton Avenue, Macon, GA , 31210			478-745-4945	
3. Geotechnical & Environmental Consultants, Inc., A Terracon Company	514 Hillcrest Industrial Blvd			(478) 757-1606	
4.	Macon, GA 31204				
Notes: 1. The inspection and testing agent(s) shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official prior to commencing work. The qualifications of the Special Inspector(s) and/or testing agencies may be subject to the approval of the Building Official and/or the Design Professional. 2. The list of Special Inspectors may be submitted as a separate document, if noted so above. 3. Shop Inspections of fabricated items are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.1 and listed in activity 1709.2. 4. Observe: Observe on a random basis, operations need not be delayed pending these inspections. Perform: These tasks shall be performed for each welded joint, bolted connection, or steel element. 5. NDT of welds completed in an approved fabricator's shop may be performed by that fabricator when approved by the AHJ. Refer to AISC 360, N6.					
Are Special Inspections for Seismic Resistance included in the Statement of Special Inspections?			No		
Are Special Inspections for Wind Resistance included in the Statement of Special Inspections?			No		
DATE:			10/30/2024		

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Pay water-service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.
- E. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

1.5 QUALITY ASSURANCE

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

1.6 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.
- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- C. Insulation: Un-faced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- square tack and marker boards.
3. Drinking water and private toilet.
4. Coffee machine and supplies.
5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
6. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 01 7700 "Closeout Procedures".

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

1. Locate facilities to limit site disturbance as specified in Section 01 1000 "Summary."
 - B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- 3.2 TEMPORARY UTILITY INSTALLATION
- A. General: Install temporary service or connect to existing service.
 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
 - B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
 - C. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
 - D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
 - E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
 - F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

- a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
1. Install electric power service overhead unless otherwise indicated.
 2. Connect temporary service to Owner's existing power source, as directed by Owner.
- I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

- B. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
 - 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 - 2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 31 2000 "Earth Moving."
 - 3. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 32 1216 "Asphalt Paving."
- C. Parking: Provide temporary parking areas for construction personnel.
- D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- E. Waste Disposal Facilities: Comply with requirements specified in Section 01 7419 "Construction Waste Management and Disposal."

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- I. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

- K. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
 2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 3. Insulate partitions to control noise transmission to occupied areas.
 4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 5. Protect air-handling equipment.
 6. Provide walk-off mats at each entrance through temporary partition.
- L. "Temporary Fire Protection" Paragraph below specifies currently accepted requirements; revise to suit local conditions. More detailed provisions for temporary fire protection in existing occupied facilities may be inserted here; refer to Section 013591 "Historic Treatment Procedures" for sample text. See Evaluations.

3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use permanent HVAC system to control humidity.
 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 7700 "Closeout Procedures."

END OF SECTION 01 5000

SECTION 01 6000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

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

SECTION 01 6000 - PRODUCT REQUIREMENTS

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Section 01 3300 "Submittal Procedures."
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 3300 "Submittal Procedures." Show compliance with requirements.
- 1.5 QUALITY ASSURANCE
- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
- 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING
- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
1. Store products to allow for inspection and measurement of quantity or counting of units.

SECTION 01 6000 - PRODUCT REQUIREMENTS

2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect stored products from damage and liquids from freezing.
5. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 7700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

SECTION 01 6000 - PRODUCT REQUIREMENTS

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
4. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

SECTION 01 6000 - PRODUCT REQUIREMENTS

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 2500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
 1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 6000

SECTION 01 7300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor.
- B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
 - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.

SECTION 01 7300 - EXECUTION

2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 4. Dates: Indicate when cutting and patching will be performed.
 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 1. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Communication systems.
 - h. Fire-detection and -alarm systems.
 - i. Electrical wiring systems.
 2. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.[Other construction elements include but are not limited to the following:]

SECTION 01 7300 - EXECUTION

- a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Equipment supports.
 - d. Piping, ductwork, vessels, and equipment.
 - e. Noise- and vibration-control elements and systems.
3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

SECTION 01 7300 - EXECUTION

- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - 1. Description of the Work.
 - 2. List of detrimental conditions, including substrates.
 - 3. List of unacceptable installation tolerances.
 - 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 3100 "Project Management and Coordination."

SECTION 01 7300 - EXECUTION

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks

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- or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

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

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore

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surfaces to their original condition.

- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 1000 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.

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2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

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

SECTION 01 7300 - EXECUTION

3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 5000 "Temporary Facilities and Controls."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

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- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 01 9113 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 01 4000 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

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

END OF SECTION 01 7300

SECTION 01 7700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

1.4 CLOSEOUT SUBMITTALS

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

1.5 MAINTENANCE MATERIAL SUBMITTALS

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

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on

SECTION 01 7700 - CLOSEOUT PROCEDURES

the list and reasons why the Work is incomplete.

- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 7900 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.

SECTION 01 7700 - CLOSEOUT PROCEDURES

8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements, including touchup painting.
 10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for final completion.
- 1.7 FINAL COMPLETION PROCEDURES
- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 01 2900 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

SECTION 01 7700 - CLOSEOUT PROCEDURES

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.
1. Organize list of spaces in sequential order, starting with exterior areas first.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.
 4. Submit list of incomplete items in the following format:
 - a. MS Excel electronic file. Architect will return annotated file.
 - b. PDF electronic file. Architect will return annotated file.
 - c. Three paper copies. Architect will return two copies.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

SECTION 01 7700 - CLOSEOUT PROCEDURES

4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

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- d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.
 - p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - q. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 01 5000 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 7419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

SECTION 01 7700 - CLOSEOUT PROCEDURES

- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01 7700

SECTION 01 7823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

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

1.4 CLOSEOUT SUBMITTALS

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

SECTION 01 7823 - OPERATION AND MAINTENANCE DATA

- a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
 - 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
 - 1. List of documents.
 - 2. List of systems.
 - 3. List of equipment.
 - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

SECTION 01 7823 - OPERATION AND MAINTENANCE DATA

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name and contact information for Contractor.
 - 6. Name and contact information for Architect.
 - 7. Name and contact information for Commissioning Authority.
 - 8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 - 9. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
 - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group

SECTION 01 7823 - OPERATION AND MAINTENANCE DATA

documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

2.3 EMERGENCY MANUALS

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

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.

SECTION 01 7823 - OPERATION AND MAINTENANCE DATA

2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

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

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of

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equipment:

1. Standard maintenance instructions and bulletins.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that

SECTION 01 7823 - OPERATION AND MAINTENANCE DATA

provides an organized reference to emergency, operation, and maintenance manuals.

- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of operation and maintenance manuals.
 - 2. Comply with requirements of newly prepared record Drawings in Section 01 7839 "Project Record Documents."
- G. Comply with Section 01 7700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 7823

SECTION 01 7839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit PDF electronic files of scanned record prints and one of file prints.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned record prints on three thumb drives and one set(s) of prints.
- B. Record Specifications: Submit one paper copy and three annotated PDF electronic files of Project's Specifications, including addenda and contract modifications (on submitted thumb drives).
- C. Record Product Data: Submit one paper copy and three annotated PDF electronic files and directories of each submittal (on submitted thumb drives).
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous

SECTION 01 7839 - PROJECT RECORD DOCUMENTS

record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy and three annotated PDF electronic files and directories of each submittal (on submitted thumb drives).

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

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding archive photographic documentation.
 - 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.

SECTION 01 7839 - PROJECT RECORD DOCUMENTS

- n. Record information on the Work that is shown only schematically.
 - 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 - 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 - 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 - 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect and Construction Manager. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
- 1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
 - 2. Format: DWG, Version , Microsoft Windows operating system.
 - 3. Format: Annotated PDF electronic file with comment function enabled.
 - 4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 - 5. Refer instances of uncertainty to Architect for resolution.
 - 6. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.
 - a. See Section 01 3300 "Submittal Procedures" for requirements related to use of Architect's digital data files.
 - b. Architect will provide data file layer information. Record markups in separate layers.
- C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
- 1. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- D. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
- 1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable mylar cover sheets. Include identification on cover sheets.

SECTION 01 7839 - PROJECT RECORD DOCUMENTS

2. Format: One set of reverse reading, full size, mylar sheets and three sets of Annotated PDF electronic files, with comment function enabled, on thumb drives.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

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

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.

SECTION 01 7839 - PROJECT RECORD DOCUMENTS

3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Product Data as one paper copy in a three ring binder and three scanned PDF electronic file(s) of marked-up paper copy of Product Data on thumb drives.
 1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as scanned PDF electronic file(s) of marked-up miscellaneous record submittals.
 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's and Construction Manager's reference during normal working hours.
- C. As-Built Record Drawings shall be kept up-to-date at all times. The Contractor shall schedule a time once a week to review the drawings with the Owner and the Architect.
- D. As-Built Drawings for ALL underground utilities shall comply with the following requirements:

SECTION 01 7839 - PROJECT RECORD DOCUMENTS

1. Dimensions shall be shown to two (2) fixed objects on the surface at intervals not to exceed 50' along the entire length of the buried utility. The depth to the top of the buried item, (i.e., conduit, water pipe, etc.) shall also be identified at the same intervals.
2. Dimensions shall be shown to two (2) fixed objects on the surface at every change of direction of the utility.
3. Dimensions shall be shown to two (2) fixed objects to show the location of all surface or underground components such as valves, manholes, drop inlets, clean-outs, pull boxes, meters, etc.
4. A full description of the utility shall be given, and the actual size, quantity and material used shall be provided.
5. To the maximum extent possible, all utilities shall be buried a minimum of eighteen (18) inches below the surface. A tracer wire shall be placed in the trench or excavation of all utilities at a minimum depth of six (6) inches. Exception: Storm drain lines shall have a caution tape provided in the excavation at an approximate depth of twelve (12) inches in lieu of a tracer wire.

END OF SECTION 01 7839

SECTION 01 7900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
- B. Allowances: Furnish demonstration and training instruction time under the Demonstration and Training Allowance as specified in Section 01 2100 "Allowances."

1.3 INFORMATIONAL SUBMITTALS

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

1.4 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

SECTION 01 7900 - DEMONSTRATION AND TRAINING

1. Identification: On each copy, provide an applied label with the following information:
 - a. Name of Project.
 - b. Name of Contractor.
 - c. Date of video recording.
2. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 4000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- B. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.
- C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 01 3100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 1. Inspect and discuss locations and other facilities required for instruction.
 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 3. Review required content of instruction.
 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION

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

SECTION 01 7900 - DEMONSTRATION AND TRAINING

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.

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4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

SECTION 01 7900 - DEMONSTRATION AND TRAINING

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 7823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

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

END OF SECTION 01 7900

SECTION 02 4119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Salvage of existing items to be reused or recycled.

1.2 DEFINITIONS

- A. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- B. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

1.3 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. Predemolition Photographs or Video: Submit before Work begins.

1.5 CLOSEOUT SUBMITTALS

- A. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

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

1.7 FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

SECTION 02 4119 - SELECTIVE DEMOLITION

- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- D. Storage or sale of removed items or materials on-site is not permitted.
- E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

SECTION 02 4119 - SELECTIVE DEMOLITION

- D. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
- E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 - 1. Comply with requirements for existing services/systems interruptions specified in Section 01 1000 "Summary."
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
- C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

SECTION 02 4119 - SELECTIVE DEMOLITION

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Comply with requirements for access and protection specified in Section 01 5000 "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 - 4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 5. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 7419 "Construction Waste Management and Disposal."
- B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.
- C. Removed and Salvaged Items:
 - 1. Clean salvaged items.

SECTION 02 4119 - SELECTIVE DEMOLITION

2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 4. Comply with requirements specified in Section 01 7419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANING

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

END OF SECTION 02 4119

SECTION 03 3000 – CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cast-in-place concrete for foundations and slabs on grade.
 - 2. Equipment pads.
 - 3. Bases for lighting fixtures.

1.2 REFERENCES

- A. American Concrete Institute (ACI)
 - 1. 301 - Structural Concrete for Buildings.
 - 2. 305R - Hot Weather Concreting.
 - 3. 306R - Cold Weather Concreting.
 - 4. 308 - Standard Practice for Curing Concrete.
 - 5. 318 - Building Code Requirements for Structural Concrete.
 - 6. ACI 117 – Specification for Tolerances for Concrete Construction and Materials.
 - 7. ACI 302 – Guidelines for Layout of Construction, Isolation and Contraction Joints.
- B. ASTM International (ASTM)
 - 1. C31 - Standard Test Method for Method of Making and Curing Concrete Test Specimens in the Field.
 - 2. C33 - Standard Specification for Concrete Aggregates.
 - 3. C39 - Standard Test Method for Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 4. C94 - Standard Specification for Ready-Mixed Concrete.
 - 5. C143 - Standard Test Method for Slump of Portland Cement Concrete.
 - 6. C150 - Standard Specification for Portland Cement.
 - 7. C171 - Standard Specification for Sheet Materials for Curing Concrete.
 - 8. C172 - Standard Test Method for Method of Sampling Freshly Mixed Concrete.
 - 9. C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
 - 10. C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - 11. C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
 - 12. C494 - Standard Specification for Chemical Admixtures for Concrete.
 - 13. C1116/1116M - Standard Specification for Fiber-Reinforced Concrete.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Concrete and Grout Mix Designs: Include:
 - a. Proportions of cement, fine and coarse aggregates, fibrous reinforcing, and water.
 - b. Combined aggregate gradation.
 - c. Aggregate specific gravities and gradations.
 - d. Water/cement ratio, design strength, slump, and air content.
 - e. Type of cement and aggregates.
 - f. Air dry density and split cylinder ratio for lightweight concrete.

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- g. Type and proportion of admixtures.
 - h. Special requirements for pumping.
 - i. Range of ambient temperature and humidity for which design is valid.
 - j. Special characteristics of mix requiring precautions in mixing, placing, or finishing techniques to achieve finished product.
- 2. Submit one manufacturer's labeled package of fiber reinforcing to be used in concrete mix and documentation indicating compliance with specification.
- 3. Jointing and Pour Sequence Plan: If Contractor proposes a different jointing layout than that shown on drawings, provide a new proposed layout of construction, control, saw-cut, and isolation joints. Clearly delineate the different joint types.
- 4. Shop drawing re-submittals: Contractor shall thoroughly review Shop Drawings prior to submittal to the A/E Team.

1.4 QUALITY ASSURANCE

- A. Concrete Mix Design: In accordance with ACI 301, Method 1 or 2.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Mix and deliver concrete to project ready mixed in accordance with ASTM C94. Fiber reinforcing shall be placed in the concrete mix only at the batch plant.
- B. Schedule delivery so that pours will not be interrupted for over 20 minutes.
- C. Place concrete on site within 90 minutes after proportioning materials at batch plant.

1.6 PROJECT CONDITIONS

- A. Cold Weather Placement - Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures. Comply with ACI 306R and following requirements:
 - 1. Air temperature at or expected to fall below 40 degrees F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F and not more than 80 degrees F at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
- B. Hot Weather Placement - Place concrete in accordance with ACI 305R and following requirements:
 - 1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F. Use chilled mixing water or chopped ice if water equivalent of ice is calculated in total amount of mixing water.
 - 2. If required, cover reinforcing steel with water soaked burlap so that steel temperature will not exceed ambient air temperature.
 - 3. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
 - 4. Do not use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions without prior approval of architect.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Concrete Chemicals:
 - 1. BASF Corporation. (www.buildingsystems.basf.com)
 - 2. Dayton Superior. (www.daytonsuperior.com)
 - 3. W. R. Meadows, Inc. (www.wrmeadows.com)
 - 4. Meadow Burke. (www.meadowburke.com)
 - 5. Nox-Crete Products Group. (www.nox-crete.com)

2.2 MATERIALS

- A. Portland Cement: ASTM C150, Type I, gray color.
- B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Fine: ASTM C33, clean, hard, durable, uncoated natural sand, free from silt, loam, and clay.
 - 2. Coarse: ASTM C33, clean, hard, durable, uncoated crushed stone, maximum 1 ½" Nominal.
 - 3. Aggregate shall be provided and classified as follows:
 - a. Footings, foundations, columns and beams not exposed to weather. Interior floor slabs with floor coverings: Class 1M.
 - b. Foundation walls above grade, retaining walls, piers and beams exposed to weather: Class 3M.
 - c. Pavements, driveways, curbs, walks: Class 4M
- C. Lightweight: ASTM C330, expanded shale or clay produced by rotary kiln method. 1" Nominal Maximum Aggregate size.
- D. Fibrous Reinforcing: ASTM C1116/1116M, Type III, 1 to 2-1/4 inches long, fibrillated polypropylene micro-fibers engineered and designed for use in concrete. Fiber manufacturer shall document compliance with above requirements.
 - 1. Manufacturers:
 - a. Fibermesh 300 by Propex Concrete Systems
 - b. FORTA ECONO-NET by Forta Corp.
 - c. Grace Fibers by W.R. Grace Co.

2.3 ACCESSORIES

- A. Water: Clean and potable.
- B. Admixtures:

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1. Air entraining: ASTM C260. Provide in all concrete and Coarse Grout
 2. No other admixtures (ie: water reducing agents and accelerators) will be permitted without prior approval of architect.
- C. Premolded Expansion Joint Filler: ASTM D1751, non-extruding type, interior – 1/2 inch, exterior - 1/4 inch.
- D. Premolded Expansion Joint Filler: ASTM D1752, non-asphaltic type, 1/4 inch.
- E. Non-Shrink Grout: Premixed, consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; minimum 7,000 psi compressive strength at 28 days.
- F. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- G. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- H. Curing Compound: ASTM C309, water based type.
- I. Curing Paper: ASTM C171, waterproof paper or polyethylene film, 6 mil.
- J. Drainage fill under slabs on grade: Clean, uncoated gravel or crushed stone (No. 57 stone), free from shale or other soft material, ranging from 3/4 inch to 1 1/2 inches in size and screened of all fines.
- K. Flex Waterstop: Non-swelling preformed joint sealant, for embedding in concrete to prevent passage of fluids through joints. It is a single component, self-sealing adhesive compound, extruded in a square cross-section.
1. Profile: Square cross-section between two quick-release protective wrappers.
 2. Size: 1 inch x 1 inch
 3. Products:
 - a. Henry; SF302 Synko-Flex
 - b. Other products by Greenstreak, CETCO and JP Specialties meeting product description is acceptable.

2.4 VAPOR RETARDERS

- A. Plastic Vapor Retarder: Vapor Retarder membrane must meet or exceed all requirements of ASTM E1745 Class A.
1. Water Vapor Permeance: 0.05 Perms.
 2. Water Vapor Transmission Rate ASTM F1249 calibrated to ASTM E96 (water method): 0.01 grains/ft²/hr.
 3. Resistance to Organisms and Substrates in Contact with Soil ASTM E154, Sections 13:0.1 Perms.
 4. Tensile Strength ASTM E154, Section 9: 45 lbs/in.

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5. Puncture Resistance ASTM D1709, Method B: 2200 g.
 6. Thickness of Retarder (plastic): Not less than 10 mils.
- B. Seam Tape: High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width to be 4”.
1. Tensile Strength ASTM D1000: 24 lbs/in.
 2. Elongation ASTM D1000: 70%.
 3. Total thickness (not including liner): 7.5 mils.
 4. Adhesive Thickness: 3 mils.
- C. Pipe Boots: Construct pipe boots from vapor barrier material and pressure sensitive tape per manufacturer’s instructions or use manufacturer’s standard premanufactured pipe boots.
- D. All components of vapor retarder system shall be manufactured by a single source and marketed as a complete system. Acceptable manufacturers include:
1. Fortafiber Building Systems Group (Moistop Ultra 10)
 2. Insulation Solutions, Inc. (Viper VaporCheck II)
 3. Reef Industries (Griffolyn)
 4. Stego Industries (Stego Wrap)
 5. W.R. Meadows (Perminator)
- E. Granular Fill: Clean mixture of crushed stone or uncrushed gravel; ASTM D448, Size 57, with 100% passing a 1½”(37.5 mm) sieve and 0 % passing a No. 8 (2.36 mm) sieve.

2.5 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.
1. Products: Provide one of the following:
 - a. Dayton Superior Corporation; Day-Chem Sure Hard (J-17).
 - b. Euclid Chemical Company (The), an RPM company; Euco Diamond Hard.
 - c. Meadows, W.R., Inc.; LIQUI-HARD.
 - d. BASF Sonneborn Building Products; Lapidolith.
 - e. Davidson Chemicals; Concrete Hardener.

2.6 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) to ½ inch (12.7 mm) and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 4. Compressive Strength: Not less than 5000 psi at 7 days when tested according to ASTM C 109/C 109M.

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- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 7 days when tested according to ASTM C 109/C 109M.

2.7 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, propositioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Admixtures: Use admixtures according to manufacturer's written instructions.

2.8 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 3000 psi at 28 days.
 - 2. Slump Limit: 4 inches plus or minus 1 inch.
 - 3. Air Content: 4.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
 - 4. Exposure Class: F1.
- B. Slabs-on-Grade and thickened turndown slabs: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 3000 psi at 28 days.
 - 2. Slump Limit: 4 inches, plus or minus 1 inch.
 - 3. Air Content: 4.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size. Except do not allow air content of trowel-finished floors to exceed 3 percent.
 - 4. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.5 lb/cu. Yd.
 - 5. Exposure Class: F1
- C. The concrete supplier shall indicate on each batch ticket the amount of water that has been omitted from each load. No water may be added to the design mix on-site without first performing a slump test. Under any circumstances not more than 20 gallons of water may be added to a full 10 cubic yard load (or same proportion for other size loads) to obtain the required slump. No water may be added to the design mix at the site unless the digital water meter on the delivery vehicle is readable and functioning correctly except by use of a 5 gallon bucket. Ball and water column method not acceptable.

SECTION 03 3000 – CAST-IN-PLACE CONCRETE

- D. Coarse Grout: Coarse grout shall be normal weight (150 psf) and shall develop 2500 psi compressive strength at 7 days on a standard 2 inch cube and shall develop 4000 psi compressive strength at 28 days.
 - 1. Proportioning shall be in accordance with “Mortar and Grout for Reinforced Masonry (ASTM C476-02).”
 - 2. Slump shall be a maximum of 8 inches when measured using a 12 inch cone in accordance with “Slump of Portland Cement Concrete (ASTM C143).”
 - 3. Sand, if used, shall conform to “Standard Specification for Aggregate for Masonry Mortar (ASTM C144)” except that gradation may be modified as necessary to obtain workability. Maximum size of aggregate shall be limited to 3/8 inch diameter.
- E. Use accelerating admixture in cold weather only when approved by Architect. Use of admixtures will not reduce cold weather placement requirements.

2.9 FABRICATING REINFORCEMENT

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

2.10 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.1 PREPARATION

- A. Notify Architect and Testing Laboratory minimum 24 hours prior to placing concrete.
- B. Remove water and debris from forms and excavations.
- C. Close openings left in forms for cleaning and inspection.
- D. Prepare previously placed and existing concrete surfaces by cleaning with steel wire brush and when necessary, applying bonding agent in accordance with manufacturer's instructions.
- E. Drainage fill: Roll thoroughly and tamp to level of at least the thickness shown. (min. 4") Cover with polyethylene film placed in greatest practicable lengths and lapped at least 12" min. All joints and penetrations shall be securely taped.
- F. Premolded expansion joint filler: Provide at intersections of grade slabs and masonry walls, grade slabs and steel columns, exterior concrete walks and elsewhere as shown, detailed or specified. Exterior PEJ shall be located 1/4 inch below finished surface of slab.

3.2 EMBEDDED ITEMS

SECTION 03 3000 – CAST-IN-PLACE CONCRETE

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Post installed anchors, where permitted on drawings, shall comply with and meet requirements of ICC-ES AC308.
 - 3. Do not cut reinforcing steel to facilitate installation of inserts or accessories.

3.3 PLACEMENT OF CONCRETE

- A. Place concrete in accordance with ACI 301 and ACI 318.
- B. Ensure reinforcement, inserts, and embedded parts are not disturbed during concrete placement.
- C. Deposit concrete as nearly as possible in its final position to minimize handling and flowing.
- D. Place concrete continuously between predetermined expansion, control, and construction joints.
- E. Do not place partially hardened, contaminated, or retempered concrete.
- F. Do not allow concrete to free fall over 5 feet; provide tremies, chutes, or other means of conveyance.
- G. Consolidate concrete with mechanical vibrating equipment. Hand compact in corners and angles of forms.
- H. Screed slabs level, to flatness tolerance of 1/4 inch in 10 feet.
- I. Concrete in footings and slabs shall not be vibrated unless slump is less than 4". Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations.
- J. All exterior concrete walks shall have rounded edges. Edges of scored and expansion joints shall be rounded.
- K. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

3.4 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots.

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Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated to receive trowel finish.
- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 1. Apply a trowel finish to surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
- D. Broom Finish: Apply a broom finish to exterior concrete walks, steps, ramps, and elsewhere as indicated.
 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Design Professional.
 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

3.6 FINISHING FORMED SURFACES

- A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed the specified limits on formed surface irregularities.
 1. Apply to concrete surfaces exposed to public view.
- B. Related Unformed Surfaces: At tops of walls, 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 PLACEMENT OF COARSE GROUT

- A. Remove loose and foreign matter from concrete; lightly roughen bonding surface.
- B. Just prior to grouting, thoroughly wet concrete surfaces; remove excess water.

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- C. Mix grout in accordance with manufacturer's instructions. Do not retemper.
- D. Place grout continuously, by most practical means; avoid entrapped air. Do not vibrate grout.

3.8 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.9 PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Provide artificial heat to maintain temperature of concrete above minimum specified temperature for duration of curing period.
- D. Keep forms sufficiently wet to prevent cracking of concrete or loosening of form joints.
- E. Hardener: After final curing, unless otherwise noted, treat interior floors noted in finish schedule as “exposed concrete with trowel finish”, with three full even applications of liquid floor hardener applied in strict accordance with the manufacturer’s written instructions.
- F. Concrete slabs used as substrate for resilient tile, wood and seamless flooring shall remain exposed (without applied finish floor covering) for a minimum of 45 days after placement. Curing components or hardeners shall not be applied to these areas.

3.10 CURING

- A. Cure concrete in accordance with ACI 308:
 - 1. Horizontal surfaces:
 - a. Use of curing compounds is prohibited for initial curing.

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- b. Initial curing shall be by ponding, continuous sprinkling, sand, burlap kept moist or moisture retaining cover (poly). Initial curing procedure shall continue for at least 7 days after concrete is placed.
- 2. Vertical surfaces: Use either wet curing or curing compound method.
- B. Curing Compound Method (Do not use unless approved by finish floor manufacturer.):
 - 1. Spray compound on surfaces in two coats, applying second at right angle to first, at minimum rate recommended by manufacturer.
 - 2. Restrict traffic on surfaces during curing.
- C. Curing Paper Method:
 - 1. Spread curing paper over surfaces, lapping ends and sides minimum 4 inches; maintain in place by use of weights.
 - 2. Remove paper after curing.
- D. Wet Curing Method: Spray water over surfaces and maintain wet for 7 days.
- E. Initial Curing may be by ponding, kept moist with sand or a moisture retaining cover.
- F. Concrete slabs used as substrate for ceramic, quarry and resilient tile flooring shall be cured for a minimum of 30 days prior to installation of flooring system. Curing compounds and hardeners shall not be applied to those areas.
- G. Final curing is defined as the point at which the concrete reaches its' specified 3,000 psi compressive strength confirmed by a cylinder break at 28 days.

3.11 CLEANING

- A. Remove efflorescence, stains, oil, grease, and foreign materials from exposed surfaces.

3.12 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

3.13 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

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- C. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 4. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 5. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 6. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- D. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- E. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.14 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections per IBC 2012, including:
1. Steel reinforcement placement.
 2. Headed bolts and studs.
 3. Verification of use of required design mixture.
 4. Concrete placement, including conveying and depositing.
 5. Curing procedures and maintenance of curing temperature.

SECTION 03 3000 – CAST-IN-PLACE CONCRETE

- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd. , plus one set for each additional 50 cu. yd. or fraction thereof.
 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 6. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 7. Compressive-Strength Tests: ASTM C 39/C 39M.
 - a. Test one laboratory-cured specimen at 7 days and one set of two specimens @ 28 days.
 - b. When two specimens are tested, the compressive strength test shall be the average compressive strength from a set of two specimens obtained from the same composite sample and tested at the age indicated.
 - c. Retain one specimen for additional testing if requested by the Design Professional.
 8. Strength of each concrete mixture will be satisfactory if concrete has achieved the specified 28-day compressive strength.
 9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
 12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

SECTION 03 3000 – CAST-IN-PLACE CONCRETE

- D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.

3.15 CONCRETE ADJUSTMENTS

- A. 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.

END OF SECTION

SECTION 04 0513 MASONRY MORTARING

PART 1 PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Mortar for masonry.
- B. Related Sections:
 - 1. Division 01: Administrative and procedural work requirements.
 - 2. Section 04 2000 - Unit Masonry.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. C91 - Standard Specification for Masonry Cement.
 - 2. C144 - Standard Specification for Aggregate for Masonry Mortar.
 - 3. C150 - Standard Specification for Portland Cement.
 - 4. C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
 - 5. C270 - Standard Specification for Mortar for Unit Masonry.
 - 6. C1329 - Standard Specification for Mortar Cement.
- B. The Masonry Society (TMS):
 - 1. 402 - Building Code for Masonry Structures.
 - 2. 602 - Specification for Masonry Structures.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Samples: 1/2 x 1/2 inch x 3 inch long colored mortar samples.
- B. Quality Control Submittals:
 - 1. Test reports: Indicating mortar compliance with ASTM C270.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver cement and lime in manufacturer's original, unopened packages or containers.
- B. Protect materials from moisture absorption and damage; reject damaged containers.
- C. Storage aggregate to prevent inclusion of foreign matter

SECTION 04 0513 MASONRY MORTARING

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers – Masonry Cement:

1. Blue Circle Cement Inc.
2. Medusa Cement Company
3. Coosa Masonry Cements
4. Giant

A. Portland Cement:

1. ASTM C150, Type I
2. For exposed surfaces, provide cement from one source throughout project.

B. Aggregate:

1. ASTM C144, standard masonry type.
2. For exposed surfaces, provide aggregate from one source throughout project.

C. Lime: ASTM C207,

D. Water: Clean and potable

E. Do not add admixtures including air-entraining agents, accelerators, retarders, water repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated. Do not use calcium chloride in mortar.

F. Exterior brick masonry cement water repellent admixture shall be Master Builders Rheopel mortar admixture or Sonneborne Hydrocide Powder.

2.3 MIXES

A. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated below:

B. Mortar Mixes: To ASTM C270 using the Property Method for job-mixed mortar and ASTM 1142 for ready-mixed mortar, of types indicated below:

1. Provide masonry cement mortar.
2. Brick Masonry below grade: Type S.
3. Concrete Masonry below finish floor: Type M.
4. Concrete masonry above finish floor: Type S or M
5. Brick Masonry above grade: Type N

2.4 MIXING

A. Mix mortar in accordance with ASTM C270-08.

SECTION 04 0513 MASONRY MORTARING

- B. Jobsite Proportioning of Mortar:
 - 1. Mix using mechanical mixer. Hand mixing not permitted.
 - 2. Mix approximately three-quarters of required water, all of cement and lime, and one-half of aggregate for minimum of 2 minutes.
 - 3. Add remainder of water and aggregate; mix for minimum of 3 minutes.
- C. Thoroughly mix ingredients in quantities needed for immediate use.
- D. Discard lumpy, caked, frozen, and hardened mixes.
- E. Provide uniformity of color in exposed mortar.
- F. Water repellent admixture shall be added at the rate recommended by manufacturer per bag or cubic foot of brick masonry cement. Water repellent is not required in mortar of interior brick or concrete block.
- G. Mortar may not be retempered. Mortar shall be used and placed in final position within 1-1/2 hours after initial mixing at ambient temperatures over 80 degrees F. At temperatures below 80 degrees F., elapsed time to placement of mortar shall not exceed 2-1/2 hours. Mortar not used within these limits shall be discarded.
- H. Do not add accelerators, retarders, water repellents, antifreeze compounds, or other additives without Architect's approval.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Follow requirements specified in referenced sections.

END OF SECTION

SECTION 04 2000 - UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units (CMU's).
2. Split-faced masonry veneer units.
3. Cast stone units.
4. Face brick units.
5. Interior glazed concrete masonry units to match existing.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type and color of exposed masonry unit and colored mortar.

1.3 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of product indicated. For masonry units include data on material properties.

1.4 QUALITY ASSURANCE

- A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- B. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 01 4000 "Quality Requirements" for mockups.
 1. Build sample panels for typical exterior wall in sizes approximately 60 inches long by 48 inches high by full thickness.

1.5 PROJECT CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

SECTION 04 2000 - UNIT MASONRY

- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 1. Provide bullnose units for outside corners of interior partitions, except where indicated otherwise.
 - 2. Provide pre-cast cast stone sills as shown on drawings.
- B. CMUs: ASTM C 90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2000 psi.
 - 2. Density Classification: Medium weight.
 - 3. Size: Typical 7-5/8-inch by 15-5/8-inch actual face dimension by 3/8-inch less than nominal thickness indicated.
 - 4. "Assembly Rating - 2 Hr." (U.L. Design No. U905): furnish units bearing UL classification D-2.
 - 5. Net Area Compressive Strength: Provide installed masonry with a net area compressive strength of 2000 psi.
- C. BRICK:
 - 1. Unit strength: 6600 PSI.

SECTION 04 2000 - UNIT MASONRY

2.3 MASONRY LINTELS

- A. General: Provide one of the following:
- B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Retain subparagraph below for square brick, 8 inches (203 mm) in nominal size.

2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Colored Cement Product: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
 - 1. Colored Portland Cement-Lime Mix:
 - a. Products: Subject to compliance with requirements, provide one of the following:
- E. Aggregate for Standard Gray Mortar: ASTM C 144.
 - 1. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 - 2. White-Mortar Aggregates: Natural white sand or crushed white stone.
- F. Aggregate for Grout: ASTM C 404.
- A. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Euclid Chemical Company (The); Accelguard 80.
Grace Construction Products, W. R. Grace & Co. - Conn.; Morset.
Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.
- G. Water: Potable.

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2.5 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.
- B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
 - 1. Interior Walls: Mill galvanized, carbon steel.
 - 2. Exterior Walls: Hot-dip galvanized, carbon steel.
 - 3. Wire Size for Side Rods: 0.148-inch diameter.
 - 4. Wire Size for Cross Rods: 0.148-inch diameter.
 - 5. Wire Size for Veneer Ties: 0.148-inch diameter.
 - 6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
 - 7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.
- D. Masonry Joint Reinforcement for Multi-wythe Masonry:
 - 1. Adjustable (two-piece) type, either ladder or truss design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches. Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.

2.6 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
 - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
 - 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
- B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.
- C. Anchor Bolts: L-shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

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2.7 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
1. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
 2. Metal Sealant Stop: Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
 3. Metal Expansion-Joint Strips: Fabricate from stainless steel to shapes indicated.
- B. Flexible Flashing: Use one of the following unless otherwise indicated:
1. Copper-Laminated Flashing: 3-oz./sq. ft. copper sheet bonded between 2 layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Advanced Building Products Inc.; Copper Fabric Flashing.
Dayton Superior Corporation, Dur-O-Wal Division; Copper Fabric Thru-Wall Flashing.
Hohmann & Barnard, Inc.; H & B C-Fab Flashing.
Phoenix Building Products; Type FCC-Fabric Covered Copper.
Sandell Manufacturing Co., Inc.; Copper Fabric Flashing.
York Manufacturing, Inc.; Multi-Flash 500.
- C. Solder and Sealants for Sheet Metal Flashings: As specified in Section 07 6200 "Sheet Metal Flashing and Trim."
- D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- B. Weep/Vent Products: Use the following unless otherwise indicated:
1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth

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1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.

- a. Products: Subject to compliance with requirements, provide one of the following:

- 1) Advanced Building Products Inc.; Mortar Maze weep vent.
Heckmann Building Products Inc.; No. 85 Cell Vent.
Hohmann & Barnard, Inc.; Quadro-Vent.

- C. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

- 1. Products: Subject to compliance with requirements, provide one of the following:

- a. Advanced Building Products Inc.; Mortar Break II.
Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
Mortar Net USA, Ltd.; Mortar Net.

- 2. Provide one of the following configurations:

- a. Strips, full-depth of cavity and 10 inches high, with dovetail shaped notches 7 inches deep.
Strips, not less than 1-1/2 inches thick and 10 inches high, with dimpled surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.
Sheets or strips full depth of cavity and installed to full height of cavity.

2.9 CAVITY-WALL INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, closed-cell product extruded with an integral skin.

- 1. R-Value: R 9.5, 1 1/2" thickness

- B. Adhesive: Type recommended by insulation board manufacturer for application indicated.

2.10 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

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1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Diedrich Technologies, Inc.
 - b. EaCo Chem, Inc.
 - c. ProSoCo, Inc.

2.11 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 1. Do not use calcium chloride in mortar or grout.
 2. Use portland cement-lime mortar unless otherwise indicated.
 3. For exterior masonry, use portland cement-lime mortar.
 4. For reinforced masonry, use portland cement-lime mortar.
 5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
 1. Mix to match Architect's sample.
 2. Application: Use preblended dry mortar mix for exposed mortar joints with the following units:
 - a. Face Brick.
 3. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 4. For masonry below grade or in contact with earth, use Type S.
 5. For reinforced masonry, use Type S.
 6. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.

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7. For interior non-load-bearing partitions, Type O may be used instead of Type N.
- C. Grout for Unit Masonry: Comply with ASTM C 476.
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
 2. Proportion grout in accordance with ASTM C 476, Table 1.
 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.2 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.

For location of elements in elevation do not vary from that indicated by more than plus 3/8 inch or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.

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4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- E. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

- A. Lay hollow brick CMUs as follows:
 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 3. With webs fully bedded in mortar in grouted masonry, including starting course

SECTION 04 2000 - UNIT MASONRY

on footings.

4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.5 CAVITY WALLS

- A. Bond wythes of cavity walls together using one of the following methods:
 1. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
 - a. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.
- B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.
- C. Coat cavity face of backup wythe to comply with Section 07 1113 "Bituminous Dampproofing."
- D. Apply air barrier to face of backup wythe to comply with Section 07 2726 "Fluid-Applied Membrane Air Barriers."
- E. Installing Cavity-Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

3.6 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

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1. Space reinforcement not more than 16 inches o.c.
Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.

3.7 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to wall framing and concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:
 1. Embed connector sections and continuous wire in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and face of sheathing.
 2. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 3. Space anchors as indicated, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

3.8 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 2. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.

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3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
 4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
- C. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
1. Use specified weep/vent products to form weep holes. Space weep holes 24 inches o.c. unless otherwise indicated.
- D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.
- E. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products to form vents.
1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.9 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
1. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 2. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 3. Limit height of vertical grout pours to not more than 60 inches .

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3.10 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Level 1 special inspections according to the "International Building Code."
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- F. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for compressive strength.
- G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.11 REPAIRING, POINTING, AND CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
 - 2. Protect surfaces from contact with cleaner.
 - 3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 4. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.

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5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.12 MASONRY WASTE DISPOSAL

- A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 1. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 2000

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Plant cast simulated stone units.
- B. Related Sections:
 - 1. Division 01: Administrative and procedural work requirements.
 - 2. Section 04 0513 - Masonry Mortaring.
 - 3. Section 07 9200 - Joint Sealers.

1.2 REFERENCES

- A. American Concrete Institute (ACI) 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International (ASTM):
 - 1. A185/A185M - Standard Specification for Welded Steel Wire Reinforcement, Plain, for Concrete.
 - 2. A615 - Standard Specification for Deformed Billet Steel Bars for Concrete.
 - 3. C33 - Standard Specification for Concrete Aggregates.
 - 4. C150 - Standard Specification for Portland Cement.
 - 5. C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - 6. C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
 - 7. C426 - Standard Test Method for Linear Shrinkage of Concrete Masonry Units.
 - 8. C494 - Standard Specification for Chemical Admixtures for Concrete.
 - 9. C618 - Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete.
 - 10. C979 - Standard Specification for Pigments for Integrally Colored Concrete.
 - 11. C1194 - Standard Test Method for Compressive Strength of Architectural Cast Stone.
 - 12. C1195 - Standard Test Method for Absorption of Architectural Cast Stone.
 - 13. C1364 - Standard Specification for Architectural Cast Stone.
- C. Cast Stone Institute (CSI) - Technical Manual.
- D. The Masonry Society (TMS):
 - 1. 402 - Building Code for Masonry Structures.
 - 2. 602 - Specification for Masonry Structures.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings:

SECTION 04 7200 CAST STONE

2. Provide cross section showing profile, reinforcing, anchors, and attachment methods.
3. Include plan and elevation of each unit, numbered in sequence for installation.
- 4.. Samples: Sample of typical unit, showing construction, profile, color, and finish.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with TMS 402 and 602.
- B. Design, fabricate, and install cast stone in accordance with CSI Technical Manual.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips visible from 20 feet under direct daylight illumination will be grounds for rejection.
- B. Support and isolate units during shipment on nonstaining spacers.
- C. Store units to protect from staining and damage.
- D. Store units on firm, level, and smooth surfaces; do not place on ground.

1.6 PROJECT CONDITIONS

- A. See masonry requirements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Portland Cement: ASTM C150, Type 1.
 1. For facing mix: White or gray.
- B. Aggregates: ASTM C33, clean and uncoated.
 1. For backing mix: Washed concrete sand, pea gravel, or graded limestone.
 2. For facing mix: Limestone, marble screenings, silica sand, or other light colored sand; same as used in mix of approved sample.
- C. Admixtures:
 1. Water reducing or water reducing/set retarding: ASTM C494, Type A or D.
 2. Air entraining: ASTM C260.
 3. Coloring: ASTM C979, pure mineral oxide, color to be selected from manufacturer's full color range.
- D. Reinforcing Bars:
 1. ASTM A615, Grade 40 or 60; galvanized or epoxy coated when covered by less than 11/2 inches of material.

SECTION 04 7200 CAST STONE

- E. Welded Wire Fabric:
 - 1. ASTM A185/A185M.
- F. Dowels and Anchors:
 - 1. Stainless steel, ASTM A666, Type 302 or 304.
- G. Spacers: Resilient plastic.
- H. Formwork: Steel or overlay plywood, consistent with required finish.

2.2 ACCESSORIES

- A. Mortar: Specified in Section 04 0513.
- B. Joint Sealer: Specified in Section 07 9200.
- C. Masonry Cleaner: Type recommended by stone manufacturer.

2.3 FABRICATION

- A. Fabricate units to match approved samples.
- B. Construct rigid, tight molds that will cast required sections with smooth finish.
- C. Provide smooth fillet on interior corners of molds to produce slight beveled edge on permanently exposed surfaces.
- D. Clean surfaces of foreign materials prior to casting.
- E. Coat contact surfaces with form release agent.
- F. Provide reinforcing and accessories required for lifting and installation.
 - 1. Before placing in forms, clean reinforcement and accessories of loose rust, mill scale, dirt, oil, and other materials that could reduce bonding.
 - 2. Accurately position reinforcement to provide minimum coverage of not less than twice the bar diameter.
 - 3. Provide reinforcing equal to minimum 0.25 percent of cross section area.
 - 4. Do not use welded wire fabric for dry-cast units.
- G. Tamp stone mixture containing minimum water into molds to produce dense stones with smooth surfaces, free from air pockets and voids.
- H. Provide uniform surface texture on exposed surfaces, free from holes, voids, and irregularities.

SECTION 04 7200 CAST STONE

- I. Curing:
 - 1. Cure units in warm curing chamber at minimum 104 degrees F and 100 percent humidity for minimum 10 hours
 - 2. Cure units in yard at 95 percent relative humidity for 350 degree-days prior to shipping.
 - 3. Protect units cured in forms from evaporation by use of curing blankets or curing compound.
- J. Fabrication Tolerances:
 - 1. Height and width: Plus or minus 1/8 inch.
 - 2. Length: L/360, maximum plus or minus 1/4 inch.
 - 3. Bowing, twisting, or warping: Maximum L/360.
 - 4. Location of dowels, flashing grooves, and similar features: Plus or minus 1/8 inch in any direction on formed sides, maximum 3/8 inch on unformed sides.

2.4 FINISHES

- A. Color: To be selected from manufacturer's full color range.
- B. Surface Finish: Fine-grained texture similar to natural stone, free from voids and surface irregularities.

2.5 SOURCE QUALITY CONTROL

- A. Select one cast stone unit for each 500 cubic feet delivered to Project in accordance with ASTM C1194 and C1195.
 - 1. Minimum average compressive strength for three cut cubes: 85 percent of specified value per ACI 318, with no test less than 75 percent of specified value.
 - 2. Average maximum cold-water absorption for three cut cubes: 6 percent.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install cast stone in accordance with approved Shop Drawings.
- B. Drench units with clean water just prior to setting.
- C. Completely fill dowels holes and anchor slots with mortar.
- D. Maintain uniform spacing between units with plastic spacers.
- E. Bed each piece in full mortar bed.
- F. Equalize bed and joint dimensions.

SECTION 04 7200 CAST STONE

- G. Completely fill beds and joints, then rake out to 3/8 inch depth to allow for sealant.
- H. Point joints with pointing mortar; tool to concave flush profile.
- I. Control and Expansion Joints:
 - 1. Keep joints free from mortar and grout.
 - 2. Install joint backing and joint sealer at control joints in accordance with Section 07 9200.
 - 3. Form expansion joint as indicated on Drawings.
- J. Installation Tolerances; Maximum variation from:
 - 1. Alignment face to face of adjacent units: Plus or minus 1/8 inch.
 - 2. Plumb: Plus or minus 1/4 inch in 10 feet noncumulative.
 - 3. Level: Plus or minus 1/8 inch in 3 feet; 1/4 inch in 10 feet; 1/2 inch in 30 feet.
 - 4. Joint thickness: Plus 1/16 inch, minus 1/8 inch.

3.2 CLEANING

- A. Clean stone with detergent and water applied with fiber brush.
- B. If initial cleaning does not produce acceptable results, apply cleaner in accordance with manufacturer's instructions.
 - 1. Protect adjacent surfaces.
 - 2. Thoroughly rinse surfaces with clean water after completion of cleaning; remove all traces of cleaning solution.

3.3 PROTECTION

- A. Clean Protect units from damage resulting from subsequent construction operations.
- B. Use protection materials and methods which will not stain or damage units.
- C. Remove protection materials upon Substantial Completion, or when risk of damage is no longer present.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Structural steel.
 - 2. Grout.
- B. Related Sections:
 - 1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
 - 2. Division 05 Section "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame miscellaneous steel fabrications and other metal items not defined as structural steel.

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 PERFORMANCE REQUIREMENTS

- A. Connections: As indicated on structural drawings.
- B. Moment Connections: As indicated on structural drawings.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. For each approved fabricator that is exempt from Special Inspections of shop fabrications and implementation procedures in accordance with Section 1704.2.5.2 of the International Building Code, the contractor shall submit "Fabricator's Certificate of Compliance". Contractor shall provide copies of fabricator's certification or building code evaluation services report and fabricator's quality control manual.
- C. 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.

SECTION 05 1200 – STRUCTURAL STEEL FRAMING

3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 4. Elements designed by the fabricator must be signed and sealed by professional engineer licensed in State of Georgia. As an alternate, a signed and sealed cover letter shall be submitted with the shop drawings substantiating the design information. The fabricator's design engineer must review and confirm in writing that the shop and erection drawings properly incorporate his design.
- D. Welding certificates.
- E. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- F. Mill test reports for structural steel, including chemical and physical properties.
- G. Product Test Reports: For the following:
1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 2. Direct-tension indicators.
 3. Tension-control, high-strength bolt-nut-washer assemblies.
 4. Shear stud connectors.
 5. Shop primers.
 6. Nonshrink grout.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Comply with applicable provisions of the following specifications and documents:
1. AISC 303.

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 corrosion and deterioration.
1. 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.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
1. Fasteners may be repackaged provided Design Professional's testing and inspecting agency observes repackaging and seals containers.
 2. Clean and relubricate bolts and nuts that become dry or rusty before use.

SECTION 05 1200 – STRUCTURAL STEEL FRAMING

3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.8 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of 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. W-Shapes: ASTM A 992/Am 992M, Grade 50
- B. Channels, Angles, M, S-Shapes: ASTM A 36/A 36M
- C. Plate and Bar: ASTM A 36/A 36M, ASTM A 572/A 572M, Grade 50, as noted on drawings.
- 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.
 2. Finish: Black.
- F. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.
- G. Steel Forgings: ASTM A 668/A 668M.
- H. Welding Electrodes: Comply with AWS requirements, E70XX.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 1. Finish: Plain.
- B. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- C. Unheaded Anchor Rods: ASTM F 1554, Grade 55.
 1. Configuration: Straight.
 2. Nuts: ASTM A 563 heavy-hex carbon steel.

SECTION 05 1200 – STRUCTURAL STEEL FRAMING

3. Plate Washers: ASTM A 36/A 36M carbon steel.
 4. Washers: ASTM F 436, Type 1, hardened carbon steel.
 5. Finish: Plain
- D. Threaded Rods: ASTM A 36/A 36M
1. Nuts: ASTM A 563 heavy-hex carbon steel.
 2. Washers: ASTM A 36/A 36M carbon steel.
 3. Finish: Plain
- E. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.
- F. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.
- G. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.3 PRIMER

- A. Primer: SSPC-Paint 25, Type II, alkyd primer.

2.4 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and 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 360.
1. Camber structural-steel members where indicated.
 2. Fabricate beams with rolling camber up.
 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 4. Mark and match-mark materials for field assembly.
 5. 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/D1.1M.
- C. Bolt Holes: Drill or punch standard bolt holes perpendicular to metal surfaces.

SECTION 05 1200 – STRUCTURAL STEEL FRAMING

- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Connection Holes: Provide holes required for securing other work to structural steel.
 - 1. Drill, or punch holes perpendicular to steel surfaces.
 - 2. Baseplate Holes: Drill 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 High-Strength Bolts" dated June 11, 2020 for type of bolt and type of joint specified.
 - 1. Joint Type: Snug Tight
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 SHOP PRIMING

- 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. Surfaces to be coated with bituminous material.
- 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 3 "Power Tool Cleaning" for other steel.
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 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 surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before erection proceeds, survey elevations and locations of concrete and masonry-bearing surfaces and locations of anchor rods, bearing plates and other embedments to receive structural framing, with Erector present, for compliance with requirements and specified tolerances.

SECTION 05 1200 – STRUCTURAL STEEL FRAMING

- 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 303 and AISC 360.
- B. Base Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. 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 plate before packing with grout.
 - 3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- 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 that form 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.
- E. Splice members only where indicated.
- F. Coat columns and base plates below floor slab with ultra-high build, single component coal tar mastic for protecting steel and concrete substrates subject to aggressive conditions and below grade damp proofing in strict accordance with manufacturer's published instructions.
- G. Do not use thermal cutting during erection unless approved by Architect. Finish approved thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- H. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

SECTION 05 1200 – STRUCTURAL STEEL FRAMING

- I. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" dated December 31, 2009 for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened
 - 2. Bolt Type: Tension Control of size, quantity and style noted on drawings.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, 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 in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Design Professional will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Bolted connections will be 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/D1.1M.
- D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

- A. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

SECTION 05 1200 – STRUCTURAL STEEL FRAMING

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION

SECTION 05 5000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Steel framing and supports for countertops.
- 2. Steel framing and supports for applications where framing and supports are not specified in other Sections.

- B. Products furnished, but not installed, under this Section:

- 1. Loose steel lintels.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design ladders, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance of Aluminum Ladders: Aluminum ladders shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Paint products.
 - 2. Grout.
- B. Shop Drawings: Show fabrication and installation details for metal fabrications.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

SECTION 05 5000 - METAL FABRICATIONS

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.8 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. 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: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

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

SECTION 05 5000 - METAL FABRICATIONS

- B. Steel Tubing: ASTM A 500, cold-formed steel tubing.

2.3 NONFERROUS METALS

- A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- D. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
- E. Bronze Plate, Sheet, Strip, and Bars: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal, 60 percent copper).

2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3; with hex nuts, ASTM A 563, Grade C3; and, where indicated, flat washers.
- D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: ASME B18.6.3.
- G. Lag Screws: ASME B18.2.1.
- H. Wood Screws: Flat head, ASME B18.6.1.
- I. Plain Washers: Round, ASME B18.22.1.
- J. Lock Washers: Helical, spring type, ASME B18.21.1.
- K. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed

SECTION 05 5000 - METAL FABRICATIONS

when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

- L. Post-Installed Anchors: Torque-controlled expansion anchors.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- E. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.
- F. 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 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

SECTION 05 5000 - METAL FABRICATIONS

- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
- C. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
 - 1. Provide bearing plates welded to beams where indicated.
 - 2. Drill or punch girders and plates for field-bolted connections where indicated.

SECTION 05 5000 - METAL FABRICATIONS

3. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches o.c.

- D. Prime miscellaneous framing and supports with where indicated.

2.8 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Galvanize exterior miscellaneous steel trim.
- C. Prime exterior miscellaneous steel trim with zinc-rich primer.

2.9 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.
- B. Galvanize loose steel lintels located in exterior walls.

2.10 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.
- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.11 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be

SECTION 05 5000 - METAL FABRICATIONS

embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless zinc-rich primer is indicated.

2.12 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

SECTION 05 5000 - METAL FABRICATIONS

- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 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.
- B. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.
 - 1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLING METAL BOLLARDS

- A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
- B. Anchor bollards in concrete in formed or core-drilled holes not less than 8 inches deep and 3/4 inch larger than OD of bollard. Fill annular space around bollard solidly with nonshrink, nonmetallic grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward bollard.
- C. Place removable bollards over internal sleeves and secure with 3/4-inch machine bolts and nuts. After tightening nuts, drill holes in bolts for inserting padlocks. Owner will furnish padlocks.
- D. Fill bollards solidly with concrete, mounding top surface to shed water.
 - 1. Do not fill removable bollards with concrete.

3.4 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 9113 "Exterior Painting."

SECTION 05 5000 - METAL FABRICATIONS

END OF SECTION 05 5000

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wood blocking and furring.
 - 2. Wood framing and sheathing.
- B. Related Sections:
 - 1. Division 01: Administrative and procedural work requirements.

1.2 REFERENCES

- A. American Wood Protection Association (AWPA) U1 - Use Category System - User Specification for Treated Wood.
- B. ASTM International (ASTM):
 - 1. A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 2. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws and Studs.
- C. National Institute of Standards and Technology (NIST) - Product Standard PS 20 - American Softwood Lumber Standard.
- D. Southern Pine Inspection Bureau (SPIB) - Standard Grading Rules for Southern Pine Lumber.
- E. Engineered Wood Association (APA) PRP-108 - Performance Standards and Qualification Policy for Structural-Use Panels.

1.3 QUALITY ASSURANCE

- A. Lumber Grading Agency: Certified to NIST PS 20.
- B. Identify lumber and sheet products by official grade mark.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Store materials minimum 6 inches above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation.
- B. Do not store seasoned or treated materials in damp location.
- C. Protect edges and corners of sheet materials from damage.

1.5 SUBMITTALS

- A. Shop Drawings – Required for trusses. Include engineer's stamp, certification and design criteria. A registered engineer must also stamp truss layout. See drawings for wood truss notes.
 - 1. Shop Drawings shall include all truss-to-truss connection details and shall comply with all bracing and requirements specified in the structural drawings and specifications.
 - 2. General Contractor responsible for review of shop drawing construction dimensions.
 - 3. General Contractor to coordinate wood truss layout with any conflicting elements.
 - 4. General Contractor must fully review and approve wood truss shop drawings and dimensions prior to submitting to Architect and Engineer for review.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Lumber: Grading rules: SPIB.
 - 1. Species: Southern Yellow Pine.
 - 2. Grade: marked No. 2 or better, see drawings.
 - 3. Surfacing: Surfaced four sides (S4S) unless otherwise indicated.
 - 4. Maximum moisture content: 19 percent.
- B. Sheet Products:
 - 1. Type: CDX Plywood. Size as indicated.
 - 2. Panel grade: CDX, grade stamped, plugged EXT-DFPA
 - 3. Exposure:
 - a. Exterior applications: Exterior.
 - 4. Plywood clips shall be 18 ga. galvanized steel.
 - 5. Wall sheathing shall be 5/8" CDX plywood.
 - 6. Roof sheathing shall be 5/8" CDX plywood
 - 7. At contractor's option, OSB (oriented strand board) may be substituted for plywood.
- C. LVL framing: Properties shall be greater than or equal to $F_b=2600$ psi and $E = 2.0E6$ psi.

2.2 ACCESSORIES

- A. Fasteners:
 - 1. Type and size: As required by conditions of use.
 - 2. Exterior locations and treated products: Hot-dip galvanized steel, ASTM A153/A153M, G90 coating class.
 - 3. Other interior locations: Plain steel.
 - 4. Hurricane clips will be specified pending receipt of truss shop drawings.
- B. Framing Accessories: Accessories such as joist hangers, hurricane anchors, framing anchors, sheathing clips and similar items shall be equal to products manufactured by Simpson (Strong-Tie Connectors), San Leandro, CA of types, gauges and finishes best suited for intended use.

SECTION 06 1000 – ROUGH CARPENTRY

2.3 FABRICATION

A. Preservative Treatment:

1. Treat lumber and sheet products in accordance with AWP A U1:
 - a. Interior locations protected from moisture sources: Category UC1 - Interior/Dry.
 - b. Interior locations subject to sources of moisture: Category UC2 - Interior/Damp.
 - c. Exterior locations above ground: Category UC3B - Above Ground/Exposed.
 - d. Exterior locations in contact with ground: Category UC4A - Ground Contact/General
2. Treatment process: Type CCA - Chromated Copper Arsenate or Type ACQ - Ammoniacal Copper Quaternary (ACQ); free from arsenic, chromium, and other EPA classified hazardous preservatives.

PART 3 EXECUTION

3.1 INSTALLATION

- #### A. Workmanship:
- All rough carpentry shall produce joints that are true, tight and well fastened and with all members assembled in accordance with the drawings. Carefully layout, cut and erect accurately to required dimensions, fitting closely and securing in place with sufficient and proper anchorage. Do not shim sills, joist, short studs, trimmers, headers, lintels or other framing components. Where members are cut for electrical or mechanical work, properly reinforce with headers, full depth of members cut.

1. Do all cutting and patching customarily performed by the carpentry trade to end results of providing adequate strength in a neat and workmanlike manner and install miscellaneous items for which the carpentry trade is customarily responsible such as “template” setting of anchor bolts, providing frames for openings through concrete and/or masonry and like items.
2. Carefully select all members; select individual pieces so that knots and obvious defects will not interfere with placing bolts or proper nailing or making proper connections.
3. Cut out and discard all defects which will render a piece unable to serve its intended function; lumber may be rejected by the Architect, whether or not it has been installed, for excessive warp, twist, bow, crook, mildew, fungus, or mold, as well as for improper cutting and fitting.

B. General Framing:

1. Comply with sizes, spacing, and configurations indicated. Where not specifically indicated, comply with applicable codes and NFPA “Manual for Wood Frame Construction”. Splice members only where specifically indicated or approved.
2. Space fasteners as indicated. Where not specifically indicated, comply with applicable codes and the “Recommended Nailing Schedule” of NFPA “Manual for Wood Frame Construction” and “National Design Specifications for Wood Construction”.

SECTION 06 1000 – ROUGH CARPENTRY

3. In addition to all framing operations normal to the fabrication and erection indicated on the drawings, install all backing required for the work of other trades.
 4. Set all horizontal or sloped members with crown up.
 5. Do not notch, bore or cut members for pipes, ducts, conduits or other reasons except as shown on the drawings or as specifically approved in advance by the Architect.
 6. Make all bearings full unless otherwise indicated on the drawings.
 7. Finish all bearing surfaces on which structural members are to rest or as to give sure and even support; where framing members slope, cut or notch the ends as required to give uniform bearing surface.
 8. Install all blocking, furring and similar items as shown on the drawings.
 9. Install roof edges and curbs in the locations shown on the drawings and in accordance with the details shown thereon.
 10. Set members level, plumb, and rigid.
 11. All wood in contact with concrete or masonry shall be pressure treated
- C. Roof Decking: Install over wood framing, as shown on the drawings, securely anchored in place in accordance with APA, utilizing sheathing clips (plyclips) or solid blocking as recommended by APA.
- D. Sheathing: Install over studs under all siding and in other locations shown on the drawings and in strict accordance with the Standard Specifications of American Plywood Association's Publication Design/Construction Guide, Residential and Commercial.
- E. Nailing: Using only the proper nails; do all nailing without splitting wood members, preboring as required, replace all split members.
- F. Bolting:
1. Drill holes 1/16-inch larger in diameter than the bolts being used; drill straight and true from one side only.
 2. Bolt threads must not bear on wood; use washers under head and nut where both bear on wood; use washers under all nuts.
- G. Screws:
1. For lag screws and wood screws, prebore holes same diameter as root of thread; enlarge holes to shank diameter for length of shank.

SECTION 06 1000 – ROUGH CARPENTRY

2. Screw, do not drive, all lag screws and wood screws.

3.2 Field Quality Control:

- A. Wood Preservative: Apply two brush coats of the approved preservative chemical all field cuts of treated lumber.
- B. Clean Up:
 1. At the end of each working day, or more often if necessary, thoroughly sweep all surfaces where refuse from this portion of the work has settled.
 2. Remove the refuse to the area of the job set aside for its storage.
 3. Upon completion of this portion of the work, thoroughly broom clean all surfaces.

END OF SECTION

SECTION 06 1300 - HEAVY TIMBER CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Timber.
2. Timber connectors.
3. Miscellaneous materials.

B. Related Requirements:

1. Section 06 1000 "Rough Carpentry" for dimension lumber items associated with heavy timber framing.
2. Section 06 1516 "Wood Roof Decking."

1.2 DEFINITIONS

A. Timbers: Lumber of 5 inches nominal or greater in least dimension.

B. Inspection agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NHLA: National Hardwood Lumber Association.
3. NLGA: National Lumber Grades Authority.
4. SPIB: Southern Pine Inspection Bureau (The).
5. WCLIB: West Coast Lumber Inspection Bureau.
6. WWPA: Western Wood Products Association.

1.3 ACTION SUBMITTALS

A. Shop Drawings: For heavy timber framing. Show layout, dimensions of each member, and details of connections.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For timbers specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by ALSC's Board of Review.

B. Certificates of Inspection: Issued by lumber-grading agency for exposed timber not marked with grade stamp.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Schedule delivery of materials to avoid extended on-site storage and to avoid delaying the Work.

B. Store materials under cover and protected from weather and contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary coverings.

SECTION 06 1300 - HEAVY TIMBER CONSTRUCTION

PART 2 - PRODUCTS

2.1 TIMBER

A. Comply with DOC PS 20 and with grading rules of lumber-grading agencies certified by ALSC's Board of Review as applicable.

1. At all members, apply grade stamps to surfaces that are not exposed to view, or omit grade stamps and provide certificates of grade compliance issued by grading agency.

B. Timber Species and Grade:

1. Southern pine; No. 1, SPIB.

C. Structural Properties: Provide any species and grade that, for moisture content provided, complies with required structural properties.

1. Allowable Stress Ratings for 5x5 and larger: Fb 1350 psi and E 1,500,000 psi

D. Moisture Content: Provide timber with 19 percent maximum moisture content at time of dressing.

2.2 TIMBER CONNECTORS

A. See structural drawings for connections.

2.3 MISCELLANEOUS MATERIALS

A. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.

B. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.

2.4 FABRICATION

A. Shop fabricate members by cutting and restoring exposed surfaces to match specified surfacing. Finish exposed surfaces to remove planing or surfacing marks, and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.

B. Predrill for fasteners and assembly of units.

C. Coat crosscuts with end sealer.

D. Seal Coat: After fabricating and surfacing each unit, apply a saturation coat of penetrating sealer on surfaces of each unit except for treated wood where the treatment included a water repellent.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Erect heavy timber framing true and plumb. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.

SECTION 06 1300 - HEAVY TIMBER CONSTRUCTION

1. Install horizontal and sloping members with crown edge up, and provide not less than 4 inches (102 mm) of bearing on supports. Provide continuous members unless otherwise indicated; tie together over supports with metal strap ties if not continuous.
2. Handle and temporarily support heavy timber framing to prevent surface damage, compression, and other effects that might interfere with indicated finish.

B. Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.

C. Fitting: Fit members by cutting and restoring exposed surfaces to match specified surfacing.

1. Predrill for fasteners using timber connectors as templates.
2. Finish exposed surfaces to remove planing or surfacing marks, and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
3. Coat crosscuts with end sealer.

D. Install timber connectors as indicated.

1. Unless otherwise indicated, install bolts with same orientation within each connection and in similar connections.
2. Install bolts with orientation as indicated or, if not indicated, as directed by Architect.

3.2 ADJUSTING

A. Repair damaged surfaces and finishes after completing erection. Replace damaged heavy timber framing if repairs are not approved by Architect.

END OF SECTION 06 1300

SECTION 06 1600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Wall sheathing.
 - 2. Sheathing joint and penetration treatment.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WALL SHEATHING

- A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corporation; GlasRoc.
 - b. G-P Gypsum Corporation; Dens-Glass Gold.
 - c. National Gypsum Company; Gold Bond e(2)XP.
 - d. Temple-Inland Inc.; GreenGlass
 - e. United States Gypsum Co.; Securock.
 - 2. Type and Thickness: Type X, 5/8 inch thick.
 - 3. Size: 48 by 96 inches for vertical installation.

SECTION 06 1600 - SHEATHING

2.2 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
 - 1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C 1002.
 - 2. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C 954.

2.3 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
 - 1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

2.4 MISCELLANEOUS MATERIALS

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.

SECTION 06 1600 - SHEATHING

2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
1. Fasten gypsum sheathing to cold-formed metal framing with screws.
 2. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
 3. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.
1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- D. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

SECTION 06 1600 - SHEATHING

2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- E. Seal sheathing joints according to sheathing manufacturer's written instructions.
1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
 2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION 06 1600

SECTION 07 1113 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Cold-applied, emulsified-asphalt dampproofing below slab and below sill flashing at wall base.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 FIELD CONDITIONS

- A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.
- B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations: Obtain primary dampproofing materials and primers from single source from single manufacturer. Provide protection course molded-sheet drainage panels and auxiliary materials recommended in writing by manufacturer of primary materials.
- B. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise required.

SECTION 07 1113 - BITUMINOUS DAMPPROOFING

2.2 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. BASF Construction Chemicals - Building Systems; Sonneborn Brand Products.
 - 2. Karnak Corporation.
 - 3. Meadows, W. R., Inc.
- B. Trowel Coats: ASTM D 1227, Type II, Class 1.
- C. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
- D. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

2.3 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.
- B. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.
- C. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.
- D. Patching Compound: Asbestos-free fibered mastic of type recommended in writing by dampproofing manufacturer.

2.4 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage panel consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core; and with a vertical flow rate of 9 to 15 gpm per ft..
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Hydrotech, Inc.
 - b. Carlisle Coatings & Waterproofing Inc.
 - c. Grace, W. R., & Co. - Conn.
 - d. Protecto Wrap Company.

SECTION 07 1113 - BITUMINOUS DAMPPROOFING

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions with Applicator present, for compliance with requirements for surface smoothness, surface moisture, and other conditions affecting performance of bituminous dampproofing work.
- B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.
- B. Clean substrates of projections and substances detrimental to the dampproofing work; fill voids, seal joints, and remove bond breakers if any, as recommended in writing by prime material manufacturer.
- C. Apply patching compound to patch and fill tie holes, honeycombs, reveals, and other imperfections; cover with asphalt-coated glass fabric.

3.3 APPLICATION, GENERAL

- A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless more stringent requirements are indicated.
 - 1. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.
- B. Provide dampproofing at footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches over outside face of footing.
 - 1. Extend dampproofing 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
 - 2. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch- wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.

SECTION 07 1113 - BITUMINOUS DAMPPROOFING

- C. Provide dampproofing at exterior face of above-grade, exterior wall cmu backup behind brick veneer, continue dampproofing through intersecting walls by keeping vertical mortar joints at intersection temporarily open or by dampproofing wall before constructing intersecting walls.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Concrete Foundations: Apply two brush or spray coats at not less than 1.5 gal. /100 sq. ft. For first coat and 1 gal. /100 sq. ft. For second coat.
- B. Unparged Masonry Foundation Walls: Apply primer and two brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat .

3.5 INSTALLATION OF PROTECTION COURSE

- A. Where indicated, install protection course over completed-and-cured dampproofing. Comply with dampproofing-material and protection-course manufacturers' written instructions for attaching protection course.
 - 1. Support protection course over cured coating with spot application of adhesive type recommended in writing by protection-board manufacturer.

3.6 INSTALLATION OF MOLDED-SHEET DRAINAGE PANELS

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall substrate, according to manufacturer's written instructions. Use adhesives or other methods that do not penetrate dampproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
 - 1. Install protection course before installing drainage panels.

3.7 CLEANING

- A. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 07 1113

SECTION 071900 - WATER REPELLENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes penetrating water-repellent treatments for the following vertical and horizontal surfaces:
 - 1. Concrete unit masonry for single wythe walls.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each type of water repellent and substrate indicated.
- C. Product certificates.

1.3 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at **Project site**.

PART 2 - PRODUCTS

2.1 PENETRATING WATER REPELLENTS

- A. Silane, Penetrating Water Repellent: Clear, containing **20** percent or more solids of alkyltrialkoxysilanes; with alcohol, mineral spirits, water, or other proprietary solvent carrier; and with 400 g/L or less of VOCs.
 - 1. Products: Subject to compliance with requirements, **provide one of the following**:
 - a. BASF Construction Chemicals, LLC; **Hydrozo 100**.
 - b. Degussa Corp; **Protectosil Chem-Trete PB 100**.
 - c. Fox Industries, Inc.; **FX-425**.

SECTION 071900 - WATER REPELLENTS

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements and conditions affecting performance of the Work.
 - 1. Verify that surfaces are clean and dry according to water-repellent manufacturer's requirements. Check moisture content in representative locations by method recommended by manufacturer.
 - 2. Inspect for previously applied treatments that may inhibit penetration or performance of water repellents.
 - 3. Verify that there is no efflorescence or other removable residues that would be trapped beneath the application of water repellent.
 - 4. Verify that required repairs are complete, cured, and dry before applying water repellent.
- B. Test pH level according to water-repellent manufacturer's written instructions to ensure chemical bond to silica-containing or siliceous minerals.

3.2 PREPARATION

- A. Cleaning: Before application of water repellent, clean substrate of substances that could impair penetration or performance of product according to water-repellent manufacturer's written instructions.
- B. Coordination with Mortar Joints: Do not apply water repellent until pointing mortar for joints adjacent to surfaces receiving water-repellent treatment has been installed and cured.
- C. Coordination with Sealant Joints: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
 - 1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those required.

3.3 APPLICATION

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.
- B. Apply a heavy-saturation coating of water repellent, on surfaces indicated for treatment, using low-pressure spray to the point of saturation. Remove excess material; do not allow material to puddle beyond saturation. Comply with manufacturer's written instructions for application procedure unless otherwise indicated.

SECTION 071900 - WATER REPELLENTS

- C. Apply a second saturation coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

3.4 CLEANING

- A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Correct damage to work of other trades caused by water-repellent application.
- B. Comply with manufacturer's written cleaning instructions.

END OF SECTION 071900

SECTION 07 2100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Foam-plastic board insulation for foundation insulation.
2. Foil faced polyisocyanurate board insulation at gym roof.
3. Continuous roof insulation above metal deck.
4. Extruded polyiso board behind metal wall panels.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

SECTION 07 2100 - THERMAL INSULATION

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company (The).
 - c. Owens Corning.
 - 2. Type IV, 25 psi.
- B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.
- C. Fasteners for Bonding Insulation to Acoustical Deck: Factory Mutual Approved.

2.2 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. CertainTeed Corporation.
 - 2. Guardian Building Products, Inc.
 - 3. Johns Manville.
 - 4. Knauf Insulation.
 - 5. Owens Corning.
 - 6. Simple Saver System (basis of design).
- B. Glass-Fiber-Blanket Insulation: ASTM C 665, type indicated below; consisting of fibers manufactured from glass, slag wool, or rock wool.
 - 1. Nonreflective Faced: Type II (blankets with nonreflective membrane covering), Category 1 (membrane is a vapor retarder), Class A (membrane-faced surface with a flame-spread index of 25 or less).
 - 2. Unfaced: Type I (blankets without membrane covering), passing ASTM E 136 for combustion characteristics.
 - a. Vapor-Retarder Facing: ASTM C 1136, with permeance not greater than

SECTION 07 2100 - THERMAL INSULATION

0.02 perm (1.15 ng/Pa x s x sq. m) when tested according to ASTM E 96/E 96M, Desiccant Method.

- 1) Composition: White polypropylene film facing and fiberglass-polyester blend fabric backing.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF BELOW-GRADE INSULATION TYPE 1

- A. On vertical surfaces, set insulation units loosely laid according to manufacturer's written instructions.
 1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
 1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

SECTION 07 2100 - THERMAL INSULATION

3.4 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 2100

SECTION 07 3113 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Asphalt shingles.
 - 2. Underlayment.

1.3 DEFINITION

- A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of asphalt shingle ridge and hip cap shingles ridge vent and exposed valley lining indicated.
 - 1. Include similar Samples of trim and accessories involving color selection.
- C. Samples for Verification: For the following products, of sizes indicated, to verify color selected:
 - 1. Asphalt Shingle: Full size.
- D. Qualification Data: For qualified Installer.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for asphalt shingles.
- F. Warranties: Sample of special warranties.

SECTION 07 3113 - ASPHALT SHINGLES

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain ridge and hip cap shingles ridge vents and self-adhering sheet underlayment from single source from single manufacturer.
- C. Fire-Resistance Characteristics: Where indicated, provide asphalt shingles and related roofing materials identical to those of assemblies tested for fire resistance per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
 - 1. Exterior Fire-Test Exposure: Class A ; ASTM E 108 or UL 790, for application and roof slopes indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.
 - 1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.
- B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install asphalt shingles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - 1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

1.8 WARRANTY

- A. Special Warranty: Standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Manufacturing defects.

SECTION 07 3113 - ASPHALT SHINGLES

- b. Structural failures including failure of asphalt shingles to self-seal after a reasonable time.
- 2. Material Warranty Period: 35 years from date of Substantial Completion, prorated, with first three years nonprorated.
- 3. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds up to **100 mph** for five years from date of Substantial Completion.
- 4. Algae-Discoloration Warranty Period: Asphalt shingles will not discolor five years from date of Substantial Completion.
- 5. Workmanship Warranty Period: 10 years from date of Substantial Completion.

1.9 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Asphalt Shingles: **100 sq. ft** of each type, in unbroken bundles.

PART 2 - PRODUCTS

2.1 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Laminated-Strip Asphalt Shingles: ASTM D 3462, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - A Basis-of-Design Product: Subject to compliance with requirements, provide Camelot® II Lifetime Designer Shingles, by GAF®
 - 2. or comparable product by one of the following:
 - a. Atlas Roofing Corporation.
 - b. CertainTeed Corporation.
 - c. Elk Premium Building Products, Inc.; an ElkCorp company.
 - d. Emco Building Products Corp.
 - e. GAF Materials Corporation.
 - f. IKO.
 - g. Malarkey Roofing Products.
 - h. Owens Corning.
 - i. PABCO Roofing Products.
 - j. TAMKO Roofing Products, Inc.
 - k. <Insert manufacturer's name>.
 - 3. Butt Edge: Notched cut.
 - 4. Strip Size: Manufacturer's standard.
 - 5. Algae Resistance: Granules treated to resist algae discoloration.

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6. Color and Blends: As selected by Architect from manufacturer's full range.
- B. Hip and Ridge Shingles: Site-fabricated units cut from asphalt shingle strips. Trim each side of lapped portion of unit to taper approximately 1 inch (25 mm).

2.2 UNDERLAYMENT MATERIALS

- A. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release paper backing; cold applied
 1. Manufacturers: Subject to compliance with requirements, :
 2. Basis-of-Design Product: Subject to compliance with requirements, provide WeatherWatch® XT Leak Barrier, by GAF® or comparable product by one of the following:
 - a. ALCO-NVC Inc.
 - b. Atlas Roofing Corporation.
 - c. Carlisle Coatings & Waterproofing, Inc.
 - d. CertainTeed Corporation.
 - e. GAF Materials Corporation.
 - f. Henry Company.
 - g. IKO.
 - h. Johns Manville.
 - i. Owens Corning. Retain first paragraph below if polyethylene-faced sheet is required. A polyester-fabric-faced, SBS-modified asphalt sheet, reinforced internally with polyester or glass-fiber mats, is also produced that may comply with ASTM D 1970; verify availability with manufacturers and insert revised description of products in paragraph.
- B. Granular-Surfaced Valley Lining: ASTM D 3909, mineral-granular-surfaced, glass-felt-based, asphalt roll roofing; 36 inches (914 mm) wide.

2.3 RIDGE VENTS

- A. Flexible Ridge Vent: Manufacturer's standard, compression-resisting, three-dimensional, open-nylon or polyester-mat filter bonded to a nonwoven, nonwicking, geotextile fabric cover.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawing or comparable product by one of the following:
 - a. GAF Materials Corporation.
 - b. Obdyke, Benjamin Incorporated.
 - c. TAMKO Roofing Products, Inc.

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2.4 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
- B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum **0.120-inch- (3-mm-)** diameter, barbed shank, sharp-pointed, with a minimum **3/8-inch- (9.5-mm-)** diameter flat head and of sufficient length to penetrate **3/4 inch (19 mm)** into solid wood decking or extend at least **1/8 inch (3 mm)** through OSB or plywood sheathing.
 - 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
- C. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, **1-inch (25-mm)** minimum diameter.

2.5 METAL FLASHING AND TRIM

- A. General: Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim."
 - 1. Sheet Metal: Zinc-tin alloy-coated stainless steel.
- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item.
 - 1. Apron Flashings: Fabricate with lower flange a minimum of **5 inches (125 mm)** over and **4 inches (100 mm)** beyond each side of downslope asphalt shingles and **6 inches (150 mm)** up the vertical surface.
 - 2. Step Flashings: Fabricate with a headlap of **2 inches (50 mm)** and a minimum extension of **5 inches (125 mm)** over the underlying asphalt shingle and up the vertical surface.
 - 3. Backer Flashings: Fabricate with concealed flange extending a minimum of **24 inches (600 mm)** beneath upslope asphalt shingles and **6 inches (150 mm)** beyond each side of chimney and **6 inches (150 mm)** above the roof plane.
 - 4. Open-Valley Flashings: Fabricate in lengths not exceeding **10 feet (3 m)** with **1-inch- (25-mm-)** high, inverted-V profile at center of valley and equal flange widths of **12 inches (300 mm)**.
 - 5. Drip Edges: Fabricate in lengths not exceeding **10 feet (3 m)** with **2-inch (50-mm)** roof-deck flange and **1-1/2-inch (38-mm)** fascia flange with **3/8-inch (9.6-mm)** drip at lower edge.
- C. Vent Pipe Flashings: ASTM B 749, Type L51121, at least **1/16 inch (1.6 mm)** thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least **4 inches (100 mm)** from pipe onto roof.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through asphalt shingles.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
- B. Single- Retain first paragraph below for installing a single, self-adhering sheet underlayment.
- C. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below, lapped in direction to shed water. Lap sides not less than **3-1/2 inches (89 mm)**. Lap ends not less than **6 inches (150 mm)** staggered **24 inches (600 mm)** between courses. Roll laps with roller. Cover underlayment within seven days.
 - 1. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment.
 - 2. Eaves: Extend from edges of eaves **24 inches (600 mm)** beyond interior face of exterior wall.
 - 3. Rakes: Extend from edges of rake **24 inches (600 mm)** beyond interior face of exterior wall.
 - 4. Valleys: Extend from lowest to highest point **18 inches (450 mm)** on each side.
 - 5. Hips: Extend **18 inches (450 mm)** on each side.
 - 6. Ridges: Extend **36 inches (914 mm)** on each side without obstructing continuous ridge vent slot.
 - 7. Sidewalls: Extend beyond sidewall **18 inches (450 mm)**, and return vertically against sidewall not less than **4 inches (100 mm)**.
 - 8. Dormers, Chimneys, Skylights, and Other Roof-Penetrating Elements: Extend beyond penetrating element **18 inches (450 mm)**, and return vertically against penetrating element not less than **4 inches (100 mm)**.
 - 9. Roof Slope Transitions: Extend **18 inches (450 mm)** on each roof slope.

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3.3 METAL FLASHING INSTALLATION

- A. General: Install metal flashings and other sheet metal to comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim."
 - 1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Apron Flashings: Extend lower flange over and beyond each side of downslope asphalt shingles and up the vertical surface.
- C. Step Flashings: Install with a headlap of 2 inches (50 mm) and extend over the underlying asphalt shingle and up the vertical surface. Fasten to roof deck only.
- D. Rake Drip Edges: Install rake drip edge flashings over underlayment and fasten to roof deck.
- E. Eave Drip Edges: Install eave drip edge flashings below underlayment and fasten to roof sheathing.
- F. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.4 ASPHALT SHINGLE INSTALLATION

- A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed at least 7 inches (175 mm) wide with self-sealing strip face up at roof edge.
 - 1. Extend asphalt shingles 3/4 inch (19 mm) over fasciae at eaves and rakes.
 - 2. Install starter strip along rake edge.
- C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- E. Install asphalt shingles by single-strip column or racking method, maintaining uniform exposure. Install full-length first course followed by cut second course, repeating alternating pattern in succeeding courses.
- F. Fasten asphalt shingle strips with a minimum of six roofing nails located according to manufacturer's written instructions.

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1. Where roof slope exceeds 20:12, seal asphalt shingles with asphalt roofing cement spots after fastening with additional roofing nails.
 2. Where roof slope is less than 4:12, seal asphalt shingles with asphalt roofing cement spots.
 3. When ambient temperature during installation is below 50 deg F (10 deg C), seal asphalt shingles with asphalt roofing cement spots.
- G. Ridge Vents: Install continuous ridge vents over asphalt shingles according to manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.
- H. Ridge and Hip Cap Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.
1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

END OF SECTION 073113

SECTION 07 6200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Formed roof-drainage sheet metal fabrications.
2. Formed low-slope roof sheet metal fabrications.
3. Formed steep-slope roof sheet metal fabrications.
4. Formed wall sheet metal fabrications.
5. Formed equipment support flashing.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
 3. Review requirements for insurance and certificates if applicable.
 4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

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1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: For sheet metal flashing and trim.
1. Include plans, elevations, sections, and attachment details.
 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
 4. Include details for forming, including profiles, shapes, seams, and dimensions.
 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 6. Include details of termination points and assemblies.
 7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
 8. Include details of roof-penetration flashing.
 9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
 10. Include details of special conditions.
 11. Include details of connections to adjoining work.
 12. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches.
- C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.
- D. Samples for Verification: For each type of exposed finish.
1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
- 1.6 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For fabricator.
- B. Product Certificates: For each type of coping and roof edge flashing that is FM Approvals approved.
- C. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- D. Sample Warranty: For special warranty.

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1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 - 1. For copings and roof edge flashings that are FM Approvals approved, shop shall be listed as able to fabricate required details as tested and approved.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.10 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

SECTION 07 6200 - SHEET METAL FLASHING AND TRIM

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. FM Approvals Listing: Manufacture and install roof edge flashings that are listed in FM Approval's "RoofNav" and approved for windstorm classification, Class 1-60. Identify materials with name of fabricator and design approved by FM Approvals.
- D. SPRI Wind Design Standard: Manufacture and install copings and roof edge flashings capable of resisting the following design pressure:
 - 1. Design Pressure: As indicated on Drawings.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed; with smooth, flat surface.
 - 1. Finish: 2D (dull, cold rolled).
- C. Metallic-Coated Steel Sheet: Provide aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; prepainted by coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Surface: Smooth, flat .

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2. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
3. Color: Match standing seam roofing.
4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.
- B. Slip Sheet:
 1. Products: Subject to compliance with requirements, provide one of the following
 - a. Carlisle Residential, a division of Carlisle Construction Materials; WIP 300HT.
 - b. Grace Construction Products, a unit of W. R. Grace & Co.-Conn.; Grace Ice and Water Shield HT.
 - c. Henry Company; Blueskin PE200 HT.
 - d. Kirsch Building Products, LLC; Sharkskin Ultra SA.
 - e. Lexsuo 20 mil vapor barrier.
 - f. Metal-Fab Manufacturing, LLC; MetShield.
 - g. Owens Corning; WeatherLock Specialty Tile & Metal Underlayment.
 - h. Polyguard Products, Inc.; Deck Guard HT.
 - i. Protecto Wrap Company; Protecto Jiffy Seal Ice & Water Guard HT.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer

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head.

- a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
2. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
 3. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
- C. Solder:
1. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
 2. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead with maximum lead content of 0.2 percent.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- H. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
- I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

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2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 2. Obtain field measurements for accurate fit before shop fabrication.
 - 3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- G. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- H. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

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- I. Do not use graphite pencils to mark metal surfaces.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof-to-Wall Transition Expansion-Joint Cover: Fabricate from the following materials:

- 1. Aluminum-Zinc Alloy-Coated Steel: 0.034 inch thick.

2.7 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof-to-Wall Transition Expansion-Joint Cover: Fabricate from the following materials:

- 1. Aluminum-Zinc Alloy-Coated Steel: 0.034 inch thick

2.8 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch-long, but not exceeding 12-foot- long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch- high, end dams. Fabricate from the following materials:

- 1. Stainless Steel: 0.016 inch thick.

- B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:

- 1. Stainless Steel: 0.016 inch thick. Aluminum: 0.032 inch thick.

- C. Wall Expansion-Joint Cover: Fabricate from the following materials:

- 1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

2.9 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:

- 1. Stainless Steel: 0.019 inch thick.

- B. Overhead-Piping Safety Pans: Fabricate from the following materials:

- 1. Stainless Steel: 0.025 inch thick.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.
- B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, according to manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.
- C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller. Cover underlayment within 14 days.
- D. Apply slip sheet, wrinkle free, directly on substrate before installing sheet metal flashing and trim.

3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

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1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 5. Torch cutting of sheet metal flashing and trim is not permitted.
 6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Section 07 9200 "Joint Sealants."

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- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder metallic-coated steel and aluminum sheet.
 2. Do not use torches for soldering.
 3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 4. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
 5. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.
 6. Copper-Clad Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for copper-clad stainless steel.
- H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.4 ROOF-DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints or joints sealed with sealant]. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.
1. Fasten gutter spacers to front and back of gutter.
 2. Anchor and loosely lock back edge of gutter to continuous cleat.
 3. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches apart.
 4. Anchor gutter with gutter brackets spaced not more than 24 inches apart to roof deck, unless otherwise indicated, and loosely lock to front gutter bead.
 5. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.
 6. Install continuous gutter screens on gutters with noncorrosive fasteners, hinged to swing open for cleaning gutters.
- C. Downspouts: Join sections with 1-1/2-inch telescoping joints.
1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c.
 2. Provide elbows at base of downspout to direct water away from building.
 3. Connect downspouts to underground drainage system.

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- D. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints minimum of 4 inches in direction of water flow.

3.5 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 04 2000 "Unit Masonry."
- C. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.6 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.
- B. Overhead-Piping Safety Pans: Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.

3.7 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.8 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation

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instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 6200

SECTION 07 9200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.

1.2 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

1.4 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

A. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period:
 - a. Typical: 20 years from date of Substantial Completion.
 - b. Urethane Joint Sealants: 10 years from date of Substantial Completion.

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PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 - 1. Suitability for Immersion in Liquids: Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- B. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.2 SILICONE JOINT SEALANTS

- A. Mildew-Resistant Silicone Joint Sealant SS-1: ASTM C 920.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Dow Corning 786 or comparable product by one of the following:
 - a. BASF Building Systems.
 - b. GE Advanced Materials - Silicones.
 - c. Pecora Corporation.
 - d. Tremco Incorporated.
 - 2. Type: Single component (S).
 - 3. Grade: nonsag (NS).
 - 4. Class: 25.
 - 5. Uses Related to Exposure: Nontraffic (NT).
- B. Neutral-Curing Silicone Joint Sealant SS-2: ASTM C 920.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Dow Corning 790 or comparable product by one of the following:
 - a. BASF Building Systems.
 - b. GE Advanced Materials - Silicones.
 - c. Pecora Corporation.

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- d. Tremco Incorporated.
 - 2. Type: Single component (S).
 - 3. Grade: nonsag (NS).
 - 4. Class: 100/50.
 - 5. Uses Related to Exposure: Nontraffic (NT).
- C. Neutral-Curing Silicone Joint Sealant SS-3: ASTM C 920.
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide Dow Corning 795 or comparable product by one of the following:
 - a. BASF Building Systems.
 - b. GE Advanced Materials - Silicones.
 - c. Pecora Corporation.
 - d. Tremco Incorporated.
 - 2. Type: Single component (S).
 - 3. Grade: nonsag (NS).
 - 4. Class: 50.
 - 5. Uses Related to Exposure: Nontraffic (NT).

2.3 URETHANE JOINT SEALANTS

- A. Urethane Joint Sealant US-1: ASTM C 920.
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide Masterseal NP100; BASF Building Systems or comparable product by one of the following:
 - a. Pecora Corporation.
 - b. Tremco Incorporated.
 - 2. Type: Single component (S).
 - 3. Grade: nonsag (NS).
 - 4. Class: 25.
 - 5. Uses Related to Exposure: Nontraffic (NT).

2.4 LATEX JOINT SEALANTS

- A. Latex Joint Sealant LS-1: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Building Systems.

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- b. Pecora Corporation.
- c. Tremco Incorporated.

2.5 JOINT SEALANT BACKING

- A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance. Backer rod at joints beyond 3/8" or less than 3 points of direct contact 3/8" into the cavity.

2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove laitance and form-release agents from concrete.
 - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

SECTION 07 9200 - JOINT SEALANTS

3.2 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- C. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- D. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
- E. Acoustical Sealant Installation: Comply with ASTM C 919 and with manufacturer's written recommendations.
- F. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.3 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces SS-2.
 - 1. Joint Locations:
 - a. Joints in exterior insulation finish systems.

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2. Joint Sealant: Silicone.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces SS-3.
1. Joint Locations:
 - a. Joints between exterior insulation finish systems and masonry.
 2. Joint Sealant: Silicone.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces US-1.
1. Joint Locations:
 - a. Control and expansion joints in unit masonry.
 - b. Joints between different materials listed above.
 - c. Perimeter joints between materials listed above and frames of doors and windows.
 2. Joint Sealant: Urethane.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces US-1.
1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Vertical joints on exposed surfaces of interior unit masonry walls and partitions.
 2. Joint Sealant: Urethane.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces LS-1.
1. Joint Locations:
 - a. Vertical joints on exposed surfaces of interior unit masonry walls and partitions.

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- b. Perimeter joints between interior wall surfaces and frames of interior doors and windows .
 - 2. Joint Sealant: Latex.
 - 3. Joint-Sealant Color: White, paintable color. Latex Joint Sealant shall be painted to match the adjacent wall.
- F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces SS-1.
- 1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - 2. Joint Sealant: Silicone.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 07 9200

SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes hollow-metal work.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, temperature-rise ratings, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door type.
 - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, joints, field splices, and connections.
 - 7. Details of accessories.

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8. Details of moldings, removable stops, and glazing.
 9. Details of conduit and preparations for power, signal, and control systems.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification:
1. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.
 2. For "Doors" and "Frames" subparagraphs below, prepare Samples approximately 8 by 10 inches to demonstrate compliance with requirements for quality of materials and construction:
 - a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
 - b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.
- E. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.
- B. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Amweld International, LLC.
 - 2. Ceco Door Products; an Assa Abloy Group company.
 - 3. Curries Company; an Assa Abloy Group company.
 - 4. Fleming-Baron Door Products.
 - 5. Pioneer Industries, Inc.
 - 6. Security Metal Products Corp.
 - 7. Steelcraft; an Ingersoll-Rand company.
- B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 REGULATORY REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - 1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
- B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 INTERIOR DOORS AND FRAMES

- A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2. .
 - 1. Physical Performance: Level B according to SDI A250.4.
 - 2. Doors:

SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES

- a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch.
 - d. Edge Construction: Model 1, Full Flush.
 - e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.
3. Frames:
- a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch.
 - b. Construction: Full profile welded.
4. Exposed Finish: Prime.

2.4 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

- A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.
1. Physical Performance: Level B according to SDI A250.4.
 2. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch, with minimum A40 coating.
 - d. Edge Construction: Model 1, Full Flush.
 - e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.
 - 1) Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
 3. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
 - b. Construction: Full profile welded.
 4. Exposed Finish: Prime.

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2.5 HOLLOW-METAL PANELS

- A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

2.6 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
 - 3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 - 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.7 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

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- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
- H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- I. Glazing: Comply with requirements in Section 08 8000 "Glazing."
- J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.8 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Doors:
 - 1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
 - 2. Fire Door Cores: As required to provide fire-protection and temperature-rise ratings indicated.
 - 3. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.
 - 4. Top Edge Closures: Close top edges of doors with inverted closures, except provide flush closures at exterior doors of same material as face sheets.
 - 5. Bottom Edge Closures: Close bottom edges of doors with end closures or channels of same material as face sheets.
 - 6. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES

7. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
 8. View Lites: 2"x 30", with screw mounted lite kits and 9/16" tempered laminated glass, as indicated on drawings.
- C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - c. Compression Type: Not less than two anchors in each frame.
 - d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

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6. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
8. Terminated Stops: Terminate stops 6 inches above finish floor with a 45-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.
9. Restroom Partition Frames: Hollow metal frames (hinge, strike, and top with one course of block above the jamb) at gang restroom partitions, as indicated on the drawings.
 - a. Frames shall be set at 12" AFF and terminate at 72" AFF. Through bolted to masonry toilet partition.
 - b. Restroom frames shall have hollow metal header, welded to hollow metal mullions.
 - c. Mullions shall be mortar filled.
- D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
- F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with butted hairline joints.
 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 4. Provide loose stops and moldings on inside of hollow-metal work.

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5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.9 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.10 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

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3.3 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
- B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 - 4. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
 - 5. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - 6. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
 - 7. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90

SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES

- degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Non-Fire-Rated Steel Doors:
 - a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
 - c. At Bottom of Door: 3/4 inch plus or minus 1/32 inch.
 - d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.
 - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 - 3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.
- D. Glazing: Comply with installation requirements in Section 08 8000 "Glazing" and with hollow-metal manufacturer's written instructions.
 - 1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

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- E. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish according to manufacturer's written instructions.
- F. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08 1113

SECTION 08 7100 - DOOR HARDWARE

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 this Section.

1.2 SUMMARY

- A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.
- B. This Section includes the following:
 - 1. Hinges
 - 2. Continuous Hinges
 - 3. Pivots
 - 4. Key control system
 - 5. Lock cylinders and keys
 - 6. Lock and latch sets
 - 7. Bolts
 - 8. Exit devices
 - 9. Push/Pull units
 - 10. Closers
 - 11. Overhead holders
 - 12. Miscellaneous door control devices
 - 13. Door trim units
 - 14. Protection plates
 - 15. Weatherstripping for exterior doors
 - 16. Sound stripping for interior doors
 - 17. Automatic drop seals (door bottoms)
 - 18. Astragals or meeting seals on pairs of doors
 - 19. Thresholds

1.3 REFERENCES

- A. Standards of the following as referenced:
 - 1. American National Standards Institute (ANSI)
 - 2. Door and Hardware Institute (DHI)
 - 3. Factory Mutual (FM)
 - 4. National Fire Protection Association (NFPA)

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5. Underwriters' Laboratories, Inc. (UL)
 - a. UL 10C - Fire Tests Door Assemblies
6. Warnock Hersey

B. Regulatory standards of the following as referenced:

1. Department of Justice, Office of the Attorney General, Americans with Disabilities Act, Public Law 101-336 (ADA).
2. CABO/ANSI A117.1: Providing Accessibility and Usability for Physically Handicap People, 2010 edition.

1.4 SYSTEM DESCRIPTION

- A. Refer to applicable Headings for system description for electric and electro-pneumatic hardware products.

1.5 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification sections.
- B. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
- C. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into vertical format "hardware sets" indicating complete designations of every item required for each door or opening. Use specification Heading numbers with any variations suffixed a, b, etc. Include the following information:
 - a. Type, style, function, size, and finish of each hardware item.
 - b. Name and manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of each hardware set cross referenced to indications on Drawings both on floor plans and in door and frame schedule.
 - e. Explanation of all abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for hardware.
 - g. Door and frame sizes and materials.
 - h. Keying information.
 - i. Cross reference numbers used within schedule deviating from those specified.
 - 1) Column 1: State specified item and manufacturer.

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2) Column 2: State prior approved substituted item and its manufacturer.

2. Submittal Sequence: Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.
 3. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
- D. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- E. Contract closeout submittals:
1. Operation and maintenance data: Complete information for installed door hardware.
 2. Warranty: Completed and executed warranty forms.

1.6 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, exit devices, closers, etc.) from a single manufacturer.
- B. Supplier Qualifications:
1. The finish hardware supplier shall be a factory authorized distributor with office and warehouse facilities within a 25 mile radius of Bibb County, Georgia.
 2. The finish hardware supplier shall have a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project.
 3. The finish hardware supplier shall employ an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the work, for consultation.
- C. Coordination Meetings:
1. Contractor to set up and attend the following:
 - a. Lock distributor to meet with the Owner to finalize lock functions and keying requirements and to obtain final instructions in writing.
 - b. Lock distributor and lock, closer and exit device manufacturer to meet with the installer prior to beginning of installation of door hardware. Instruct installer on proper installation of specified products.
 2. Contractor to set up and attend the following:
 - a. Meet with the Owner, General Contractor, Supplier, electrical and security contractors to coordinate all electrical hardware items. Supplier to provide riser diagrams, elevation drawings, wiring diagrams and operational descriptions as required by the General and sub-contractors.

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- D. The hardware manufacturer's representative(s) shall conduct a pre-installation conference with the Contractor's installer, a representative of the county planning and/or maintenance department, and a representative of the hardware supplier, to demonstrate product installation and adjustment in accordance with manufacturer's recommendations and Owner's requirements.
- E. Hardware manufacturers' representative shall inspect hardware installation to confirm that all products are installed and adjusted according to manufacturer's recommendations. A certificate of compliance shall be submitted with the project closeout documents.
- F. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not. All hardware shall comply with standards UL 10C.
 - 1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".

1.7 PRODUCT HANDLING

- A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.
- B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.
- C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.
- D. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).
- E. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.8 WARRANTY

- A. Special warranties:
 - 1. Door Closers: Ten year period
 - 2. Exit Devices: Three year period

1.9 MAINTENANCE:

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- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Hinges:

1. Acceptable manufacturers: Products by the following manufacturers meet all the performance characteristics listed below:
 - a. Hager
 - b. Bommer
 - c. Ives*
2. Characteristics:
 - a. Templates: Provide only template-produced units.
 - b. Screws: Provide Phillips flat-head screws complying with the following requirements:
 - 1) For metal doors and frames install machine screws into drilled and tapped holes.
 - 2) For wood doors and frames install threaded-to-the-head wood screws.
 - 3) For fire-rated wood doors install #12 x 1-1/4 inch, threaded-to-the-head steel wood screws.
 - 4) Finish screw heads to match surface of hinges or pivots.
 - c. Hinge pins: Except as otherwise indicated, provide hinge pins as follows:
 - 1) Out-Swing Exterior Doors: Non-removable pins.
 - 2) Out-Swing Corridor Doors with Locks: Non-removable pins.
 - 3) Interior Doors: Non-rising pins.
 - 4) Tips: Flat button and matching plug. Finished to match leafs.
 - d. Size: Size hinges in accordance with specified manufacturer's published recommendations.
 - e. Quantity: Furnish one pair of hinges for all doors up to 5'0" high. Furnish one hinge for each additional 2-1/2 feet or fraction thereof.
 - f. Provide half surface hinges with back plates for all fire-rated wood doors.

B. Continuous Hinges:

1. Acceptable manufacturers: Products by the following manufacturers meet all the performance characteristics listed below:
 - a. Ives*
2. Characteristics:
 - a. Continuous gear hinges to be manufactured of extruded 6063-T6 aluminum alloy with anodized finish, or factory painted finish as scheduled. Hinges are to be Ives 157 XY with full adjustability after installation.

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- b. All hinges are to be manufactured to template. Uncut hinges shall be non-handed and shall be a pinless assembly of three interlocking extrusions applied to the full height of the door and frame without mortising.
- c. Vertical door loads shall be carried on chemically lubricated polyacetal thrust bearings. The door and frame leaves shall be continually geared together for the entire hinge length and secured with a full cover channel. Hinge to operate to a full 180°.
- d. Hinges to be milled, anodized and assembled in matching pairs.
- e. Provide UL listed continuous hinges at fire doors. Continuous hinges at fire doors shall meet the required ratings without the use of auxiliary fused pins or studs.

C. Cylinders:

- 1. Acceptable manufacturers:
 - a. Schlage - Primus Level III* and Conventional, keyed to existing system. See notes below.
- 2. Characteristics:
 - a. *Review the keying system with the Owner and provide the type required (master, grandmaster or great-grandmaster), either new or integrated with Owner's existing system.
 - b. Equip locks with cylinders for interchangeable-core pin tumbler inserts for all doors. Furnish only temporary inserts for the construction period.
 - c. *Furnish final cores and keys for installation by Owner.
 - d. Metals: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.
 - e. Exterior doors, Vault, AV and food storage to be Primus. Interior doors are conventional keyway. All keys are to be Primus. KR mullions are to have conventional keyway cylinders.
 - f. *Comply with Owner's instructions for master keying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
 - 1) Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE."
 - 2) * Keying Submittal must be reviewed and approved by the Owner before permanent cores are ordered from Schlage Lock Co.
 - g. Key Material: Provide keys of nickel silver only.
 - h. Key Quantity: Furnish 3 change keys for each lock, (max of 10 at large KA groups), 5 master keys for each master system, and 5 grandmaster keys for each grandmaster system. Provide any additional keys not used as key blanks. Provide 10 construction master keys and 4 construction control keys.
 - 1) *Deliver keys to Owner.
 - 2) All keys are to be Primus
 - 3) All cores shall be Primus where noted above.
 - 4) Key vault and food storage as a change under the great grandmaster only (GGM1)
 - 5) AV storage shall be keyed SKD (next available)

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D. Locksets, Latchsets, Deadbolts:

1. Acceptable manufacturers: Products by the following manufacturers meet all the performance characteristics listed below:
 - a. Basis of Design Manufacturer: Subject to compliance with requirements, products manufactured by Schlage to match existing equipment used throughout Macon Parks Department.
2. Mortise Locksets and Latchsets: as scheduled.
 - a. Chassis: cold-rolled steel, handing field-changeable without disassembly.
 - b. Latchbolts: 3/4-inch throw stainless steel anti-friction type.
 - c. Lever Trim: through-bolted, accessible design, cast or solid rod lever as scheduled. Spindles: independent break-away.
 - d. Thumbturns: accessible design not requiring pinching or twisting motions to operate.
 - e. Deadbolts: stainless steel 1-inch throw.
 - f. Electric operation: Manufacturer-installed continuous duty solenoid.
 - g. Strikes: 16 gage curved stainless steel, bronze or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.
 - h. Scheduled Lock Series and Design: Schlage L series, 07A design.
 - i. Certifications:
 - 1) ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.
 - 2) ANSI/ASTM F476-84 Grade 30 UL Listed.
3. Extra Heavy Duty Cylindrical Locks and Latches: as scheduled, fastened with through-bolts.
 - a. Chassis: Cylindrical design, corrosion-resistant plated cold-rolled steel.
 - b. Locking Spindle: Stainless steel, interlocking design.
 - c. Latch Retractors: Forged steel. Balance of inner parts: Corrosion-resistant plated steel, or stainless steel.
 - d. Lever Trim: Accessible design, independent operation, spring-cage supported, minimum 2" clearance from lever mid-point to door face.
 - e. Rosettes: Minimum 3-7/16" diameter for coverage of ANSI/DHI A115.18, 1994 door preparation, through-bolt lugs on both spring cages to fully engage this pattern.
 - f. Springs: Full compression type.
 - g. Electric operation: Manufacturer-installed continuous duty solenoid.
 - h. Strikes: 16 gage curved steel, bronze or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.
 - i. Lock Series and Design: Schlage ND series, ATH design.
 - j. Certifications:
 - 1) ANSI A156.2, 1994, Series 4000, Grade 1. Tested to exceed 3,000,000 cycles.
 - 2) UL listed for A label single doors up to 4 ft x 8 ft.

E. Exit Devices:

1. Acceptable manufacturers: Products by the following manufacturers meet all the performance characteristics listed below:
 - a. Basis of Design Manufacturer: Subject to compliance with requirements, products manufactured by Von Duprin to match existing equipment used throughout Macon Parks Department.

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2. Removable mullions by Von Duprin - Steel material ONLY - key removable.
3. Electronic access points shall be Von Duprin EL98 Electric panic hardware operated by electronic access control system hardwired with a card reader recessed into the building structure.
 - a. EL devices shall use a 16 amp solenoid to activate a mechanical linkage to retract the latch.
 - b. Power supplies shall be Von Duprin PS914 x 900-RS Series.
4. Conduit and necessary wiring shall be provided under Electrical Section. See Owner's standard details.
5. Characteristics:
 - a. All exit devices shall be of one manufacturer.
 - b. All exit devices shall have US32D touchpads. All finished parts that are not US32D shall be US26D. No painted finish shall be allowed.
 - c. All exit devices shall be flush mounted. Provide manufacturer's standard shim kit to accommodate molding for glass and vision lights. Exit devices that are not flush mounted must provide a filler bar on those doors where conflict with molding for glass vision lights is not an issue.
 - d. Exit devices shall be attached with sex nuts and bolts on all doors. Finish on all exposed fasteners shall match devices.
 - e. Lever handle operating trim for exit devices shall be of heavy duty construction, incorporating cast or heavy solid forged escutcheons and levers. Where listed in the hardware sets, provide "breakaway" lever incorporating an internal clutch mechanism allowing the lever to break away and drop into a "down" position when more than 35 pounds of torque are applied. Lever shall be easily reset to its operating position by a simple uplift motion.
 - f. Exit devices shall be "UL" listed for life safety. All exit devices for fire rated openings shall have "UL" labels for "Fire Exit Hardware."
 - g. All trim shall be thru-bolted to the lock stile case.
 - h. All exit devices shall be made of brass, bronze, stainless steel, or aluminum material, plated or powder coated to the standard architectural finishes to match the balance of the door hardware. Painted finishes are not accepted.
 - i. Provide glass bead conversion kits to shim exit devices on doors with raised glass heads.
 - j. Dogging mechanism shall be "hook and eye" type. No plastic dogging cams or friction type dogging mechanism shall be allowed.
 - k. Equip rim exit devices with a roller strike.
 - l. All exit devices shall be non-handed.
 - m. Touchpad shall extend a minimum of 1/2 of the door width. Touchpad height shall exceed height of mechanism case or rail assembly to eliminate pinch points. If touchpad height does not exceed height of mechanism case/rail assembly provide factory installed insert/filler on top and bottom of touchpad along mechanism case/rail assembly to prevent pinch point. Plastic touchpads are not acceptable.
 - n. All latchbolts to be the deadlocking type. Latchbolts shall have a self-lubricating coating to reduce wear. Plated or plastic coated latchbolts are not acceptable.
 - o. At specific locations, such as the Media Center, Auditorium, Administrative areas, etc. equip exit devices with a fluid dampening device to reduce noise associated with the operation of the exit device.

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- p. Exit devices shall include impact resistant, flush mounted end cap design to avoid damage due to carts and other heavy objects passing through an opening. End cap shall be of heavy-duty metal alloy construction and provide horizontal adjustment to provide alignment with device cover plate. When exit device end cap is installed, no raised edges will protrude.

F. Closers and Door Control Devices:

1. Acceptable manufacturers: Products by the following manufacturers meet all the performance characteristics listed below:
 - a. Basis of Design Manufacturer: Subject to compliance with requirements, products manufactured by LCN to match existing equipment used throughout Macon Parks Department.
2. Characteristics:
 - a. Door closers shall be overhead type and have fully hydraulic, full rack and pinion action with a high strength cast iron cylinder.
 - b. All closers shall be attached using sex nuts and bolts only. Provide mounting plates if required to mount on narrow top rail of door.
 - c. All fire rated doors shall have closers. Closers shall not be installed on classroom doors unless required by Fire Marshal's office.
 - d. Hydraulic fluid shall be of a type requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F (49 degrees C) to -30 degrees F (-35 degrees C).
 - e. Spring power shall be continuously adjustable over the full range of closer sizes, and allow for reduced opening force for the physically handicapped. Hydraulic regulation shall be by tamper-proof, non-critical valves. Closers shall have separate adjustment for latch speed, general speed and back check. Closers shall be sized in accordance with manufacturer's recommendation.
 - f. All closers shall have solid forged steel main arms (and forearms for parallel arm closers) and where specified shall have a cast-in solid stop on the closer shoe ("cush"). Where door travel on out-swing doors must be limited, use "Cush" type closers. Auxiliary stops are not required when cushion type closers are used.
 - g. All closers shall be certified to exceed ten million (10,000,000) full load cycles by a recognized independent testing laboratory. All closers (overhead, surface and concealed) shall be of one manufacturer and carry manufacturer's ten year warranty (electric closers to have two year warranty).
 - h. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ADA and ANSI A-117.1 provisions for door opening force.
 - i. Closers to be installed to allow door swing as shown on plans. Doors swinging into exit corridors shall provide for corridor clear width as required by code. Where possible, mount closers inside rooms.
 - j. Provide powder coated finish, certified to exceed 100 hours salt spray testing by ETL, an independent testing laboratory used by BHMA for ANSI certification. Lacquer or painted finish on metal components is not acceptable.

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G. Floor Stops and Wall Bumpers:

1. Acceptable manufacturers:
 - a. Trimco
 - b. Ives*
 - c. Rockwood
2. Characteristics: Refer to Hardware Headings.

H. Door Bolts/Coordinators:

1. Acceptable manufacturers:
 - a. Trimco
 - b. Ives*
 - c. Rockwood
2. Characteristics:
 - a. Flush bolts to be forged brass 6-3/4" x 1", with 1/2" diameter bolts. Plunger to be supplied with milled surface one side which fits into a matching guide.
 - b. Automatic flush bolts to be UL listed as top and bottom bolts on a pair of classified fire doors. Bolt construction to be of rugged steel and brass components.
 - c. Self-latching flush bolts to be UL listed as top and bottom bolts on a pair of classified fire doors. Bolt construction to be of rugged steel and brass components.
 - d. Automatic flush bolts and self-latching flush bolts shall be UL listed for fire door application without bottom bolts.
 - e. Coordinator to be soffit mounted non-handed fully automatic UL listed coordinating device for sequential closing of paired doors with or without astragals.
 - f. Provide filler pieced to close the header. Provide brackets as required for mounting of soffit applied hardware.

I. Push Plates:

1. Acceptable manufacturers:
 - a. Trimco
 - b. Ives*
 - c. Rockwood
2. Characteristics:
 - a. Exposed Fasteners: Provide manufacturers standard, stainless steel exposed fasteners.
 - b. Material to be extruded/forged, stainless steel, per the Hardware Headings.
 - c. Provide plated sized as shown in Hardware Headings.

J. Door Pulls & Pull Plates:

1. Acceptable manufacturers:
 - a. Trimco
 - b. Ives*
 - c. Rockwood

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2. Characteristics:
 - a. Provide concealed thru-bolted trim on back to back mounted pulls, but not for single units.
 - b. Material to be extruded/forged/cast, stainless steel.
 - c. Provide units sized as shown in Hardware Headings.

K. Push Pull Sets:

1. Acceptable manufacturers:
 - a. Trimco
 - b. Ives*
 - c. Rockwood
2. Characteristics:
 - a. Provide mounting systems as shown in hardware sets.
 - b. Material to be (description - i.e. solid rod, tubular, cast etc.) stainless steel.
 - c. Provide Push/Pull sets sized as shown in Hardware Headings.

L. Protective Plates:

1. Acceptable manufacturers:
 - a. Trimco
 - b. Ives*
 - c. Rockwood
2. Characteristics:
 - a. Provide manufacturers standard, stainless steel exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.
 - b. Materials:
 - 1) Metal Plates: Stainless Steel, .050 inch (U.S. 18 gage).
 - c. Fabricate protection plates not more than 2 inches less than door width on push side and not more than 1 inch less than door width on pull side.
 - d. Heights:
 - 1) Kick plates to be 10 inches in height.
 - 2) Mop plates to be 4 inches in height.
 - 3) Armor plates to be 34 inches in height. Armor plates on fire doors to comply with NFPA 80.

M. Thresholds:

1. Acceptable manufacturers:
 - a. Pemko*
 - b. Reese Industries
 - c. Zero Weatherstripping
2. Types: Indicated in Hardware Headings.

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N. Weatherstripping:

1. Acceptable manufacturers:
 - a. Pemko*
 - b. Reese Industries
 - c. Zero Weatherstripping
2. Types: Indicated in Hardware Headings.

O. Silencers:

1. Acceptable manufacturers:
 - a. Hager
 - b. Ives*
 - c. Rockwood
2. Three for each single doors; two for pairs of doors.

P. Key Cabinet and System:

1. Acceptable manufacturers:
 - a. Telkee, Inc.
2. Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150 percent of the number of locks required for the Project.
 - a. Provide hinged-panel type cabinet for wall mounting.

Q. Magnetic Door Holders

1. Acceptable manufacturers:
 - a. LCN*
 - b. Rixson-Firemark
 - c. Edwards
2. Wall mounted 24vdc units with finish to match door hardware. Provide standard extensions as manufactured by the same manufacturer of the Magnetic holders as required for job conditions.

2.2 MATERIALS AND FABRICATION

- A. Manufacturer's Name Plate: Do not use manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise acceptable to Architect.

1. Manufacturer's identification will be permitted on rim of lock cylinders only.

- B. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI/BHMA A156 series standards for each type of hardware item and with

SECTION 08 7100 - DOOR HARDWARE

ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.

- C. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
 - 1. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
 - 2. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.
 - 3. All exit devices, door closers, overhead stops and surface mounted hardware shall be attached with thru-bolts.

2.3 HARDWARE FINISHES

- A. Match items to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).
- B. Provide finishes that match those established by ANSI or, if none established, match the Architect's sample.
- C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
- D. The designations used to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes," including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.
 - 1. Hinges (Exterior): 630 (US32D) Satin Stainless Steel
 - 2. Hinges (Interior): 652 (US26D) Satin Chrome Plated Steel
 - 3. Continuous Hinges: 628 (US28) Clear Anodized Aluminum finish to match doors @ aluminum entrance systems
 - 4. Flush Bolts: 626 (US26D) Satin Chrome Plated Brass/Bronze
 - 5. Locks: 626 (US26D) Satin Chrome Plated
 - 6. Exit Devices: 628 (US28) chassis, 626 (Satin Chrome) covers, and 630 (US32D) touchpads
 - 7. Door Closers: 689 (AL) Powder Coat
 - 8. Push Plates: 630 (US32D) Satin Stainless Steel
 - 9. Pull Plates: 630 (US32D) Satin Stainless Steel
 - 10. Protective Plates: 630 (US32D) Satin Stainless Steel
 - 11. Door Stops: 626 (US26D) Satin Chrome Plated Brass/Bronze
 - 12. Thresholds/Weatherstripping: 627/628 (US27/US28) Aluminum

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.
 - 1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
- B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.
- C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section "Joint Sealers."
- F. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.2 ADJUSTING, CLEANING, AND DEMONSTRATING

- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
 - 1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to function properly with final operation of heating and ventilating equipment.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Door Hardware Supplier's Field Service
 - 1. Inspect door hardware items for correct installation and adjustment after complete installation of door hardware.
 - 2. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.
 - 3. File written report of this inspection to Architect.

- D. Prior to project completion, representatives of the lock, exit device and overhead closer manufacturer(s) shall inspect and adjust all units and certify that all units are installed in accordance with the manufacturer's instructions, and are regulated properly and functioning correctly. A written report shall be provided to the Architect as to the inspection and shall include appropriate certificates.

3.3 HARDWARE SCHEDULE

- A. As shown on drawings.

SECTION 09 9113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:

- 1. Steel.

1.2 DEFINITIONS

- A. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples: For each type of paint system and each color and gloss of topcoat.
- C. Product List: For each product indicated. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.
 - 2. Provide a list of paint products used (manufacturer), and color codes (mix proportions) to the maintenance paint department at the end of the project.

SECTION 09 9113 - EXTERIOR PAINTING

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in other Part 2 articles for the paint category indicated.
- B. Painting Systems Schedule: All trade names and numbers listed hereinafter are in the following order, unless specifically shown otherwise:
 - 1. ICI ICI/GLIDDEN AND DEVOE
 - 2. MS Martin Senour
 - 3. PL Pratt and Lambert
 - 4. BM Benjamin Moore
 - 5. SW Sherwin Williams

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- C. Colors: As indicated in a color schedule.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

SECTION 09 9113 - EXTERIOR PAINTING

- C. Proceed with coating application only after unsatisfactory conditions have been corrected.

- 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

3.3 APPLICATION

- A. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

- A. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 EXTERIOR PAINTING SCHEDULE

- A. Steel Substrates:
 - 1. Prime Coat – Alkyd MultiPurpose Metal Primer:
 - a. ICI 4160 Devguard Multi-Purpose Tank and Structural Primer
 - b. MS Tough Coat® Rust Control Universal Metal Primer
 - c. PL S45XX Steeltech® Rust Inhibitive Metal Primer
 - d. BM Super Spec HP Universal Alkyd Metal Primer P07
 - e. SW B66W00001 - DTM Acrylic Primer/Finish
 - 2. Prime Coat: Shop primer specified in Section where substrate is specified.

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3. Intermediate Coat: Exterior alkyd enamel, matching topcoat.
4. Top Coat - Alkyd Industrial Enamel
 - a. ICI 4308 Devguard 4308 Alkyd Industrial Gloss Enamel
 - b. MS Tough Coat® Heavy Duty Alkyd Enamel
 - c. PL S45XX Techgard Maintenance Gloss Enamel
 - d. BM Benjamin Moore® Super Spec HP® D.T.M. Aklyd Gloss Enamel P26
 - e. SW B66W00111 - DTM Acrylic Gloss Acrylic Coating

END OF SECTION 09 9113

SECTION 09 9123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior substrates.
 - 1. Concrete masonry units (CMU).
 - 2. Steel.
 - 3. Galvanized metal.
 - 4. Gypsum board.

1.3 DEFINITIONS

- A. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- C. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. VOC content.

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1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials[, from the same product run,] that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide product listed in other Part 3 articles for the paint category indicated.
- B. Painting Systems Schedule: All trade names and numbers listed hereinafter are in the following order, unless specifically shown otherwise:
 - 1. ICI ICI/GLIDDEN AND DEVOE
 - 2. MS Martin Senour
 - 3. PL Pratt and Lambert
 - 4. BM Benjamin Moore
 - 5. SW Sherwin Williams

2.2 PAINT, GENERAL

- A. Material Compatibility:

SECTION 09 9123 - INTERIOR PAINTING

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.
1. Nonflat Paints and Coatings: 150 g/L.
 2. Primers, Sealers, and Undercoaters: 200 g/L.
 3. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 4. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
- C. Colors: As indicated in a color schedule.
1. 30 percent of surface area will be painted with deep tones.
- 2.3 SOURCE QUALITY CONTROL
- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic

SECTION 09 9123 - INTERIOR PAINTING

moisture meter as follows:

1. Concrete: 12 percent.
 2. Masonry (Clay and CMU): 12 percent.
 3. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:

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1. SSPC-SP 2, "Hand Tool Cleaning."
 2. SSPC-SP 3, "Power Tool Cleaning."
 3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- 3.3 APPLICATION
- A. Apply paints according to manufacturer's written instructions.
1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.

SECTION 09 9123 - INTERIOR PAINTING

- c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.
 - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
2. Paint the following work where exposed in occupied spaces:
- a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.
3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
- 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

SECTION 09 9123 - INTERIOR PAINTING

- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. CMU Substrates:

1. Block Filler -Heavy Duty Interior/Exterior Heavy Duty Block Filler
 - a. BM Super Spec® HP Latex Block Filler 160
 - b. ICI 4000 Blok-Fill Int/Ext Heavy Duty Acrylic Block Filler
 - c. MS ProLine® Premium Int/Ext Heavy Duty Block Filler
 - d. PL Z8465 Enducryl Int/Ext Heavy Duty Latex Block Filler
 - e. SW B25W00025 - Preprite Interior/Exterior Latex Block Filler
2. Intermediate Coat - Waterborne Polyamide High Performance Acrylic Semi-Gloss Epoxy matching top coat
3. Top Coat – Waterborne Polyamide High Performance Acrylic Semi-Gloss Epoxy
 - a. BM Polyamide Epoxy Semi-Gloss Coating M36/M38
 - b. ICI 4406 Devoe Tru-Glaze-WB Waterborne Polyamide Semi Gloss Epoxy
 - c. MS Super Tough Coat® Acrylic Water Based Epoxy
 - d. PL Enducryl® HP (High Performance) Water-Based Epoxy
 - e. SW B70W00211 - Waterbased Catalyzed Epoxy (Part A), Two-part epoxy - Part B B60V25

B. Steel Substrates:

1. Prime Coat – Alkyd MultiPurpose Metal
 - a. BM Super Spec HP Universal Alkyd Metal Primer P07
 - b. ICI 4160 Devguard Multi-Purpose Tank and Structural Primer
 - c. MS Tough Coat® Rust Control Universal Metal Primer
 - d. PL S45XX Steeltech® Rust Inhibitive Metal Primer
 - e. SW
2. Intermediate Coat: Alkyd Industrial Enamel, matching topcoat.
3. Top Coat - Alkyd Industrial Enamel
 - a. BM Benjamin Moore® Super Spec HP® D.T.M. Aklyd Gloss Enamel P26
 - b. ICI 4308 Devguard 4308 Alkyd Industrial Enamel
 - c. MS Tough Coat® Heavy Duty Alkyd Enamel
 - d. PL S45XX Techgard Maintenance Gloss Enamel
 - e. SW

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C. Galvanized-Metal Substrates:

1. Primer-Waterborne Acrylic DTM Metal Primer
 - a. BM SuperSpec Acrylic Metal Primer 004
 - b. ICI 4020 Devflex DTM Flat Interior/Exterior Waterborne Primer Finish
 - c. MS Super Tough Coat® Acrylic Prime & Finish
 - d. PL Z190 Steeltech® Acrylic Prime or Finish
 - e. SW
2. Intermediate Coat: Waterborne Int/Ext Waterborne Acrylic Semi-Gloss, matching topcoat.
3. Top coat-Waterborne Int/Ext Waterborne Acrylic Semi-Gloss
 - a. BM DTM Acrylic Semi-Gloss M29
 - b. ICI 4206 Devflex Interior/Exterior Waterborne Acrylic Semi-Gloss
 - c. MS Super Tough Coat® Acrylic Semi-Gloss Enamel
 - d. PL 6620 Enducryl® Acrylic Semi-Gloss Enamel
 - e. SW

D. Gypsum Board Substrates:

1. Prime Coat - Waterborne Acrylic Latex
 - a. BM: Super Spec® Latex Enamel Undercoater & Primer Sealer 253
 - b. ICI: Prep&Prime Gripper Multi-Purpose Primer 3210
 - c. MS: T.P.S.® Interior Multi-Surface Latex Enamel Undercoater
 - d. PL: Z1013 SUPRIME® Interior Latex Enamel Undercoater
 - e. SW: B28W02600 - ProMar 200 Zero VOC Interior Latex primer
2. Intermediate Coat: Waterborne Polyamide High Performance Acrylic Semi-Gloss Epoxy, matching topcoat.
3. Top Coat – Waterborne Polyamide High Performance Acrylic Semi-Gloss Epoxy
 - a. BM: Polyamide Epoxy Semi-Gloss Coating M36/M38
 - b. ICI: 4406 Devoe Tru-Glaze-WB Waterborne Polyamide Semi-Gloss Epoxy
 - c. MS: Super Tough Coat® Acrylic Water Based Epoxy
 - d. PL: Enducryl® HP (High Performance) Water-Based Epoxy
 - e. SW: B70W00211 - Waterbased Catalyzed Epoxy (Part A), Two-part epoxy - Part B B60V25

END OF SECTION 09 9123

SECTION 10 2800 – TOILET ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Public-use washroom accessories.
 - 2. Public-use shower room accessories.
 - 3. Underlavatory guards.
 - 4. Custodial accessories.
- B. Owner-Furnished Material: Soap Dispensers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.
 - 2. Identify products using designations indicated.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

SECTION 10 2800 – TOILET ACCESSORIES

1.5 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.7 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- C. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- D. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

SECTION 10 2800 – TOILET ACCESSORIES

- F. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:

- 1. American Specialties, Inc.
- 2. Bobrick Washroom Equipment, Inc.
- 3. Bradley Corporation.

- B. Changing stations:

- 1. KB-200SS

- C. Roll towel dispenser:

- 1. Bobrick B-2974

- D. Toilet Tissue (Roll) Dispenser :

- 1. Basis-of-Design Product: TP Series by Royce Rolls Ringer, SS.
- 2. Mounting: Surface mounted.

- E. Liquid-Soap Dispenser :

- 1. Description: Provided by Owner and designed for dispensing soap in liquid or lotion form.
- 2. Mounting: Vertically oriented, surface mounted.

- F. Grab Bar :

- 1. Basis-of-Design Product: Bobrick; B6806 x 36, B6806 x 42 .
- 2. Mounting: Flanges with concealed fasteners.
- 3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
- 4. Outside Diameter: 1-1/4 inches.
- 5. Configuration and Length: As indicated on Drawings.

- G. Mirror Unit :

- 1. Basis-of-Design Product: Bobrick B2908.
- 2. Frame: Stainless-steel channel.

SECTION 10 2800 – TOILET ACCESSORIES

- a. Corners: Welded and ground smooth.
3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
4. Size: As indicated on Drawings.

2.3 UNDERLAVATORY GUARDS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
 1. Plumberex Specialty Products, Inc.
 2. Truebro by IPS Corporation.
 3. TCI Products
- B. Underlavatory Guard :
 1. Basis-of-Design Product: Truebo Lav Guard 2.
 2. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
 3. Material and Finish: Antimicrobial, molded plastic, white.

2.4 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

SECTION 10 2800 – TOILET ACCESSORIES

- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10 2800

SECTION 32 11 00

GRADED AGGREGATE BASE COURSE

PART 1 GENERAL

1.1 SCOPE

- A. This section specifies requirements for furnishing materials and constructing a quality controlled graded aggregate base course on a compacted subgrade, for flexible pavements.
- B. Contractor shall provide all service, labor, materials, and equipment required for the aggregate base course necessary to complete the work as shown on the drawings or specified in these specifications, or as determined in the field jointly by the Contractor and Owner.

1.2 RELATED SECTIONS

- A. Section 31 11 00 – Clearing & Grubbing
- B. Section 32 12 16 – Asphalt Concrete Paving

1.3 REFERENCES

- A. AASHTO Specifications:
 - 1. AASHTO T 96-91 – Resistance to Abrasion of Small Size Coarse Aggregate by Use of Los Angeles Machine.
 - 2. AASHTO T 180-90 – Moisture – Density Relations of Soils Using a 10-lb (4.5 kg) Rammer and an 18-in. (457 mm) Drop.
- B. ASTM Standards:
 - 1. ASTM D 1556-90 – Density and Unit Weight of Soil in Place by the Sand-Cone Method.
 - 2. ASTM D 1557-91 – Laboratory Compaction Characteristics of Soil Using Modified Effort.
 - 3. ASTM D 2167-94 – Density and Unit Weight of Soil in Place by the Rubber

Balloon Method.

4. ASTM D 2922-91 – Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
5. ASTM D 3017-88 (1993) – Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
6. ASMT D 3740-94 – Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock Used in Engineering Design and Construction.
7. ASTM E 329-93 – Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

1.4 REGULATORY REQUIREMENTS

- A. Perform all work in accordance with the Department of Transportation, State of Georgia, Standard Specifications, current edition.

1.5 SUBMITTALS

- A. Provide certificates stating that materials supplied comply with Specifications. Certificates shall be signed by the producer and the Contractor.

1.6 CONDITIONS

- A. Weather Limitations
 1. Do not conduct base placement operations when surface is wet, frozen or contains excess of moisture which would prevent uniform distribution and required penetration.
 2. Place base course when air temperature is above 35 degrees F and rising. No base course shall be placed on a frozen or muddy subgrade.
- B. Grade Control: Establish and maintain the required lines and grades for each course during construction operations.

1.7 INSPECTION AND TESTING

- A. Testing laboratory shall operate in accordance to ASTM D 3740 and E 329 and

shall be accepted by the Owner.

- B. The testing laboratory and Owner shall be given a minimum of 48 hours notice prior to taking any of the tests.
- C. Testing shall be the responsibility of the Contractor and shall be performed at the Contractor's expense by a commercial testing laboratory that operates in accordance with 1.7.A above.
- D. Test results shall be furnished to the Owner in a timely manner.
- E. The testing agency shall test in-place courses for compliance with specified compaction, thickness and surface smoothness requirements.
- F. Graded Aggregate Base Compaction: Minimum acceptable density shall be 100 percent of maximum dry density in accordance with ASTM D 1556. Conduct one test for each 5000 square feet of in-place material, but in no case less than one daily for each layer. Test the density of graded aggregate base according to ASTM D 2167 (rubber balloon method), ASTM D 2937 (sand cone method) or nuclear method of ASTM D 2922.
- G. Base Thickness: Inspect the cores of the base course to determine the average thickness of the course. If the average thickness exceeds the allowable variation below, additional cores shall be made at the Contractor's expense to determine the area of deficient thickness. The deficient area shall be corrected by overlay with the same type base.
 - 1. Base Course Tolerance: +/- 1/2-inch
- H. Surface Smoothness: Test finished surface of the base course for smoothness using a 10 foot straight edge. Intervals of tests shall be as directed by the Owner. Surfaces will not be acceptable if the base course exceeds 1/4-inch in 10 feet.
- I. Compacted base layer shall be tested before asphalt paving construction work is performed.
- J. Contractor's Duties Relative to Testing
 - 1. Notify laboratory of conditions requiring testing.
 - 2. Coordinate with laboratory for field testing.

3. Pay costs for all retesting where initial tests reveal non-conformance with specified requirements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. **Coarse Aggregate:** Aggregate retained on the No. 4 sieve shall consist of durable, angular fragments of gravel or crushed stone obtained from an approved quarry, and shall be capable of withstanding the effects of handling, spreading, and compaction with minimum degradation.
- B. **Fine Aggregate:** Material passing the No. 4 sieve shall consist essentially of particles produced from the crushing of coarse aggregate at the approved source. Other types of fine aggregate, if permitted for use, shall meet the Georgia Department of Transportation's requirements.
- C. **Grading:** The Graded Aggregate Base Course material shall be of uniform quality throughout. The graded aggregate may be produced from an approved source or deposit which will yield a satisfactory mixture conforming to all requirements of these Specifications after it has been crushed or processed as a part of the mining operations, or the material may be furnished in two sizes of such gradation that when combined in the central mix plant the resultant mixture shall conform to the required Specifications. In addition, the aggregate shall be free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign material and shall be durable and sound. The aggregate shall meet the applicable requirements of Section 815 – Graded Aggregate of the Department of Transportation, State of Georgia, Standard Specifications, Construction of Roads and Bridges, Current Edition.

The material shall meet the following gradation:

Sieve Size	Percent by Weight Passing
2"	100
1-1 ½"	95-100
1"	75-95
3/8"	40-75
#4	30-60
#10	20-45
#40	15-30
#200	5-20
Liquid Limit	0-25
Plasticity Index	0-6

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

- A. Verify subgrade has been inspected, is dry, and gradients and elevations are correct.
- B. The subgrade shall be leveled to the lines and grades of the plans and cleaned of all foreign substances prior to constructing the base course.
- C. Do not place base on soft, muddy or frozen surfaces.
- D. Correct irregularities in subgrade gradient and elevation by scarifying, reshaping, and re-compacting.
- E. Thorough compaction of the subgrade with appropriate equipment. In general the upper 12 inches of the subgrade should be compacted to at least 100% of AASHTO T-99 maximum dry density. Sheepsfoot rollers usually perform well in cohesive soils such as clays and silts. Vibratory rollers and pneumatic tired rollers can be used in cohesionless soils such as sands.
- F. The surface of the subgrade shall be checked by the Owner for adequate compaction and surface tolerances. Ruts or soft yielding spots that may appear in areas of the subgrade course having inadequate compaction, and areas not smooth or which vary in elevation more than 3/8-inch above or below the required grade established on the plans shall be corrected to the satisfaction of the Owner. Base material shall not be placed until subgrade has been properly prepared and test results have so indicated.

3.2 AGGREGATE PLACEMENT

- A. Aggregate shall be placed with an acceptable spreader in accordance with the Department of Transportation's, State of Georgia, Standard Specifications for Construction of Roads and Bridges, Current Edition, Section 300 and in accordance with all terms included in these specifications. (The spreader shall contain a hopper and adjustable screed and be so designed that there will be a uniform, steady flow of material from the hopper. The spreader shall be capable of laying material without segregation across the full width of the lane to a uniform thickness and to a uniform loose density.) Spreaders are not required on curb and gutter road sections.
- B. Level and contour surfaces to elevations and gradients indicated.

- C. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- D. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- E. Use mechanical tamping equipment in areas inaccessible to compaction equipment.
- F. While at optimum moisture ($\pm 1 - \frac{1}{2} \%$), compact the base course with rollers capable of obtaining the required density. Vibratory, flat wheel, and other rollers accepted by the Owner may be used to obtain the required compaction. Rolling shall continue until the base is compacted to 95% of the maximum laboratory dry density as determined by ASTM D 1557 or AASHTO T 180. In-place density of the compacted base will be determined in accordance with ASTM D 1556 or ASTM D 2922.

3.3 TOLERANCES

- A. Flatness: Maximum variation of $\frac{1}{4}$ inch measured with an acceptable 10-foot straight edge.
- B. Scheduled Compacted Thickness: Within $\frac{3}{8}$ inch.
- C. Variation from Design Elevation: Within $\frac{3}{8}$ inch.
- D. Depth measurements for compacted thickness shall be made by test holes through the base course. Where the base course is deficient, correct such areas by scarifying, adding base material and recompacting as directed by the Owner. Measurements shall be made at staggered intervals not to exceed 250 feet for two-lane streets and roads.

END OF SECTION

SECTION 31 23 33

TRENCH EXCAVATION AND BACKFILL

PART 1 GENERAL

1.1 SCOPE

- A. The work under this section consists of furnishing all labor, equipment and materials and performing all operations in connection with the trench excavation and backfill required to install the site utilities, including all pipelines and conduits shown on the drawings and as specified.
- B. Site utility excavations shall include the removal of trees, stumps, brush, debris or other obstacles which remain after the clearing and grubbing operations, which may obstruct the work, and the excavation and removal of all earth, rock or other materials to the extent necessary to install the utility and appurtenances in conformance with the lines and grades shown on the Drawings and as specified.
- C. Site utility backfill shall include the refilling and compaction of the fill in the trenches and excavations up to the surrounding ground surface or road grade at crossing.

1.2 DEFINITIONS

- A. The trench is divided into five specific areas:
 - 1. **Foundation:** The area beneath the bedding sometimes referenced to as trench stabilization.
 - 2. **Bedding:** The area above the trench bottom (or foundation) and below the bottom of the utility.
 - 3. **Haunch:** The area above the bottom of the utility to a specified height along the utility.
 - 4. **Initial Backfill:** The area above the haunch and below an 18-inch plane above the top of the utility.
 - 5. **Final Backfill:** 18-inch plane over the top of the utility to the proposed grade (elevation).

1.3 REFERENCES

- A. ASTM D 698 – Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, current edition.
- B. ASTM D 1556 – Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method, current edition.
- C. ASTM D 2937 – Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method, current edition.

- D. ASTM D 2487 – Standard Classification of Soils for Engineering Purposes, current edition.
- E. ASTM D 2488 – Practice for Description and Identification of Soils (Visual-Manual Procedure), current edition.
- F. ASTM D 2922 – Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth), current edition.
- G. ASTM D 3017 – Standard Test Method Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth), current edition.

1.4 QUALITY ASSURANCE

- A. Density: Tests for compaction and density shall be conducted by an independent testing laboratory selected and paid for by the Contractor.
- B. The soils testing laboratory is responsible for the following:
 - 1. Field compaction testing shall be based on using the maximum dry density determined by the Standard Proctor Compaction Test in accordance with ASTM D-698.
 - 2. Maximum dry density for non-cohesive materials shall mean the maximum index density as determined by ASTM D 4253.
 - 3. Determination of in-place backfill density shall be done in accordance with ASTM D 1556, ASTM D 2937, or ASTM D 2922.
 - 4. Field density tests for each two feet of lift.
 - 5. Inspecting and testing stripped site, subgrades and proposed fill materials.
- C. Contractor is responsible for:
 - 1. Notifying laboratory of conditions requiring testing.
 - 2. Coordinating with laboratory for field testing.
 - 3. Providing representative fill soil samples to the laboratory for test purposes. Provide 50 pound samples of each fill soil.
- D. Sources and Evaluation Testing:
 - 1. Testing of materials to certify conformance with the Specifications shall be performed in accordance with Section 02300.

PART 2 PRODUCTS

2.1 TRENCH FOUNDATION MATERIALS

- A. Crushed stone shall be utilized as foundation materials should existing native materials not be acceptable to support the entire length of the pipe section.

Unless otherwise detailed, foundation materials shall have earth material trench foundations.

- B. Crushed stone shall conform to Georgia DOT Standard Specifications for Construction, 800.01, size No's. 78 and 57.

2.2 BEDDING AND HAUNCHING MATERIALS

- A. Unless detailed or specified otherwise, all bedding material shall be classified as SW or SP under the Unified Soil Classification System.
- B. For pressurized mains, earth materials utilized to bed and haunch shall be suitable materials selected from materials excavated from the trench. Suitable materials shall be clean and free of rock, organics, cinders, stumps, limbs, frozen earth or mud, man-made wastes and other unsuitable materials. Should the material excavated from the trench be saturated, the saturated material may be used for bedding and haunch material, provided it is allowed to dry properly and it is capable of meeting the specified compaction requirements. When necessary, earth bedding and haunch materials shall be moistened to facilitate compaction by tamping. If materials excavated from the trench are not suitable for use as bedding or haunch material, provide select material conforming to the requirements of this Section at no additional cost to the Owner.

2.3 INITIAL BACKFILL

- A. Initial backfill material shall be acceptable earth materials as detailed and specified herein.
- B. Earth materials utilized for initial backfill shall be suitable materials selected from materials excavated from the trench. Materials shall be clean and free of rock, organics, cinders, stumps, limbs, or frozen earth or mud, man-made wastes and other unsuitable materials for at least one foot above the top of the pipe. No stone larger than ¾-inches in its greatest dimension shall be used for backfill. Should the material excavated from the trench be saturated, the saturated material may be used for initial backfill, provided it is allowed to dry and it is capable of meeting the specified compaction requirements. When necessary, initial backfill materials shall be moistened to facilitate compaction by tamping. If materials excavated from the trench are not acceptable for use as initial backfill material, provide select material conforming to the requirements of this Section at no additional cost to the Owner.

2.4 FINAL BACKFILL

- A. Final backfill material shall be general excavated earth materials, shall not contain rock larger than 4-inches at its greatest diameter, cinders, stumps, limbs, man-made wastes. If materials excavated from the trench are not acceptable for use as final backfill material, provide select material conforming to the requirements of this Section at no additional cost to the Owner.

2.5 SELECT BACKFILL

- A. Select backfill shall be materials which meet the requirements as specified for bedding, haunch, initial backfill or final backfill materials, including compaction requirements.

- B. Use materials classified as GW, GP, GM, SW or SP under the Unified Soil Classification System.

2.6 CONCRETE

- A. Concrete for bedding, haunch, initial backfill or encasement shall have a minimum 3000psi compressive strength at 28 days.

PART 3 EXECUTION

3.1 GENERAL

- A. Conduct all construction operations in accordance with the U.S. "Occupational Safety and Health Act of 1970", the Standards of the U.S. Department of Labor, Occupational Safety and Health Administration and the latest amendments thereto.
- B. Protect structures, utilities, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by trenching operations.

3.2 PREPARATION

- A. Identify required lines and levels.
- B. Maintain benchmarks, other control points, existing structures, and paving. If disturbed or destroyed, re-establish at no additional cost to the Owner.
- C. Locate existing utilities and structures above or below ground before excavation starts.
- D. Maintain and protect existing utilities not designated for removal. When utilities are encountered but are not shown on the drawings, or when locations differ from those shown on the drawings, notify the Owner for instructions before proceeding.

3.3 TRENCH EXCAVATION

- A. Description: The trench shall be dug to the alignment and grade required and not to exceed 200 feet in advance of the pipe laying. The trench shall be braced if necessary and drained in order that workmen therein may work safely and efficiently. It is essential that the discharge from any pumps be led to natural drainage channels or to drains.
- B. Width: Minimum width of trench shall be six (6) inches from the outside of barrel of pipe on each side of pipe. Maximum width of trench shall be nine (9) inches from the outside of barrel of pipe on each side of pipe. Sides of trench shall be dug and maintained. Contractor shall adhere to all applicable requirements of OSHA for trench safety.
- C. Correcting Faulty Grade: Any part of the trench excavated below grade shall be corrected with acceptable material thoroughly compacted.

- D. Bell hole dimensions shall be dug in trenches at each joint to permit the joint to be made.
- E. Braced and Sheeted Trenches: Wherever necessary to prevent caving, excavations shall be sheeted and braced. Where sheeting and bracing are used, the trench width shall be increased accordingly. Trench sheeting shall remain in place until the pipe has been laid, tested for defects, and repaired if necessary, and the earth around it compacted to a depth of two feet over the top of the pipe.
- F. Trench Stabilization: Wherever the material at the bottom of the trench is not acceptable for installation of the pipe, it shall be removed and replaced with select material.
- G. When so directed by the Owner, undercut the trench and backfill with No. 57 stone meeting the requirements of GA D.O.T. Specification 800.01. Place and compact this material to bring the trench to the required grade.
- H. Pipe Alignment and Grade: The pipe shall be laid in the trench so that the interior surface of pipe shall conform accurately to the grades and alignments fixed and shown on the plans.
- I. Haunch Sewer Pipe: Haunch pipelines in accordance with detail drawing and the following specifications. Contractor shall pay close attention to the haunch procedures for all pipe installations.
- J. Bedding Sewer Pipe: Bed pipelines in accordance with the following specifications.
 - 1. PVC Sewer: All bedding materials shall be crushed stone unless shown or specified otherwise. Crushed stone bedding materials shall meet the requirements of Georgia Department of Transportation Specification 800.01 for No. 78 stone.
 - 2. Ductile Iron Sewer: All bedding materials shall be crushed stone unless shown or specified otherwise. Crushed stone bedding material shall meet the requirements of Georgia Department of Transportation Specification 800.01 for No. 57 stone.
 - 3. Sewer Laterals: The bedding requirement for the laterals from the main sewer to the structure shall be the same as applicable to the main sewer.
 - 4. Manholes: All bedding materials shall be crushed stone unless shown or specified otherwise. Crushed stone bedding materials shall meet the requirements of Georgia Department of Transportation Specification 800.01 for No 57 stone.
 - 5. General: Compact stone bedding material by tamping or slicing with a flat-blade shovel. Prepare the trench bottom to support the pipe uniformly throughout its length. Provide bell holes to relieve pipe bells of all loads. If the trench is excavated to excessive width or depth, provide the next better class of bedding. In rock trenches, bed pipe in at least six inches of bedding material.
- K. Bedding Classifications: All gravity sanitary sewer installations shall conform to the following bedding classifications.

1. Ductile Iron Sewer: Lay all ductile iron pipe with Type "B" bedding unless otherwise specified. Bedding shall be prepared according to the following specifications.
 - a. Type "A": Excavate the trench to a depth of one-fourth the nominal diameter of the pipe below grade and lay the pipe to line and grade on concrete block. Place concrete, with a minimum compressive strength of 1500psi to the full width of the trench and to a height of one-fourth the outside diameter of the pipe above the invert.
 - b. Type "B": Excavate the bottom of the trench flat at a minimum depth shown on the Drawings below the bottom of the pipe barrel. The Contractor shall place and compact bedding material to the proper grade. Bedding shall then be carefully placed by hand and compacted to provide full support under and up to the centerline of the pipe.
 - c. Type "C": Excavate the bottom of the trench flat at a minimum depth shown on the Drawings, below the bottom of the pipe barrel. The Contractor shall place and compact bedding materials to the proper grade. Bedding shall then be carefully placed by hand and compacted to provide full support under and up to a height of one-fourth the outside diameter of the pipe invert.
2. PVC: Excavate the bottom of the trench flat at a minimum depth shown on the Drawings below the bottom of the pipe barrel. Place the compact bedding material to the proper grade. Bedding shall then be carefully placed by hand and compacted to provide full support under the pipe and up to 6" above the crown of the pipe.
3. Sewer Laterals: The bedding requirements for the laterals from the main sewer to the structure shall be the same as applicable to the main sewer and as explained above.
- L. Manholes: Excavate to a minimum of 12 inches below the planned elevation of the base of the manhole. The Contractor shall place and compact stone bedding material to the required grade before constructing the manhole.
- M. Compaction: Bedding under pipe and manholes shall be compacted to a minimum of 95 percent of the maximum dry density as determined by a Standard Proctor Compaction Test, ASTM D-698, current edition.
- N. Care of Surface Material for Reuse: If local conditions permit their reuse, all surface materials suitable for reuse in restoring the surface shall be kept separate from the general excavation material.
- O. Manner of Piling Excavated Materials: All excavated materials shall be piled so that it will not endanger the work and avoid obstructing roads and driveways. Drainage channels shall be kept clear or other satisfactory provisions made for drainage.

- P. Trenching by Machine or by Hand: The use of trench digging machinery will be permitted except in places where operation of same will cause damage to existing structures above or below the ground; in which case, hand methods shall be employed.
- Q. Remove topsoil or stone paving from trench lines and stockpile for later use over compacted backfill.
- R. Excavate trenches to the depth shown on the drawings.
- S. Accurately grade the trench bottom to provide uniform bearing for the utility.
- T. Trim and shape trench bottom and leave free of irregularities, lumps, and projections.
- U. Removal of materials beyond the indicated subgrade elevation without authorization by the Owner shall be classified as unauthorized excavation and shall be backfilled and compacted at no additional cost to the Owner.
- V. Remove water from the excavation continuously throughout the progress of the work and keep the excavation dry until the pipe installation and backfilling are completed.
- W. Where underground streams or springs are found, provide temporary drainage and notify the Owner.

3.4 INITIAL BACKFILL

- A. As soon as practicable after the completion of laying and jointing of the pipe, the trench shall be backfilled, and at no time shall the completed backfilled trench be more than 200 feet behind the pipe laying. Initial backfill shall be placed to anchor the pipe, protect the pipe from damage by subsequent backfill and ensure the uniform distribution of the loads over the top of the pipe.
- B. Place initial backfill material carefully around the pipe in uniform layers to a depth of at least 18-inches above the pipe. Layer depths shall be a maximum of 6-inches for pipe 18-inches in diameter and smaller and a maximum of 12-inches for pipe larger than 18-inches in diameter.
- C. Backfill on both sides of the pipe simultaneously to prevent side pressures.
- D. Compact each layer thoroughly with suitable hand tools or tamping equipment being careful not to damage the pipe. Any pipe that is damaged shall be replaced at the Contractor's expense.
- E. Initial backfill shall be compacted to a minimum 98 percent of the maximum dry density, unless shown or specified otherwise.
- F. For conduit and duct banks, place the first 12-inches of initial backfill materials as specified in this Section. The Contractor shall place the remaining backfill in 6-inch layers and compact with hand tools or tamping equipment.
- G. If materials excavated from the trench are not acceptable for use as backfill materials, provide select backfill material conforming to the requirements of this Section.

- H. Maintain optimum moisture content of backfill materials to attain required compaction density.
- I. Restore and compact stone paving disturbed by trenching activities.

3.5 CONCRETE ENCASEMENT FOR PIPELINES

- A. Where concrete encasement is shown on the Drawings for pipelines, excavate the trench to provide a minimum of 6-inches clearance from the bell of the pipe. Lay the pipe to line and grade on concrete blocks. In lieu of bedding, haunch and initial backfill, place concrete to the full width of the trench and to a height of not less than 6-inches above the pipe bell. Do not backfill the trench for a period of at least 24 hours after concrete is placed.

3.6 FINAL BACKFILL

- A. After initial backfill materials has been placed and compacted, backfill with final backfill material. Place backfill material in uniform layers and compact each layer thoroughly as follows:
 - 1. In 6-inch layers, if using light power tamping equipment, such as a 'jumping jack.'
 - 2. In 12-inch layers, if using heavy tamping equipment, such as hammer with tamping feet.
 - 3. In 24-inch layers, if using a hydra-hammer.
- B. Final backfill shall be compacted to a minimum 98 percent of the maximum dry density, unless specified otherwise.
- C. Backfill shall provide a finished grade at the elevations shown on the Drawings.
- D. The top materials layer shall be topsoil obtained as specified in Section 02300 of these Specifications.
- E. If materials excavated from the trench are not acceptable for use as final backfill material, provide select backfill material conforming to the requirements of this Section.
- F. Settlement: If trench settles, re-fill and grade the surface to conform to the adjacent surfaces.
- G. Top Surface of Backfilling: ± 1 inch from required elevations.

3.7 ADDITIONAL MATERIAL

- A. Where final grades above the pre-construction grades are required to maintain minimum cover, additional fill material will be as shown on the Drawings. Utilize excess material excavated from the trench, if the material is acceptable. If excess excavated materials are not acceptable, or if the quantity available is not sufficient, provide additional acceptable fill material at the Contractor's expense.

3.8 BACKFILL UNDER ROADS

- A. Compact backfill underlying within ten (10) feet of pavement and sidewalks, and backfill under dirt and gravel roads to a minimum 98 percent of the Standard Proctor maximum dry density (ASTM D 698).

3.9 FIELD QUALITY CONTROL

- A. Testing of Trench Backfill Material
 - 1. Compaction/Density tests: minimum of one test for every 100 linear foot of trench.
- B. Materials not meeting density specification requirement shall be scarified, re-compacted, and retested at the Contractor's expense.
- C. The Owner may require additional tests to establish gradation, maximum density, and in-place density as working conditions dictate, at the Contractor's expense.

3.10 DETECTION TAPE

- A. Where required, detection tape shall be buried 4 to 10-inches beneath the ground surface directly over the top of the utility. Should detection tape need to be installed deeper, the Contractor shall provide 3-inch wide tape. In no case shall detection tape be buried greater than 20-inches from the finished grade surface.

END SECTION

SECTION 32 11 00

GRADED AGGREGATE BASE COURSE

PART 1 GENERAL

1.1 SCOPE

- A. This section specifies requirements for furnishing materials and constructing a quality controlled graded aggregate base course on a compacted subgrade, for flexible pavements.
- B. Contractor shall provide all service, labor, materials, and equipment required for the aggregate base course necessary to complete the work as shown on the drawings or specified in these specifications, or as determined in the field jointly by the Contractor and Owner.

1.2 RELATED SECTIONS

- A. Section 31 11 00 – Clearing & Grubbing
- B. Section 32 12 16 – Asphalt Concrete Paving

1.3 REFERENCES

- A. AASHTO Specifications:
 - 1. AASHTO T 96-91 – Resistance to Abrasion of Small Size Coarse Aggregate by Use of Los Angeles Machine.
 - 2. AASHTO T 180-90 – Moisture – Density Relations of Soils Using a 10-lb (4.5 kg) Rammer and an 18-in. (457 mm) Drop.
- B. ASTM Standards:
 - 1. ASTM D 1556-90 – Density and Unit Weight of Soil in Place by the Sand-Cone Method.
 - 2. ASTM D 1557-91 – Laboratory Compaction Characteristics of Soil Using Modified Effort.
 - 3. ASTM D 2167-94 – Density and Unit Weight of Soil in Place by the Rubber

Balloon Method.

4. ASTM D 2922-91 – Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
5. ASTM D 3017-88 (1993) – Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
6. ASMT D 3740-94 – Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock Used in Engineering Design and Construction.
7. ASTM E 329-93 – Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

1.4 REGULATORY REQUIREMENTS

- A. Perform all work in accordance with the Department of Transportation, State of Georgia, Standard Specifications, current edition.

1.5 SUBMITTALS

- A. Provide certificates stating that materials supplied comply with Specifications. Certificates shall be signed by the producer and the Contractor.

1.6 CONDITIONS

- A. Weather Limitations
 1. Do not conduct base placement operations when surface is wet, frozen or contains excess of moisture which would prevent uniform distribution and required penetration.
 2. Place base course when air temperature is above 35 degrees F and rising. No base course shall be placed on a frozen or muddy subgrade.
- B. Grade Control: Establish and maintain the required lines and grades for each course during construction operations.

1.7 INSPECTION AND TESTING

- A. Testing laboratory shall operate in accordance to ASTM D 3740 and E 329 and

shall be accepted by the Owner.

- B. The testing laboratory and Owner shall be given a minimum of 48 hours notice prior to taking any of the tests.
- C. Testing shall be the responsibility of the Contractor and shall be performed at the Contractor's expense by a commercial testing laboratory that operates in accordance with 1.7.A above.
- D. Test results shall be furnished to the Owner in a timely manner.
- E. The testing agency shall test in-place courses for compliance with specified compaction, thickness and surface smoothness requirements.
- F. Graded Aggregate Base Compaction: Minimum acceptable density shall be 100 percent of maximum dry density in accordance with ASTM D 1556. Conduct one test for each 5000 square feet of in-place material, but in no case less than one daily for each layer. Test the density of graded aggregate base according to ASTM D 2167 (rubber balloon method), ASTM D 2937 (sand cone method) or nuclear method of ASTM D 2922.
- G. Base Thickness: Inspect the cores of the base course to determine the average thickness of the course. If the average thickness exceeds the allowable variation below, additional cores shall be made at the Contractor's expense to determine the area of deficient thickness. The deficient area shall be corrected by overlay with the same type base.
 - 1. Base Course Tolerance: +/- 1/2-inch
- H. Surface Smoothness: Test finished surface of the base course for smoothness using a 10 foot straight edge. Intervals of tests shall be as directed by the Owner. Surfaces will not be acceptable if the base course exceeds 1/4-inch in 10 feet.
- I. Compacted base layer shall be tested before asphalt paving construction work is performed.
- J. Contractor's Duties Relative to Testing
 - 1. Notify laboratory of conditions requiring testing.
 - 2. Coordinate with laboratory for field testing.

3. Pay costs for all retesting where initial tests reveal non-conformance with specified requirements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. **Coarse Aggregate:** Aggregate retained on the No. 4 sieve shall consist of durable, angular fragments of gravel or crushed stone obtained from an approved quarry, and shall be capable of withstanding the effects of handling, spreading, and compaction with minimum degradation.
- B. **Fine Aggregate:** Material passing the No. 4 sieve shall consist essentially of particles produced from the crushing of coarse aggregate at the approved source. Other types of fine aggregate, if permitted for use, shall meet the Georgia Department of Transportation's requirements.
- C. **Grading:** The Graded Aggregate Base Course material shall be of uniform quality throughout. The graded aggregate may be produced from an approved source or deposit which will yield a satisfactory mixture conforming to all requirements of these Specifications after it has been crushed or processed as a part of the mining operations, or the material may be furnished in two sizes of such gradation that when combined in the central mix plant the resultant mixture shall conform to the required Specifications. In addition, the aggregate shall be free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign material and shall be durable and sound. The aggregate shall meet the applicable requirements of Section 815 – Graded Aggregate of the Department of Transportation, State of Georgia, Standard Specifications, Construction of Roads and Bridges, Current Edition.

The material shall meet the following gradation:

Sieve Size	Percent by Weight Passing
2"	100
1-1 ½"	95-100
1"	75-95
3/8"	40-75
#4	30-60
#10	20-45
#40	15-30
#200	5-20
Liquid Limit	0-25
Plasticity Index	0-6

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

- A. Verify subgrade has been inspected, is dry, and gradients and elevations are correct.
- B. The subgrade shall be leveled to the lines and grades of the plans and cleaned of all foreign substances prior to constructing the base course.
- C. Do not place base on soft, muddy or frozen surfaces.
- D. Correct irregularities in subgrade gradient and elevation by scarifying, reshaping, and re-compacting.
- E. Thorough compaction of the subgrade with appropriate equipment. In general the upper 12 inches of the subgrade should be compacted to at least 100% of AASHTO T-99 maximum dry density. Sheepsfoot rollers usually perform well in cohesive soils such as clays and silts. Vibratory rollers and pneumatic tired rollers can be used in cohesionless soils such as sands.
- F. The surface of the subgrade shall be checked by the Owner for adequate compaction and surface tolerances. Ruts or soft yielding spots that may appear in areas of the subgrade course having inadequate compaction, and areas not smooth or which vary in elevation more than 3/8-inch above or below the required grade established on the plans shall be corrected to the satisfaction of the Owner. Base material shall not be placed until subgrade has been properly prepared and test results have so indicated.

3.2 AGGREGATE PLACEMENT

- A. Aggregate shall be placed with an acceptable spreader in accordance with the Department of Transportation's, State of Georgia, Standard Specifications for Construction of Roads and Bridges, Current Edition, Section 300 and in accordance with all terms included in these specifications. (The spreader shall contain a hopper and adjustable screed and be so designed that there will be a uniform, steady flow of material from the hopper. The spreader shall be capable of laying material without segregation across the full width of the lane to a uniform thickness and to a uniform loose density.) Spreaders are not required on curb and gutter road sections.
- B. Level and contour surfaces to elevations and gradients indicated.

- C. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- D. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- E. Use mechanical tamping equipment in areas inaccessible to compaction equipment.
- F. While at optimum moisture ($\pm 1 - \frac{1}{2} \%$), compact the base course with rollers capable of obtaining the required density. Vibratory, flat wheel, and other rollers accepted by the Owner may be used to obtain the required compaction. Rolling shall continue until the base is compacted to 95% of the maximum laboratory dry density as determined by ASTM D 1557 or AASHTO T 180. In-place density of the compacted base will be determined in accordance with ASTM D 1556 or ASTM D 2922.

3.3 TOLERANCES

- A. Flatness: Maximum variation of $\frac{1}{4}$ inch measured with an acceptable 10-foot straight edge.
- B. Scheduled Compacted Thickness: Within $\frac{3}{8}$ inch.
- C. Variation from Design Elevation: Within $\frac{3}{8}$ inch.
- D. Depth measurements for compacted thickness shall be made by test holes through the base course. Where the base course is deficient, correct such areas by scarifying, adding base material and recompacting as directed by the Owner. Measurements shall be made at staggered intervals not to exceed 250 feet for two-lane streets and roads.

END OF SECTION

SECTION 32 12 16

ASPHALT CONCRETE PAVING

PART 1 GENERAL

1.1 SCOPE

- A. This section covers the general requirements for furnishing materials, labor, and equipment for installing asphalt concrete paving. The limits for the asphalt concrete paving are as shown on the construction plans or as denoted in these specifications.

1.2 RELATED SECTIONS

- A. Section 31 00 00 – Earthwork
- B. Section 32 11 00 – Graded Aggregate Base Course

1.3 REFERENCES

- A. ASTM Specifications:
 - 1. ASTM D 946-82 – Penetration-Graded Asphalt-Cement for Use in Pavement Construction.
 - 2. ASTM E 329-93b – Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
 - 3. ASTM D 3740-94 – Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock Used in Engineering Design and Construction.
 - 4. ASTM D 2726-93 – Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens.
 - 5. ASTM D 2950-91 – Density of Bituminous Concrete in Place by Nuclear Methods.
 - 6. ASTM D-1188-89 – Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens.
- B. AASHTO Guidelines:
 - 1. AASHTO-T 245-91 – Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.
 - 2. AASHTO-T 179-88 – Effect of Heat and Air on Asphalt Materials (Thin-film Oven Test).

1.4 REGULATORY REQUIREMENTS

- A. Perform work in accordance with Georgia Department of Transportation Standard Specifications for Construction of Transportation Systems, current edition, Section 400.
- B. Mixing Plan shall conform to Georgia Department of Transportation Standard Specifications, current edition, and regularly engage in the production of hot-mix, hot-laid asphalt concrete.

1.5 TESTING & INSPECTION

- A. Testing laboratory shall operate in accordance to ASTM D 3740 and E 329 and shall be accepted by the Owner.
- B. The testing laboratory and Owner shall be given a minimum of 48 hours notice prior to taking any of the tests.
- C. Testing shall be the responsibility of the Contractor and shall be performed at the Contractor's expense by a commercial testing laboratory that operates in accordance with 1.5.A above.
- D. Test results shall be furnished to the Owner in duplicate in a timely manner.
- E. The testing agency shall take one 4-inch diameter core per 1,100 square yards of paved surface at locations selected by the Owner for density and thickness test. Contractor shall repair holes resulting from coring to match existing paving.
- F. Compaction
 - 1. Asphaltic Concrete: Compare density of in-place material against laboratory specimen of same mixture. Minimum acceptable density of in-place material shall be 94 percent of the calculated voidless density based upon the effective specific gravity of the aggregate used. It is intended that acceptance density testing will be accomplished while the bituminous mixture is hot enough to permit further densification if such is shown to be necessary. If the density does not conform to the requirements stated herein above, the Contractor shall continue compaction effort until the required density is obtained.
- G. Pavement Thickness: Inspect the cores of the base and surface course to determine the average thickness of the course. If the average thickness exceeds the allowable variation below, additional cores shall be made at the Contractor's expense to determine the area of deficient thickness. The deficient area shall be corrected by overlay with the same type mix to the limits as determined by the Owner.
 - 1. Base Course Tolerance: +1/2-inch.
 - 2. Surface Course Tolerance: +1/4-inch.

- H. Surface Smoothness: Test finished surface of each asphalt course for smoothness using a 10 foot straightedge. Intervals of tests shall be as directed by the Owner. Surfaces will not be acceptable if exceeding the following:
1. Base Course Tolerance: 1/4-inch in 10 feet.
 2. Surface Course Tolerance: 1/8-inch in 10 feet.
- I. Contractor's Duties Relative to Testing
1. Notify laboratory of conditions requiring testing.
 2. Coordinate with laboratory for field testing.
 3. Pay all costs for re-testing where initial tests reveal non-conformance with specified requirements.
 4. Paying the cost of overlays or pavement removal and replacement which does not comply with the specified testing limits.

1.6 WEATHER CONDITIONS

- A. Do not place asphalt mixture when ambient air temperature is less than that indicated in the Table below.

Lift Thickness	Min. Air Temperature, Degrees F.
1" or less	55
1.1" to 2"	45
2.1" to 3"	35
3.1" to 4"	30
4.1" to 8"	Contractor's Discretion

- B. Mixture shall be delivered to the spreader at a temperature between 250 degrees F and 325 degrees F. Place mixture when temperature of the mixture is not more than 15 degrees F below bitumen supplier's bill of lading and not more than the maximum specified temperature.
- C. Do not mix or place asphalt concrete when the existing surface is wet or frozen.
- D. Apply bituminous prime and tack coats only when the ambient temperature in the shade is at least 40 degrees F.
- E. Place base course when air temperature is above 35 degrees F and rising. No base course shall be placed on a frozen or muddy subgrade.

1.7 SUBMITTALS

- A. Certificates: Provide certificates stating that materials supplied comply with Specifications. Certificates shall be signed by the asphalt producer and the Contractor.
- B. Mix Design: Submit mix design for each course to the Owner for acceptance.
- C. Asphalt spreader equipment shall be approved by the Owner. Submit design and operational data.
- D. Traffic paint manufacturer's application instructions and a description and other data relative to the Contractor's application equipment and methods shall be submitted to the Owner for approval.

PART 2 PRODUCTS

2.1 PRIME COAT

- A. Material: Shall consist of preparing and spraying the base course surface with low viscosity liquid asphalt such as MC-30 and RC-30, which is known as a Cut-Back Asphalt, and allowing the asphalt to penetrate as far as possible.
- B. The asphalt shall conform to Section 412 –Bituminous Prime of the Department of Transportation, State of Georgia, Standard Specifications, current edition.

2.2 TACK COAT

- A. Material: Shall be AC-20 or AC-30, asphalt cement, conforming to Section 413 – Bituminous Tack Coat and Section 820 – Asphalt Cement of the Department of Transportation, State of Georgia, Standard Specifications, current edition. When the temperature in the shade exceeds 70° F, an emulsion such as CRS-2h or CRS-3 may be used.

2.3 ASPHALT CEMENT AND ADDITIVES

- A. Asphalt Cement: Shall conform to the requirements of Section 820.1 – Asphalt Cement of the Department of Transportation, State of Georgia, Standard Specifications, current edition. The material shall be AC-30 with the exception that AC-20 having a penetration at 77°F not exceeding 80 and an initial viscosity at 77°F not less than 25 million poises may be used in lieu of AC-30. The loss on heating from the Thin-Film Oven Test shall not exceed 0.75%.
- B. Anti-Stripping: Shall conform to the requirements of Section 831.04 – Heat Stable Anti-Stripping Additive of the Department of Transportation, State of Georgia, Standard Specifications, current edition.

2.4 AGGREGATES

- A. General: Mineral aggregate shall be composed of fine aggregate or a combination of fine and coarse aggregate. Coarse aggregate shall be that portion of the material retained on a No.8 Sieve.
- B. Fine aggregate shall be considered that portion passing the No. 8 Sieve. Fine aggregate, coarse aggregate, and any additives in combination with the specified percentage of asphalt cement shall meet the requirements of test specified, before approval may be given for their individual use.
- C. Fine aggregate: Shall conform to the requirements of Section 802.01 – Fine Aggregate for Asphaltic Concrete of the Department of Transportation, State of Georgia, Standard Specifications, current edition.
- D. Coarse aggregate: Shall conform to the requirements of Section 802.02 – Coarse Aggregate for Asphaltic Concrete of the Department of Transportation, State of Georgia, Standard Specifications, current edition.
- E. Surface Coarse: The surface coarse shall consist of fine and coarse aggregate and mineral filler uniformly mixed with hot asphalt cement in an approved mixing plant. It shall also conform to the requirements of Section 828 of the DOT, State of Georgia, Standard Specifications, current edition. The gradations, asphalt content and stabilities shall be the following:

Square Sieve	Percent Passing
$\frac{3}{4}$ "	100
$\frac{1}{2}$ "	85-100
$\frac{3}{8}$ "	70-85
No. 8	44-48
No. 50	13-22
No. 200	4-7
Percent Asphalt	5.0-7.0
Marshall Stability @ 50 Blows (Design)	1500
Air Voids, % (Design)	4.5±0.5

- F. Intermediate or Binder Course: The Binder Course shall conform to the requirements of Section 828 of the DOT, State of Georgia, Standard Specifications, current edition. The mineral aggregates and asphalt cement shall be combined in such proportions that the composition by weight of the finished mixture shall be within the following range limits:

2.5 SOURCE QUALITY CONTROL

- A. Submit proposed mix design for review prior to beginning work.
- B. Test samples in accordance with the requirements of these specifications.

PART 3 EXECUTION

3.1 EXAMINATION

- A. ON-SITE OBSERVATIONS: The Owner will have the right to require that any portion of the work to be done in his presence and if the work is covered up after such instruction, it shall be exposed by the Contractor for observation at no additional cost to the Owner. However, if the Contractor notifies the Owner that such work is scheduled, and the Owner fails to appear within 48 hours, the Contractor may proceed without him. All work done and materials furnished shall be subject to review by the Owner. Improper work shall be reconstructed, and all materials, which do not conform to the requirements of the specifications, shall be removed from the work upon notice being received from the Owner for the rejection of such materials. The Owner shall have the right to mark rejected materials so as to distinguish them as such.
- B. Contractor verify that base has been inspected, is dry, and gradients and elevations are correct.

3.2 PREPARATION

- A. Apply prime coat in accordance with Section 412-Bituminous Prime of the Department of Transportation, State of Georgia, Standard Specifications, current edition. Rate of application shall be 0.20 gallons per square yard. All irregularities in the base course surface shall be corrected prior to application of the prime coat.
- B. Do not apply prime to a wet surface when the temperature is below 40°F in the shade. Do not apply prime when rain threatens nor when weather conditions prevent proper construction of prime coat.
- C. Apply tack coat in accordance with Section 413 – Bituminous Tack Coat of the Department of Transportation, State of Georgia, Standard Specifications, current edition. Rate of application shall be 0.06 gallons per square yard of surface.
- D. Work shall be planned so that no more tack coat than is necessary for the day's operation is placed on the surface. All traffic not essential to the work should be kept off the tack coat.
- E. Apply tack coat to contact surfaces of curbs and gutters. Apply in manner so exposed curb or gutter surfaces are not stained.
- F. Coat surfaces of manhole frames and inlets frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.
- G. Before beginning the application of the hot mix asphaltic concrete pavement, the existing surface shall be cleaned to the satisfaction of the Owner.

- H. Patching and Repair of Minor Defects: All potholes and broken areas in the existing surface and base, which require patching as directed by the Owner, shall be corrected prior to placing any leveling course. Areas to be patched shall be cut out, trimmed to vertical sides, and all loose material removed. It shall then be cleaned, primed, and tack coated.

3.3 EQUIPMENT

- A. Provide size and quantity of equipment to complete the work specified within the Project time schedule.
- B. Bituminous pavers shall be self-propelled, steel-wheeled and pneumatic-tired rollers that can reverse direction without backlash.
- C. Rolling equipment shall be self-propelled, steel-wheeled and pneumatic-tired rollers that can reverse direction without backlash.
- D. Provide rakes, lutes, shovels, tampers, smoothing irons, pavement cutters, portable heaters, and other miscellaneous small tools to complete the work specified.

3.1 PLACEMENT

- A. Construction shall be in accordance with Section 400 – Hot Mix Asphaltic Concrete Surface Construction of the Department of Transportation, State of Georgia, Standard Specifications, current edition.
- B. Place asphalt concrete mix on prepared surface, spread and strike-off using paving machine.
- C. Asphaltic concrete shall not be placed on a surface that is wet or frozen.
- D. Inaccessible and small areas may be placed by hand.
- E. Compaction shall commence as soon as possible after the mixture has been spread to the desired thickness. Compaction shall be continuous and uniform over the entire surface. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks. Compaction rolling shall be complete before material temperature drops below 185° F.
- F. Machine Placing
 - 1. Unless otherwise directed, begin placing along centerline of areas to be paved on crowned section, and at high side of sections on one way slope, and direction of traffic flow.
 - 2. After first strip has been placed and rolled, place succeeding strips and extend

rolling to overlap previous strips.

3. Complete base courses for a section before placing surface courses.
4. Place mixture in as continuous an operation as practical.

G. Hand Placing

1. Spread, tamp, and finish mixture using hand tools in areas where machine spreading is not possible.
2. Place mixture at a rate that will ensure handling and compaction before mixture becomes cooler than acceptable working temperature.

H. Joints

1. Make joints between old and new pavements, or between successive days work, to ensure a continuous bond between adjoining work.
2. Construct joints to have same texture, density and smoothness as adjacent sections of asphalt concrete course.
3. Clean contact surfaces free of sand, dirt, or other objectionable material and apply tack coat.
4. Offset transverse joints in succeeding courses not less than 24-inches.
5. Cut back edge of previously placed course to expose an even, vertical surface for full course thickness.
6. Offset longitudinal joints in succeeding courses not less than 6-inches.
7. When the edges of longitudinal joints are irregular, honeycombed, or inadequately compacted, cut back unsatisfactory sections to expose an even, vertical surface for full course thickness.

- I. Areas of pavement with deficient thickness or density shall be removed and replaced at no additional cost to the Owner.

3.5 ASPHALTIC CONCRETE COMPACTION

- A. Provide sufficient rollers to obtain the required pavement density.
- B. Begin rolling operations as soon after placing as the mixture will bear weight of roller without excessive displacement.

- C. Do not permit heavy equipment, including rollers to stand on finished surface before it has thoroughly cooled or set.
- D. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- E. Start rolling longitudinally at extreme lower side of sections and proceed toward center of pavement. Roll to slightly different lengths on alternate roller runs.
- F. Do not roll centers of sections first under any circumstances.
- G. Breakdown Rolling
 - 1. Accomplish breakdown or initial rolling immediately following rolling of transverse and longitudinal joints and outside edge.
 - 2. Operate rollers as close as possible to paver without causing pavement displacement.
 - 3. Check crown, grade, and smoothness after breakdown rolling. Repair displaced areas by loosening and filling, if required, with hot material.
- H. Second Rolling
 - 1. Follow breakdown rolling as soon as possible, while mixture is hot and in condition for compaction.
 - 2. Continue second rolling until mixture has been thoroughly compacted.
- I. Finish Rolling
 - 1. Perform finish rolling while mixture is still warm enough for removal of roller marks.
 - 2. Continue rolling until roller marks are eliminated and course has attained specified density.
- J. Patching
 - 1. Remove and replace defective areas.
 - 2. Cut-out and fill with fresh, hot asphalt concrete.
 - 3. Compact by rolling to specified surface density and smoothness.
 - 4. Remove deficient areas for full depth of course.

5. Cut sides perpendicular and parallel to direction of traffic with edges vertical.
6. Apply tack coat to exposed surfaces before placing new asphalt concrete mixture.

3.6 CLEANING AND PROTECTION

- A. Cleaning: After completion of paving operations, clean surfaces of excess or spilled asphalt materials.
- B. Protection
 1. After final rolling, do not permit vehicular traffic on asphalt concrete pavement until it has cooled and hardened and in no case no sooner than six hours.
 2. Provide barricades and warning devices as required to protect pavement and the general public until mixture has cooled enough to become marked.
- C. Maintenance: The Contractor shall maintain the surfaces of pavements until the acceptance of the Project. Maintenance shall include replacement, overlay, milling and reshaping as necessary to prevent raveling of the road material, the preservation of smooth surfaces and the repair of damaged or unsatisfactory surfaces.

3.6 TOLERANCES

- A. General: All paving shall be subject to visual and straightedge inspection during construction operations and thereafter prior to final acceptance. A 10 foot straightedge shall be maintained in the vicinity of the paving operation at all times for the purpose of measuring surface irregularities on all paving courses. The straightedge and labor for its use shall be provided by the Contractor. The surface of all courses shall be inspected with the straightedge as necessary to detect surface irregularities. Irregularities such as rippling, tearing, or pulling, which in the judgment of the Owner indicate a continuing problem in equipment, mixture or operation technique, will not be permitted to recur. The paving operation shall be stopped until appropriate steps are taken by the Contractor to correct the problem.
- B. Flatness: All irregularities in excess of $\frac{1}{8}$ " in 10' for surface courses and $\frac{3}{16}$ " in 10' for intermediate courses shall be corrected.
- C. Variation from Design Elevation: Less than $\frac{1}{4}$ ".
- D. Scheduled Compaction Thickness: Less than $\frac{1}{4}$ " under tolerance.
- E. Pavement Deficient in Thickness: When measurement of any core indicates that the pavement is deficient in thickness, additional cores will be drilled 10' either side of the deficient core along the centerline of the land until the cores indicate that the thickness conforms to the above specified requirements. A core indicating thickness deficiencies is

considered a failed test. Pavement deficient in thickness shall be removed and replaced with the appropriate thickness of materials. If the Contractor believes that the cores and measurements taken are not sufficient to indicate fairly the actual thickness of the pavement, additional cores and measurements will be taken, provided the Contractor will bear the extra cost of drilling the cores and filling the holes in the roadway as directed.

3.7 FIELD QUALITY CONTROL

- A. Quality acceptance of the in-place density of the surface course shall be in accordance with Section 400.05 – Construction, subparagraphs F and G of the Department of Transportation, State of Georgia, Standard Specifications, current edition.
- B. Density Testing: Performed in accordance with ASTM D 2726 and ASTM D 2950. Core samples for each day's operation shall be taken, tested, and the results reported to the Owner the following day. The areas sampled shall be properly restored by the Contractor at no additional cost to the Owner. Compaction must be accomplished when the temperature of the mix is above 185° F and below 300° F. When the density of the compacted course is less than 96% or more than 100% of the maximum laboratory density, the course will be rejected.
- C. Temperature:
 - 1. Asphaltic concrete shall not exceed 325° F at any time.
 - 2. Temperature at time of loading shall be recorded on the truck delivery ticket.
- D. Frequency of Test:
 - 1. Asphaltic Concrete – One (1) test for each 250 tons placed.
 - a. Asphalt extraction and gradation test.
 - b. Marshal Stability Test.
 - c. Core Sample.
 - 1. Field determination of density by the nuclear method every 5,000 square feet during construction of the base course.

END SECTION

SECTION 32 16 00

CONCRETE CURB & GUTTER AND SIDEWALK

PART 1 GENERAL

1.1 SCOPE

- A. The work included in this section includes furnishing all materials, equipment, and labor necessary to construct Portland Cement Concrete curb and gutter and sidewalk as shown on the construction plans.

1.2 RELATED SECTIONS

- A. Section 32 11 00 – Graded Aggregate Base Course

1.3 REFERENCES

A. ACI Code:

1. ACI 301 – Specifications for Concrete Buildings.
2. ACI 304 – Recommended Practice for Measuring, Measuring, Mixing, Transporting, and Placing Concrete.

B. ASTM Specifications:

1. ASTM A 185-94 – Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
2. ASTM A 497-94 – Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
3. ASTM A 615-95 – Deformed and Plain Billet-Street Bars for Concrete Reinforcement.
4. ASTM C 33-93 – Concrete Aggregates.
5. ASTM C 39-94 – Compressive Strength of Cylindrical Concrete Specimens
6. ASTM C 94-94 – Ready-Mixed Concrete.
7. ASTM C 150-05 – Portland Cement
8. ASTM C 260-94 – Air – Entraining Admixtures for Concrete.
9. ASTM C 309-94 – Liquid Membrane – Forming Compounds for Curing Concrete.
10. ASTM C 494-92 – Chemical Admixtures for Concrete
11. ASTM D 1751-83 (1991) – Preformed Expansion Joint Filler for Concrete Paving and Structures Construction. (Nonextruding and Resilient Bituminous Type).
12. ASTM D 1752-84 (1992) – Performed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
13. ASTM D 3740-94 – Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
14. ASTM E 329-93 – Agencies Engaged in the Testing and/or Inspection of Materials used in construction.

1.4 REGULATORY REQUIREMENTS

- A. Perform work in accordance with State of Georgia Department of Transportation, Standard Specifications, Current Edition.

- B. Conform to applicable standards for paving work on public property.

1.5 TESTING

- A. Testing laboratory shall operate in accordance to ASTM D 3740 and E 329 and shall be accepted by the Owner.
- B. The testing laboratory and Owner shall be given a minimum of 48 hours notice prior to taking any of the tests.
- C. Testing shall be the responsibility of the Contractor and shall be performed at the Contractor's expense by a commercial testing laboratory that operates in accordance with 1.4.A above.
- D. The Contractor shall submit for review a design mix for "Class A" concrete proposed for use. The mix shall be prepared by an approved testing laboratory. Compressive strength of at least four (4) specimens of the design mix shall indicate 15% higher than 28 days strengths specified. During the work, the Contractor shall make 3 test cylinders for each 75 cubic yards, or fraction thereof, of concrete placed each day. One cylinder shall be tested at 7 days and the other two at 28 days in accordance with ASTM C-39. Copies of all test reports shall be furnished to the Owner.

1.6 SUBMITTALS

- A. Product Data: Provide data on joint filler, admixtures, and curing compounds.
- B. Concrete Mix Design.

1.7 WEATHER CONDITIONS

- A. Do not place concrete when base surface temperature is less than 40° F, or surface is wet or frozen.

PART 2 PRODUCTS

2.1 FORM MATERIALS

- A. Shall conform to ACI 301.
- B. Shall be wood, plywood, metal or other accepted material and shall be of the grade or type suitable to obtain the finish specified. The material should be of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removed. Use straight forms, free of distortion and defects.

- C. Use flexible spring steel forms or laminated boards to form radius bends as required.
- D. Form Ties: Removable or snap-off type, galvanized metal, adjustable length, free of defects that could leave holes larger than 1-inch in concrete surface.
- E. Form Release Agent: Colorless mineral oil, which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

2.2 REINFORCING STEEL

- A. Reinforcing Steel: ASTM A 615, Grade 60 billet steel deformed bars; uncoated finish.
- B. Welded Steel Wire Fabric: Plain type, ASTM A-185; uncoated finish.
- C. When specifically called for on the plans, reinforcing bars shall be epoxy-coated in accordance with ASTM A-775.

2.3 CONCRETE MATERIALS

- A. Design mix to produce normal weight concrete consisting of Portland cement, aggregate, air-entrained admixture and water.
- B. Fine and Coarse Mix Aggregates: ASSTM C33.
- C. Water: Potable, not detrimental to concrete
- D. Air Entrainment: ASTM C260.

2.4 JOINT SEALERS

- A. Joint Fillers: ASTM D1751 Asphalt impregnated fiberboard or felt, tongue and groove profile.
- B. Sealant: Joints shall be sealed per detail on project drawings. ASTM C 920-94, Type S or M, Grade P or NS, Class 25.

2.5 CONCRETE MIX-BY PERFORMANCE CRITERIA

- A. Concrete mixed at the job site shall be mixed in a batch mixer in accordance with American Concrete Institution Standard A.C.I. 318, and in a similar manner subject to acceptance. Ready-mixed concrete shall conform to A.S.T.M. Standard C-94. Mixing time for stationary mixers over 1 cubic yard in capacity shall be increased 15 seconds for each additional ½ cubic yard or fraction thereof materials mixed. Construction shall be in accordance with applicable portions of "Building Code Requirements for Concrete" (A.C.I. – 318).
- B. Provide concrete to the following criteria:
 - 1. Flexible Strength: 700 psi
 - 2. Compressive Strength: 4,000 psi @ 28 days.
 - 3. Slump: 3 inches.
 - 4. Air Content: 5% to 8%
 - 5. Welded Wire Mesh (WWM): Welded plain cold-drawn steel wire fabric, ASTM A-185. Furnish in flat sheets.
 - 6. Fibermesh reinforced concrete shall be concrete with polypropylene, collated, fibrillated fibers meeting the requirements of ASTM C 1116. Provide 1.5 pounds of 1-1/2" fibers per cubic yard of concrete.
- C. Use accelerating admixtures in cold weather only when approved by Owner. Use of admixtures will not relax cold weather placement requirements.
- D. Use calcium chloride only when approved by Owner.
- E. Use set retarding admixtures during hot weather only when approved by Owner.

2.6 SOURCE QUALITY CONTROL AND TEST

- A. All sampling and testing services shall be performed at the Contractor's expense, by a testing laboratory which operates in accordance with ASTM D 3740 and E 329 latest edition and accepted by the Engineer.
- B. The Contractor shall submit for review a design mix for each class of concrete proposed for use. The mix shall be prepared by an approved testing laboratory. Compressive strength of a least four specimens of the design mix shall indicate 15% higher than 28 days strength specified. During the work, the Contractor shall make 3 test cylinders for each 30 cubic yards, or fraction thereof, of concrete placed each day. One cylinder shall be tested a 7 days and the other two at 28 days in accordance with ASTM C 39. Copies of all test reports shall be furnished to the Owner in duplicate.

PART 3 EXECUTION

3.1 CONSTRUCTION OBSERVATION

- A. Verify compacted subgrade & granular base are acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.
- C. The Owner will have the right to require that any portion of the work the done in his presence and if the work is covered up after such instruction, it shall be exposed by the Contractor for observation. However, if the Contractor notifies the Owner that such work is scheduled, and the Owner fails to appear within 48 hours, the Contractor may proceed without him. All work done and materials furnished shall be subject to review by the Owner. Improper work shall be reconstructed. All materials, which do not conform to the requirements of the specifications, shall be removed from the work upon notice being received from the Owner for the rejection of such materials. The Owner shall have the right to mark rejected materials so as to distinguish them as such.

3.2 SUBBASE

- A. Prepare subbase in accordance with Section 300 – Standard Specifications for Base and Subbase Courses, Department of Transportation, State of Georgia, current edition.
- B. Remove loose material from compacted subbase surface immediately before placing concrete.
- C. Proof-roll prepared subbase surface to check for unstable areas and need for additional compaction. Do not begin paving work until such conditions have been corrected and area is ready to receive paving.

3.3 PREPARATION FOR PLACEMENT

- A. Water shall be removed from excavations before concrete is deposited. Hardened concrete debris and other foreign materials shall be removed from the interior of forms and from the inside of mixing and conveying equipment. The reinforcement shall be made secure in position and shall be subject to examination and acceptance.
- B. Moisten base to minimize absorption of water from fresh concrete.
- C. Notify Owner minimum 48 hours prior to commencement of concreting operations.

3.4 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler in position, in straight lines. Secure to formwork during concrete placement.
- D. Forms shall be constructed to the shape, form line, and grade required and shall be maintained sufficiently rigid to prevent deformation under load. Formwork and details of construction shall conform to ACI-318, Chapter 6.
- E. Check completed formwork for grade and alignment to following tolerances:
 - 1. Top of forms shall not be more than 1/8" in 10'.
 - 2. Vertical face on longitudinal axis shall not be more than 1/4" in 10'.

3.5 REINFORCING

- A. Place Reinforcement as indicated.
- B. Interrupt reinforcement at expansion joints.

3.6 PLACING CONCRETE

- A. Placing of concrete shall conform to Chapter 5 of the American Concrete Institution Standard A.C.I. 318. Concrete having attained initial set or having contained water for more than 45 minutes shall not be used in the work. Concrete shall not be dropped freely more than 3 feet. Concrete shall be mixed and placed only when the temperature is at least 40 degrees F and rising. Concrete shall be placed only upon surfaces that are free from frost, ice, mud and other detrimental circumstances. When placed on dry soil or previous materials, waterproof paper or polyethylene sheeting shall be laid over the surfaces that are to receive the concrete.
- B. Ensure reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.
- C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

3.7 JOINTS

- A. Place expansion and/or contraction joints at 20 foot intervals. Align curb, gutter, and sidewalk joints.
- B. Place joint filler between paving components and building or other appurtenances. Recess filler $\frac{1}{4}$ inch.
- C. Provide saw joints at 3 feet intervals between sidewalks and curbs.
- D. Saw cut contraction joints $\frac{3}{16}$ inch wide at an optimum time after finishing. Cut $\frac{1}{3}$ into depth of slab.
- E. Finishing: After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.
- F. After floating, test surface for trueness with a 10' straightedge. Distribute concrete as required to remove subsurface irregularities, and refloat areas to provide a continuous smooth finish.

3.8 FINISHING

- A. Concrete Finishing: After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.
- B. After floating, test surface for trueness with a 10' straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.
- C. Work edges of gutters, back top edge of curb, and formed joints with an edging tool, and round to ½" radius, unless otherwise indicated. Eliminate tool marks on concrete surface.
- D. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Engineer.
- E. Sidewalk Paving: Finish with a light broom.

3.9 CONCRETE CURING

- A. Immediately after placement and finishing, concrete shall be protected from moisture loss for not less than 7 days. For concrete surfaces not in contact with forms, white-pigmented curing compound shall be uniformly applied after water sheen disappears from the concrete surface. Formed surfaces shall receive and application of curing compound if forms are removed during the 7 day curing period. Curing compound shall not be applied during rainfall.
- B. Curing compound shall be applied under pressure at the rate of 1 gallon to not more than 150 square feet by mechanical sprayers. The spraying equipment shall be of the fully atomizing type. At the time of use, the compound shall be thoroughly mixed with white pigments uniformly dispersed throughout the sprayer. Care shall be taken to prevent application to joints where concrete bond is required, to reinforcing steel and to joints where joint sealer is to be placed. The compound shall form a uniform continuous coherent film that will not crack or peel and shall be free from pinholes and other imperfections.
- C. Concrete surfaces that are subjected to heavy rainfall within 3 hours after curing compound has been applied shall be resprayed by the above method and at the above coverage at no additional expense to the Owner.

D. No pedestrian or vehicular traffic shall be allowed over the surface for seven days unless the surface is protected by planks, plywood, or sand. The protection shall not be placed until at least 12 hours after the application of the curing compound.

E. Protect concrete by suitable methods to prevent damage by mechanical injury or excessively hot or cold temperatures.

3.10 FIELD QUALITY CONTROL

A. Three concrete cylinders will be taken every 75 cubic yards of concrete placed each day.

B. One additional test cylinder will be taken during cold weather and cured on site under same conditions as concrete it represents.

C. One slump test will be taken for each set of test cylinders taken.

D. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.11 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Repair or Replace broken or defective concrete, as directed by Owner.

C. Allow testing company to drill test cores where directed by Owner, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

D. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

E. Sweep concrete curb and gutter and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.

END OF SECTION

SECTION 32 16 00

CONCRETE CURB & GUTTER AND SIDEWALK

PART 1 GENERAL

1.1 SCOPE

- A. The work included in this section includes furnishing all materials, equipment, and labor necessary to construct Portland Cement Concrete curb and gutter and sidewalk as shown on the construction plans.

1.2 RELATED SECTIONS

- A. Section 32 11 00 – Graded Aggregate Base Course

1.3 REFERENCES

- A. ACI Code:
 - 1. ACI 301 – Specifications for Concrete Buildings.
 - 2. ACI 304 – Recommended Practice for Measuring, Measuring, Mixing, Transporting, and Placing Concrete.
- B. ASTM Specifications:
 - 1. ASTM A 185-94 – Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
 - 2. ASTM A 497-94 – Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
 - 3. ASTM A 615-95 – Deformed and Plain Billet-Street Bars for Concrete Reinforcement.
 - 4. ASTM C 33-93 – Concrete Aggregates.
 - 5. ASTM C 39-94 – Compressive Strength of Cylindrical Concrete Specimens
 - 6. ASTM C 94-94 – Ready-Mixed Concrete.
 - 7. ASTM C 150-05 – Portland Cement
 - 8. ASTM C 260-94 – Air – Entraining Admixtures for Concrete.
 - 9. ASTM C 309-94 – Liquid Membrane – Forming Compounds for Curing Concrete.
 - 10. ASTM C 494-92 – Chemical Admixtures for Concrete
 - 11. ASTM D 1751-83 (1991) – Preformed Expansion Joint Filler for Concrete Paving and Structures Construction. (Nonextruding and Resilient Bituminous Type).

12. ASTM D 1752-84 (1992) – Performed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
13. ASTM D 3740-94 – Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
14. ASTM E 329-93 – Agencies Engaged in the Testing and/or Inspection of Materials used in construction.

1.4 REGULATORY REQUIREMENTS

- A. Perform work in accordance with State of Georgia Department of Transportation, Standard Specifications, Current Edition.
- B. Conform to applicable standards for paving work on public property.

1.5 TESTING

- A. Testing laboratory shall operate in accordance to ASTM D 3740 and E 329 and shall be accepted by the Owner.
- B. The testing laboratory and Owner shall be given a minimum of 48 hours notice prior to taking any of the tests.
- C. Testing shall be the responsibility of the Contractor and shall be performed at the Contractor's expense by a commercial testing laboratory that operates in accordance with 1.4.A above.
- D. The Contractor shall submit for review a design mix for "Class A" concrete proposed for use. The mix shall be prepared by an approved testing laboratory. Compressive strength of at least four (4) specimens of the design mix shall indicate 15% higher than 28 days strengths specified. During the work, the Contractor shall make 3 test cylinders for each 75 cubic yards, or fraction thereof, of concrete placed each day. One cylinder shall be tested at 7 days and the other two at 28 days in accordance with ASTM C-39. Copies of all test reports shall be furnished to the Owner.

1.6 SUBMITTALS

- A. Product Data: Provide data on joint filler, admixtures, and curing compounds.
- B. Concrete Mix Design.

1.7 WEATHER CONDITIONS

- A. Do not place concrete when base surface temperature is less than 40° F, or surface is wet or frozen.

PART 2 PRODUCTS

2.1 FORM MATERIALS

- A. Shall conform to ACI 301.
- B. Shall be wood, plywood, metal or other accepted material and shall be of the grade or type suitable to obtain the finish specified. The material should be of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removed. Use straight forms, free of distortion and defects.
- C. Use flexible spring steel forms or laminated boards to form radius bends as required.
- D. Form Ties: Removable or snap-off type, galvanized metal, adjustable length, free of defects that could leave holes larger than 1-inch in concrete surface.
- E. Form Release Agent: Colorless mineral oil, which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

2.2 REINFORCING STEEL

- A. Reinforcing Steel: ASTM A 615, Grade 60 billet steel deformed bars; uncoated finish.
- B. Welded Steel Wire Fabric: Plain type, ASTM A-185; uncoated finish.
- C. When specifically called for on the plans, reinforcing bars shall be epoxy-coated in accordance with ASTM A-775.

2.3 CONCRETE MATERIALS

- A. Design mix to produce normal weight concrete consisting of Portland cement, aggregate, air-entrained admixture and water.
- B. Fine and Coarse Mix Aggregates: ASSTM C33.
- C. Water: Potable, not detrimental to concrete
- D. Air Entrainment: ASTM C260.

2.4 JOINT SEALERS

- A. Joint Fillers: ASTM D1751 Asphalt impregnated fiberboard or felt, tongue and groove profile.
- B. Sealant: Joints shall be sealed per detail on project drawings. ASTM C 920-94, Type S or M, Grade P or NS, Class 25.

2.5 CONCRETE MIX-BY PERFORMANCE CRITERIA

- A. Concrete mixed at the job site shall be mixed in a batch mixer in accordance with American Concrete Institution Standard A.C.I 318, and in a similar manner subject to acceptance. Ready-mixed concrete shall conform to A.S.T.M. Standard C-94. Mixing time for stationary mixers over 1 cubic yard in capacity shall be increased 15 seconds for each additional ½ cubic yard or fraction thereof materials mixed. Construction shall be in accordance with applicable portions of “Building Code Requirements for Concrete” (A.C.I. – 318).

- B. Provide concrete to the following criteria:
1. Flexible Strength: 700 psi
 2. Compressive Strength: 4,000 psi @ 28 days.
 3. Slump: 3 inches.
 4. Air Content: 5% to 8%
 5. Welded Wire Mesh (WWM): Welded plain cold-drawn steel wire fabric, ASTM A-185. Furnish in flat sheets.
 6. Fibermesh reinforced concrete shall be concrete with polypropylene, collated, fibrillated fibers meeting the requirements of ASTM C 1116. Provide 1.5 pounds of 1-1/2" fibers per cubic yard of concrete.
- C. Use accelerating admixtures in cold weather only when approved by Owner. Use of admixtures will not relax cold weather placement requirements.
- D. Use calcium chloride only when approved by Owner.
- E. Use set retarding admixtures during hot weather only when approved by Owner.

2.6 SOURCE QUALITY CONTROL AND TEST

- A. All sampling and testing services shall be performed at the Contractor's expense, by a testing laboratory which operates in accordance with ASTM D 3740 and E 329 latest edition and accepted by the Engineer.
- B. The Contractor shall submit for review a design mix for each class of concrete proposed for use. The mix shall be prepared by an approved testing laboratory. Compressive strength of a least four specimens of the design mix shall indicate 15% higher than 28 days strength specified. During the work, the Contractor shall make 3 test cylinders for each 30 cubic yards, or fraction thereof, of concrete placed each day. One cylinder shall be tested at 7 days and the other two at 28 days in accordance with ASTM C 39. Copies of all test reports shall be furnished to the Owner in duplicate.

PART 3 EXECUTION

3.1 CONSTRUCTION OBSERVATION

- A. Verify compacted subgrade & granular base are acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.
- C. The Owner will have the right to require that any portion of the work the done in his presence and if the work is covered up after such instruction, it shall be exposed by the Contractor for observation. However, if the Contractor notifies the Owner that such work is scheduled, and the Owner fails to appear within 48 hours, the Contractor may proceed without him. All work

done and materials furnished shall be subject to review by the Owner. Improper work shall be reconstructed. All materials, which do not conform to the requirements of the specifications, shall be removed from the work upon notice being received from the Owner for the rejection of such materials. The Owner shall have the right to mark rejected materials so as to distinguish them as such.

3.2 SUBBASE

- A. Prepare sub-base in accordance with Section 300 - Standard Specifications for Base and Sub-base Courses, Department of Transportation, State of Georgia, current edition.
- B. Remove loose material from compacted sub-base surface immediately before placing concrete.
- C. Proof-roll prepared sub-base surface to check for unstable areas and need for additional compaction. Do not begin paving work until such conditions have been corrected and area is ready to receive paving.

3.3 PREPARATION FOR PLACEMENT

- A. Water shall be removed from excavations before concrete is deposited. Hardened concrete debris and other foreign materials shall be removed from the interior of forms and from the inside of mixing and conveying equipment. The reinforcement shall be made secure in position and shall be subject to examination and acceptance.
- B. Moisten base to minimize absorption of water from fresh concrete.
- C. Notify Owner minimum 48 hours prior to commencement of concreting operations.

3.4 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler in position, in straight lines. Secure to formwork during concrete placement.
- D. Forms shall be constructed to the shape, form line, and grade required and shall be maintained sufficiently rigid to prevent deformation under load. Formwork and details of construction shall conform to ACI-318, Chapter 6.
- E. Check completed formwork for grade and alignment to following tolerances:
 - 1. Top of forms shall not be more than 1/8" in 10'.
 - 2. Vertical face on longitudinal axis shall not be more than 1/4" in 10'.

3.5 REINFORCING

- A. Place Reinforcement as indicated.
- B. Interrupt reinforcement at expansion joints.

3.6 PLACING CONCRETE

- A. Placing of concrete shall conform to Chapter 5 of the American Concrete Institution Standard A.C.I. 318. Concrete having attained initial set or having contained water for more than 45 minutes shall not be used in the work. Concrete shall not be dropped freely more than 3 feet. Concrete shall be mixed and placed only when the temperature is at least 40 degrees F and rising. Concrete shall be placed only upon surfaces that are free from frost, ice, mud and other detrimental circumstances. When placed on dry soil or previous materials, waterproof paper or polyethylene sheeting shall be laid over the surfaces that are to receive the concrete.
- B. Ensure reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.
- C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

3.7 JOINTS

- A. Place expansion and/or contraction joints at 20 foot intervals (max). Align curb, gutter, and sidewalk joints.
- B. Place joint filler between paving components and building or other appurtenances. Recess filler $\frac{1}{4}$ inch.
- C. Provide swan joints at 3 feet intervals between sidewalks and curbs.
- D. Saw cut contraction joints $\frac{3}{16}$ inch wide at an optimum time after finishing. Cut $\frac{1}{3}$ into depth of slab.
- E. Finishing: After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.
- F. After floating, test surface for trueness with a 10' straightedge. Distribute concrete as required to remove surface irregularities, and refloat areas to provide a continuous smooth finish.

3.8 FINISHING

- A. Concrete Finishing: After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.
- B. After floating, test surface for trueness with a 10' straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous

smooth finish.

- C. Work edges of gutters, back top edge of curb, and formed joints with an edging tool, and round to ½" radius, unless otherwise indicated. Eliminate tool marks on concrete surface.
- D. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Design Professional.
- E. Sidewalk Paving: Finish with a light broom.

3.9 CONCRETE CURING

- A. Immediately after placement and finishing, concrete shall be protected from moisture loss for not less than 7 days. For concrete surfaces not in contact with forms, white-pigmented curing compound shall be uniformly applied after water sheen disappears from the concrete surface. Formed surfaces shall receive and application of curing compound if forms are removed during the 7 day curing period. Curing compound shall not be applied during rainfall.
- B. Curing compound shall be applied under pressure at the rate of 1 gallon to not more than 150 square feet by mechanical sprayers. The spraying equipment shall be of the fully atomizing type. At the time of use, the compound shall be thoroughly mixed with white pigments uniformly dispersed throughout the sprayer. Care shall be taken to prevent application to joints where concrete bond is required, to reinforcing steel and to joints where joint sealer is to be placed. The compound shall form a uniform continuous coherent film that will not crack or peel and shall be free from pinholes and other imperfections.
- C. Concrete surfaces that are subjected to heavy rainfall within 3 hours after curing compound has been applied shall be resprayed by the above method and at the above coverage at no additional expense to the Owner.
- D. No pedestrian or vehicular traffic shall be allowed over the surface for seven days unless the surface is protected by planks, plywood, or sand. The protection shall not be placed until at least 12 hours after the application of the curing compound.
- E. Protect concrete by suitable methods to prevent damage by mechanical injury or excessively hot or cold temperatures.

3.10 FIELD QUALITY CONTROL

- A. Three concrete cylinders will be taken every 75 cubic yards of concrete placed each day.
- B. One additional test cylinder will be taken during cold weather and cured on site under same conditions as concrete it represents.
- C. One slump test will be taken for each set of test cylinders taken.
- D. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.11 PROTECTION

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Repair or Replace broken or defective concrete, as directed by Owner.
- C. Allow testing company to drill test cores where directed by Owner, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
- D. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- E. Sweep concrete curb and gutter and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.

END OF SECTION

SECTION 32 17 23

PAVEMENT MARKINGS

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

- A. The work to be performed under this section shall consist of furnishing and applying reflective Traffic Line Paint. Painted stripes shall consist of either solid or broken (skip) lines of the color and at the location designated on the Construction Plans and in accordance with the Construction Details.
- B. Skip traffic stripes consist of painted segments between unpainted gaps in a designated sequence with a ratio of 1:3 (10 foot segment and 30 foot gap). The location and color will be as designated on the Construction Plans.
- C. This section shall also be in accordance with the requirements of the “Manual on Uniform Traffic Control Devices”.

1.2 WEATHER CONDITIONS

- A. Paint shall be applied only when the temperature is at or above 40°F. It shall not be applied on damp surfaces or frosted surfaces, nor shall it be applied when the air is misty or otherwise unsatisfactory of the work.

PART 2 PRODUCTS

2.1 MATERIALS

- A. All materials shall meet the requirements of Section 652.02 – Thermoplastic Traffic Stripe, Department of Transportation, State of Georgia, Standard Specifications, current edition.

PART 3 EXECUTION

3.1 CONSTRUCTION

- A. All construction and application methods shall meet the requirements of Section 652.03 – Thermoplastic Traffic Stripe and Section 870.03 - Paint, Department of Transportation, State of Georgia, Standard Specifications, current edition.

END OF SECTION

SECTION 32 92 00

GRASSING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Seeding, planting grass and fertilizing graded areas behind the structures, pipeline rights-of-way, roadway shoulders, yards and other disturbed areas.
- B. Seed protection.
- C. Maintaining seeded areas until final acceptance.

1.2 RELATED SECTIONS

- A. Section 31 25 00 – Erosion, Sedimentation, & Pollution Control

1.3 DELIVERY, STORAGE AND HANDLING

- A. Deliver grass seed in original containers showing analysis of seed mixture, percentage of pure seed, year of production, net weight, and date of packaging and location of packaging. Damaged packages are not acceptable.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer. Damaged bags are not acceptable.
- C. Deliver sod on pallets.
- D. All material shall be acceptable to Owner prior to use.

1.4 PLANTING DATES

- A. This specification provides for the establishment of a permanent grass cover between the dates of March 1 and September 30. If finished earth grades are not completed in time to permit planting and establishment of the permanent grass during the favorable season between the dates specified above unless otherwise accepted, the Contractor will be required to plant a temporary cover to protect the new graded areas from erosion and to keep windborne dust to a minimum. The temporary cover shall be planted between October 1 and February 28 unless otherwise permitted.

PART 2 PRODUCTS

2.1 SEED

- A. All seed shall conform to all Georgia State Laws and to all requirements and regulations of the State of Georgia Department of Agriculture.
- B. The several varieties of seed shall be individually packaged or bagged, and tagged to

show name of seed, net weight, origin, germination, lot number, and other information required by the State of Georgia Department of Agriculture.

- C. The Owner reserves the right to test, reject, or accept all seed before seeding.
- D. The seed shall be delivered to the site in the original sacks as received from the producer and each sack shall be tagged in accordance with the agricultural seed laws of the United States and the State of Georgia. Each sack shall be tagged showing the dealers guarantee as to the year grown, percentage of purity, percentage of germination and the date of the test by which the percentages of purity and germination were determined. All seed sown shall have a date of test within six months of the date of sowing.
- F. Any seed delivered prior to use, shall be stored so that it will be protected from damage by heat, moisture, rodents, or other cause.

2.2 FERTILIZER

- A. Shall be a slow release, complete fertilizer as stated by the soil analysis results. The nitrogen content of which shall be derived from either organic or inorganic sources and meets the minimum requirements of plant food by weight. Should the soil analysis and report indicate a need for a different fertilizer mixture, the recommended mixture shall be furnished and applied at the Contractor's expense. All State and Federal laws relating to fertilizer shall be complied with.

2.3 SEEDING SCHEDULE

- A.

SEED	RATE	PLANTING DATES
Bermuda	10 lbs/acre	March 1 – September 30
Rye	40 lbs/acre	October 1 – February 28

- B. In areas where existing grass is to be matched, contractor shall sow seed at the rate and dates recommended by seed distributor.

2.4 LIME

- A. Agricultural grade, ground limestone: Shall be ground dolomitic limestone containing not less than 85 percent of total carbonates and shall be ground to fineness such that more than 50 percent will pass through a 100-mesh sieve and 90 percent will pass through a 20-mesh sieve. Coarser material will be acceptable, provided the specified rates of application are increased proportionately on the basis of quantities passing the 100-mesh sieve. Slag may be used as a substitute for limestone and must pass the sieve tests cited above.

2.5 AMMONIUM NITRATE

- A. Shall be a commercial product in dry powder form of recent manufacture and shall be delivered in the original, unopened containers each bearing the manufacturer's guaranteed statement of analysis. It shall contain not less than 33.5% Nitrogen.

2.6 WATER

- A. The Contractor shall be responsible for providing water to the newly planted grass. The Contractor shall be responsible for providing temporary above-ground irrigation equipment for watering purposes.

2.7 SOD

- A. Sod shall be densely rooted, good quality centipede grass, free from noxious weeds. The sod shall be obtained from areas where the soil is reasonably fertile. The sod shall be raked free of all debris and the grass mowed to two inches before cutting. The sod shall contain practically all of the dense root system and not be less than one (1) inch thick. Sod shall be cut in uniform strips not less than twelve (12) inches in width and not less than twenty-four (24) inches

2.8 ACCESSORIES

- A. Straw Mulch: Oat or wheat straw, reasonably free from weeds, foreign matter detrimental to plant life, and in dry condition.
- B. Excelsior Mulch: Excelsior mulch shall consist of wood fibers cut from sound, green timber. The average length of the fibers shall be 4 to 6 inches. The cut shall be made in such a manner as to provide maximum strength of fiber, but at a slight angle to the natural grain of the wood so as to cause splintering of the fibers when weathering in order to provide adherence to each other and to the soil.
- C. Wood cellulose fiber shall be made from wood chip particles manufactured particularly for discharging uniformly on the ground surface when dispersed by a hydraulic water sprayer. It shall remain in uniform suspension in water under agitation and blend with grass seed and fertilizer to form homogenous slurry. The mulch fibers shall intertwine physically to form a strong moisture holding mat on the ground surface and allow rainfall to percolate into the underlying soil. The mulch shall be heat processed so as to contain no germination or growth-inhibiting factors. It shall be dyed (non-toxic) an appropriate color to facilitate metering of material.

2.9 PRODUCT REVIEW

- A. The Contractor shall provide the Owner with a complete description of all products before ordering. The Owner will review all products before they are ordered.

PART 3 EXECUTION

3.1 PREPARATION

- A. The areas to be seeded shall be made smooth and uniform and shall conform to the finished grade indicated on the plans.
- B. Remove foreign materials, plants, roots, stones, and debris from surfaces to be seeded.

- C. Grassing areas, if not loose, shall be loosened to a minimum depth of 3-inch before fertilizer, seed or sod is applied.

3.2 STAND OF GRASS

- A. Before acceptance of the seeding performed for the establishment of permanent vegetation, the Contractor will be required to produce a satisfactory stand of perennial grass whose root system shall be developed sufficiently to survive dry periods and the winter weather and be capable of re-establishment in the spring.
- B. Before acceptance of the seeding performed for the establishment of temporary vegetation, the Contractor will be required to produce a stand of grass sufficient to control erosion for a given area and length of time before the next phase of construction or the establishment of permanent vegetation is to commence.

3.3 SEEDING DATES

- A. Seeding shall be performed during the periods and at the rates specified in the seeding schedules. Seeding work may, at the discretion of the Contractor, be performed throughout the year using the schedule prescribed for the given period. Seeding work shall not be conducted when the ground is frozen or excessively wet. The Contractor will be required to produce a satisfactory stand of grass regardless of the period of the year the work is performed.

3.4 APPLYING LIME AND FERTILIZER

- A. Following advance preparation and placing selected material for shoulders and slopes, lime, if called for based on soil tests and fertilizer, shall be spread uniformly over the designated areas and shall be thoroughly mixed with the soil to a depth of approximately 2-inches. Fertilizer shall be applied at the rate of 1,500 pounds per acre for the initial application unless otherwise directed by the Owner. Lime shall be applied at the rate determined by the soil test. Unless otherwise provided, lime will not be applied for temporary seeding. In all cases where practicable, acceptable mechanical spreaders shall be used for spreading fertilizer. On steep slopes subject to slides and inaccessible to power equipment, the slopes shall be adequately scarified. Fertilizer may be applied on steep slopes by hydraulic methods as a mixture of fertilizer and seed. When fertilizer is applied with combination seed and fertilizer drills, no further incorporation will be necessary. The fertilizer and seed shall be applied together when Wood Cellulose Fiber Mulch is used. Any stones larger than 2-1/2 inches in any dimension, larger clods, roots, or other debris brought to the surface shall be removed.

3.5 SEEDING

- A. Seed shall be sown within 24 hours following the application of fertilizer and lime and preparation of the seedbed as specified in Section 3.4. Seed shall be uniformly sown at the rate specified by the use of acceptable mechanical seed drills. Rotary hand seeders, power sprayers or other satisfactory equipment may be used on steep slopes or on other areas that are inaccessible to seed drills.
- B. The seeds shall be covered and lightly compacted by means of culti-packer or light

roller if the drill does not perform this operation. On slopes inaccessible to compaction equipment, the seed shall be covered by dragging spiked chains, by light harrowing or by other satisfactory methods.

- C. Apply water with fine spray immediately after each area has been sown.
- D. Do not sow seed when ground is too dry, during windy periods or immediately following a rain.
- E. If permitted by the special provisions, wood cellulose fiber mulch or excelsior fiber mulch may be used.

3.6 HYDROSEEDING

- A. Hydroseeding may be used on any area to be grassed. Under this method of seeding, the seed and fertilizer, at the specified rates, with Wood Fiber Mulch shall be distributed over the area to be seeded in the form of slurry. Seeds of all sizes may be mixed together.
- B. Wood Fiber Mulch is required to be used as a metering agent and seedbed when hydroseeding is used. The application rate for Wood Fiber Mulch shall be approximately 1500 pounds per acre and is required regardless of which mulching method is chosen.
- C. Ground preparations for hydroseeding shall be the same as for conventional seeding.
- D. Equipment for mixing and applying the slurry shall be especially designed for this purpose. It shall be capable of applying a uniform mixture over the entire area to be seeded. The slurry mixture shall be agitated during application to keep the ingredients thoroughly mixed. All materials shall be discharged within one hour after being combined in the hydroseeder. Hydroseeding shall not be performed when winds prevent an even, thorough application. The equipment manufacturer's directions shall be followed.
- E. The entire hydroseeded area shall be mulched as specified.

3.7 SEED PROTECTION (STRAW MULCH)

- A. All seeded areas seeded with permanent grasses shall be uniformly mulched in a continuous blanket immediately following seeding and compacting operations, using at least 2 tons of straw per acre.

3.8 SEED PROTECTION (EXCELSIOR MULCH)

- A. Seed shall be sown as specified in Section 3.5. Within 24 hours after the covering of seed, excelsior mulch shall be uniformly applied at the rate of 2 tons per acre. The mulch may be applied hydraulically or by other acceptable methods. Should the mulch be placed in a dry condition, it shall be thoroughly wetted immediately after placing. The Owner may require light rolling of the mulch to form a tight mat.

3.9 SEED PROTECTION (WOOD CELLULOSE FIBER MULCH)

- A. After the lime has been applied and ground prepared as specified in Section 3.4, wood cellulose fiber mulch shall be applied at the rate of 1,500 pounds per acre in a mixture of seed and fertilizer. Hydraulic equipment shall be used for the application of fertilizer, seed and slurry of the prepared wood pulp. This equipment shall have a built-in agitation system with an operating capacity sufficient to agitate, suspend, and homogeneously mix slurry of the specified amount of fiber, fertilizer, seed and water. The slurry distribution lines shall be large enough to prevent stoppage. The discharge line shall be equipped with a set of hydraulic spray nozzles which will provide an even distribution of the slurry on the various areas to be seeded. The slurry tank shall have a minimum capacity of 1,000 gallons.
- B. The seed, fertilizer, wood pulp mulch, and water shall all be combined into the slurry tank for distribution of all ingredients in one operation by the hydraulic seeding method specified herein. The materials shall be combined in a manner recommended by the manufacturer. The slurry mixture shall be so regulated that the amounts and rates of application shall result in a uniform application of all materials at rates not less than the amount specified. Using the color of the wood pulp as a guide, the equipment operator shall spray the prepared seedbed with a uniform visible coat. The slurry shall be applied in a sweeping motion, in an arched stream so as to fall like rain, allowing the wood fibers to build upon each other until an even coat is achieved.

3.10 SODDING

- A. Sod shall be placed between March 1st and December 1st.
- B. Sod shall be placed within 48 hours of cutting.
- C. Sod shall be moist when laid and placed on moist ground. The sod shall be carefully placed by hand, beginning at the toe of slopes and working upwards. The length of the strips shall be at right angles to the flow of surface water. All joints shall be tightly butted and end joints shall be staggered at least 12 inches. The sod shall be immediately pressed firmly into the ground by tamping or rolling. Fill all joints between strips with fine screened soil. Sod on slopes shall be pegged with sod pegs to prevent movement. The sod shall be watered, mowed, weeded, repaired or otherwise maintained, to insure the establishment of a uniform healthy stand of grass until acceptance.

3.11 MAINTENANCE

- A. Maintain seeded surfaces until final acceptance.
- B. Maintenance shall consist of providing protection against traffic, watering to ensure uniform seed germination and to keep surface of soil damp, and repairing any areas damaged as a result of construction operations or erosion.

3.12 ACCEPTANCE

- A. Before acceptance of the seeding performed for the establishment of permanent vegetation, the Contractor will be required to produce a satisfactory stand of perennial grass whose root system shall be developed sufficiently to survive dry periods and the winter weather and be capable of reestablishment in the spring.

END SECTION

SECTION 33 14 13

WATER DISTRIBUTION MAINS AND ACCESSORIES

PART 1 GENERAL

1.1 SCOPE

- A. This Section describes products to be incorporated into the water mains and requirements for the installation and use of these items. Furnish all products and perform all labor necessary to fulfill the requirements of these Specifications. It includes, but is not limited to the construction of piping, valves, fittings, connection to existing systems, and all other appurtenances necessary to convey potable water.
- B. Warranty: Water distribution system installed by the Contractor shall be warranted and guaranteed for a period of one year from the date of final acceptance that the completed system is free from all defects due to faulty products or workmanship, and that the Contractor shall make such corrections as may be necessary by reason of such defects upon notice by the Owner.
- C. All construction shall meet the requirements of the City of Washington and EPD.

1.2 RELATED SECTIONS

- A. Section 31 11 00 – Clearing and Grubbing
- B. Section 31 41 00 – Sheeting, Shoring, and Bracing
- C. Section 31 23 33 – Trenching Excavation & Backfill
- D. Section 32920 - Grassing

1.3 REFERENCES

- A. ASTM Specifications:
 - 1. ASTM D 3740-94a – Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
 - 2. ASTM E 329-93b – Agencies Engaged in the Testing and/or Inspection of Materials as Used in Construction.
 - 3. ASTM D 3034-94 – Type PSM PVC Sewer Pipe and Fittings.
 - 4. ASTM D 2321-89 – Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Installations.
 - 5. ASTM A 746-95 – Ductile Iron Gravity Sewer Pipe.
 - 6. ASTM D 3212-92 – Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

7. ASTM F 477-95 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
8. ASTM D 2241-94 – PVC Pressure-Rated Pipe (SDR – Series).
9. ASTM D 3139-95 – Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seams.
10. ASTM A 139-93a – Electric-Fusion (Arc) Welded Steel Pipe (NPS 4 and Over).
11. ASTM C 478-94 – Precast Reinforced Concrete Manhole sections.
12. ASTM C 443-94 – Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
13. ASTM C 39-94 – Compressive Strength of Cylindrical Concrete Specimens.
14. ASTM C 890-91 – Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
15. ASTM C 891-90 – Installation of Underground Precast Concrete Utility Structures.
16. ASTM C 913-89 – Precast Concrete Water and Wastewater Structures.
17. ASTM A 615/A 615 M-95b – Deformed and Plain Billet – Steel Bars for Concrete Reinforcement.
18. ASTM D-2922-91 – Test methods for Density of Soil and Soil Aggregate In-Place by Nuclear Methods (Shallow Depth).
19. ASTM D-1557-91 – Laboratory Compaction Characteristics of Soil Using Modified Effort.
20. ASTM D 1556-90 – Density and Unit Weight of Soil In-Place By The Sand-Cone Method.
21. ASTM D 71-87 (reapproved 1994) – Evaluation Degree of Blistering of Paints.
22. ASTM D 2794-93 – Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
23. ASTM E 96-95 – Water Vapor Transmission of Materials.
24. ASTM G 53-95 – Operating Light and Water-Exposure Apparatus (Fluorescent UV – Condensation Type) for Exposure of Nonmetallic Materials.
25. ASTM A 377-95 – Index of Specifications for Ductile Iron Pressure Pipe.

B. ANSI/AWWA Specifications:

1. ANSI/AWWA C 150/A 21.50-96 – Thickness Design of Ductile Iron Pipe.

2. ANSI/AWWA C 151/A 21.51-91 – Ductile Iron Pipe, Centrifugally Cast, for Water or Other Liquids.
 3. ANSI/AWWA C-500-93 – Metal-Seated Gate Valves for Water Supply Service.
 4. ANSI/AWWA C-509-94 – Resilient-Seated Gate Valves for Water Supply Service.
 5. ANSI/AWWA C 111/A 21.11-95 – Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
 6. ANSI/AWWA C 600-93 – Installation of Ductile Iron Water Mains and their appurtenances.
- C. ACI Specifications:
1. ACI 318-89 – Building Code Requirements for Reinforced concrete.
- D. AASHTO Standards:
1. AASHTO T 191-91 – Density of Soil In-Place by the Sand-Cone Method.

1.4 SUBMITTALS

- A. Complete shop drawings and product data on all piping and accessories shall be submitted to the Owner in accordance with the requirements of these Specifications.
- B. Shop drawings shall indicate piping layout in plan and/or elevations and shall include a complete schedule of all pipe, fittings, special hangers and supports. Special castings shall be clearly detailed showing all pertinent dimensions. Special coatings shall be clearly identified.
- C. The Contractor shall furnish the Owner with lists of all pieces of pipe and fittings in each shipment received. These lists shall give the serial or mark number, weight, class, size and description of each item received.
- D. The Contractor shall submit written evidence to the Owner that the products furnished under this Section will conform to the material and mechanical requirements specified herein. Certified copies of independent laboratory test results or mill test results from the pipe supplier may be considered evidence of compliance provided such tests are performed in accordance with the appropriate testing standards by experienced, competent personnel. In case of doubt as to the accuracy or adequacy of mill tests, the Owner may require that the Contractor furnish test reports from an independent testing laboratory on samples of pipe materials.

1.5 QUALITY ASSURANCE

- A. Material and equipment shall be the standard product of a manufacturer who has manufactured them for a minimum of 2 years and who provides published data on the quality and performance of the product.

- B. A Subcontractor for any part of the work must have experience on similar work and if required, furnish the Owner with a list of projects and reference contacts.
- C. Devices, equipment, structures, and systems not designated by the Engineer that the Contractor wishes to furnish shall be designed either by a registered professional engineer or by someone the Owner approved as qualified. If required, complete design calculations and assumptions shall be furnished to the Owner before acceptance.
- D. All testing of the piping shall be made by the Contractor with equipment qualified by the Owner or utility company and in the presence of the Owner and utility company. The Owner reserves the right to accept or reject testing equipment.
- E. Soil testing shall be done by a testing laboratory regularly engaged in soil testing, and shall be approved by the Owner prior to engagement. Mill certificates of test on materials made by manufactures will be accepted provided the manufacturer maintains an adequate testing laboratory, makes regularly scheduled tests that are spot checked by an outside laboratory, and furnishes satisfactory certificates with the name of the one making the test.
- F. The details of all welded joints shall comply with all of the requirements for joints, which are accepted without qualification test under the "Code of Arc and Gas Welding in Building Construction of the American Welding Society". Workmanship shall conform to A.I.S.C. Specifications for Fabrication and Erection. All work shall be executed by skilled workmen under experienced supervision. All welding shall be done by welders who have been previously qualified by tests as prescribed in the "American Welding Society Standard Qualification Procedure" to perform the type of work required. Welders shall have passed the qualification test (Qualification tests using procedures covered in AWSS B3.0 Part II) within the preceding 12 months.

1.6 TRANSPORTATION AND HANDLING

- A. Unloading: Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings, valves and accessories. Make equipment available at all times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification. Pipe handled on skids shall not be rolled or skidded against the pipe on the ground.
- B. Handling: Handle pipe, fittings, valves and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift, or front end loader. Do not use material damaged in handling. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior coatings or internal lining of the pipe.
- C. Distribution: Distribute and place pipe and materials to not interfere with traffic. Do not string pipe more than 250 feet beyond the area where pipe is being laid. Do not obstruct drainage ditches.

1.7 STORAGE AND PROTECTION

- A. Store all pipes which cannot be distributed along the route. Make arrangements for the use of suitable storage areas. Do not interfere with other Contractor's right to

access.

- B. Stored materials shall be kept safe from damage. The interior of all pipes, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times. Valves and hydrants shall be drained and stored in a manner that will protect them from damage by freezing.
- C. Pipe shall not be stacked higher than the limits recommended by the manufacturer. The bottom tier shall be kept off the ground on timbers, rails or concrete. Pipe in tiers shall be alternated: bell, plain end; bell, plain end. The timbers shall be large enough to prevent contact between the pipes in adjacent tiers.
- D. Stored mechanical and push-on joint gaskets shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.
- E. Mechanical-joint bolts shall be handled and stored in such manner that will ensure proper use with respect to types and sizes.

1.8 SEQUENCING, SCHEDULING

- A. The Contractor shall arrange his work so that sections of mains between valves are tested, sterilized, placed in service as soon as reasonable after it is placed.

1.9 ALTERNATIVES

- A. The intention of these specifications is to produce the best system for the Owner. If the Contractor suggests that alternate material, equipment or procedures will improve the results at no additional cost, the Owner will examine the suggestion and determine if acceptable for use. The basis upon which acceptance of an alternate will be given is its value to the Owner, and not for the convenience of the Contractor.

1.10 GUARANTEE

- A. The Contractor shall guarantee the quality of the materials, equipment, and workmanship for 12 months after acceptance of the completed Project. Defects discovered during that period shall be repaired by the Contractor, at no cost to the Owner. The Performance Bond shall reflect this guarantee.
- B. The manufacturers of equipment, valves, pumps, controls, measuring devices and special equipment shall test the equipment at field conditions for compliance with the specifications. The manufacturer shall guarantee the product to be free from defects in material and factory workmanship for a period of 12 months from date of acceptance of the completed project, provided the product is properly installed, serviced and operated under normal conditions and according to the manufacturer's instructions. The manufacturer shall furnish a replacement for any component that proves defective during the guarantee period, except such items which are seals. The Contractor shall furnish the services of a representative of the manufacturer to check the installation after it is completed and to furnish the Owner with a certificate that the equipment meets the specifications and will perform as required.

1.11 EXISTING UTILITIES

- A. All known utility facilities are shown schematically on plans, and are not necessarily accurate in location as to plan or elevation. Utilities such as service lines or unknown facilities not shown on plans will not relieve the contractor of his responsibility under this requirement. "Existing Utility Facilities" means any utility that exists on the project in its original, relocated or newly installed position. The Contractor will be held responsible for the cost of repairs to damaged underground facilities; even when such facilities are not shown on the plans. The Contractor shall contact all utility companies prior to beginning the work and request an accurate field location of their respective utility lines.
- B. Damage to any part of the existing water system and facilities by the Contractor or Subcontractors, that is required by the Owner's forces, shall be charged to the Contractor on the basis of time and material, plus 30% for overhead and administration.

1.12 REQUIREMENTS OF REGULATORY AGENCIES

- A. Water mains shall be sterilized to meet the requirements of the appropriate Health/Public Works Department. Sterilization shall be in accordance with AWWA Standards C-651, latest revision.

1.13 CONNECT NEW MAIN TO EXISTING SYSTEM

- A. The Contractor shall furnish the necessary pipe and perform all excavation, dewatering, shoring, backfilling, etc. necessary to make the connection of a new main to the existing water system. The Contractor shall contact the Superintendent of the Water Utility a minimum of 48 hours in advance of construction. The Contractor shall be responsible for coordinating his construction with the utility operator.

1.14 ACCEPTANCE OF PORTIONS OF WORK

- A. The Owner reserves the right to accept and use any portion of the work whenever it is considered in the public interest to do so.

1.15 RECORD DATA

- A. It will be required of the Contractor to keep accurate, legible records of the location of any deviations from the construction drawings, any additional items or structures to the construction drawings, and all utilities encountered which are not shown on the construction drawings. These records will be made available to the Owner before his inspection for incorporation into the "Drawing of Record".

1.16 OPTIONS

- A. Several materials are described within these specifications. Where manufacturer and model of equipment is named in the specification, it is intended that these are to describe the quality and function required. The Contractor may use equipment or material of other manufacturers provided they are reviewed and accepted by the Owner as meeting the specifications.
- B. The Contractor will furnish the Owner a description of all materials before ordering.

The Owner will review the Contractor's submittals and provide in writing an acceptance or rejection of material. However, an acceptance of any material by the Owner does not relieve the Contractor of this responsibility to meet the requirements of the construction plans or these specifications.

PART 2 PRODUCTS

2.1 PIPING MATERIALS AND ACCESSORIES

A. Ductile Iron Pipe (DIP) :

1. Ductile iron pipe shall be manufactured in accordance with AWWA C151. All pipes, except as specials, shall be furnished in nominal lengths of 18 to 20 feet. Diameters will be as shown on the Drawings. All pipes shall have a minimum pressure rating of 350 pounds per square inch (psi), and corresponding minimum wall thickness, unless otherwise specified or shown on the Drawings.
2. Flanged pipe minimum wall thickness shall be equal to Special Class 53 for pipe sizes 4"-54". Flanges shall be furnished by the pipe manufacturer.
3. Fittings and Accessories:
 - a. Fittings shall be ductile iron and shall conform to AWWA C110/ANSI A21.10. The minimum rated working pressure for fittings shall be 350.
 - b. Flanged elbow fittings shall be ANSI pattern using short radius elbows except where noted differently on the Drawings. Special fittings, ductile iron wall pipes and sleeves shall conform to the dimensions and details as shown on the Drawings.
 - c. All grooved-end fittings shall conform to the laying length requirements of AWWA C110/ANSI A21.10, end preparation requirements of AWWA C606, and wall thickness requirements of AWWA C110/ANSI A21.10.
 - d. Thrust Collars: Thrust collars shall be welded-on ductile iron body type capable of withstanding a thrust due to 250 psi internal pressure on a dead end from either direction on that pipe size. Weld on collars shall be continuously welded to the pipe by the pipe manufacturer.
 - e. Bosses: Shall be welded-on ductile iron body type and shall be faced and tapped for AWWA C110/ANSI A21.10 flange connection. All welding, fabrication and outlet hole drilling shall be performed by the manufacturer. Outlets shall be free of burrs. Sizes shall be as indicated on the Drawings. The bosses shall be welded on a minimum Class 51 ductile iron pipe greater than 12 inches and Class 52 for smaller pipe. Bosses shall be equal to ACIPCO A-96945 for mechanical joint or A-96946 for flanged joints.
 - f. Solid Sleeves: Shall permit the connection of plain end ductile iron

pipe and plain end PVC pipe. Solid sleeves shall meet the requirements of ANSI/AWWA C110 for long pattern and have a minimum pressure rating of 250 psi. Solid sleeves shall have a mechanical or restrained joint as specified in this Section and as shown on the Drawings. Solid sleeves shall be provided with gaskets suitable for the type of pipe to be connected. Solid sleeves shall be used only in locations shown on the Drawings. Solid sleeves shall be manufactured by J.C.M. or equal.

4. Joints for Ductile Iron Pipe and Fittings

- a. Joints for ductile iron pipe and fittings shall be mechanical joint, flanged joint, restrained joint, push-on joint or grooved-end joint as shown on the Drawings or specified herein.
- b. Unless otherwise shown on the Drawings, specified or directed, all ductile iron pipe laid underground shall be joined using mechanical joints or push-on type joints.
- c. In all cases, gaskets shall be made of material that will not be damaged by the fluid being transported or by the environment in which the pipe is installed.
- d. Provide the necessary bolts for connections. All bolts and nuts shall be threaded in accordance with ANSI B1.1, Coarse Thread Series, Class 2A external and 2B internal fit. All bolts and nuts shall be made in the U.S.A.
- e. Mechanical Joints:
 1. Joints shall conform to AWWA C111/ANSI A21.11.
 2. Bolts and nuts shall be Tee Head Bolts and nuts of high strength low-alloy steel in accordance with ASTM A-242 to the dimensions shown in AWWA C111/ANSI A21.11.
 3. Gaskets shall be in accordance with AWWA C111/ANSI A21.11 and shall be constructed of 1/8" thick cloth reinforced rubber; gaskets may be ring type or full face type.
 4. Mechanical joint glands shall be ductile iron.
- f. Push-On Joints: Push-on joints and gaskets shall conform to AWWA C111/ANSI A21.11. Details of the joint design shall be in accordance with the manufacturer's standard practice such as ACIPCO "Fastite", McWane (Clow) "Bell-Tite", or U.S. Pipe "Tyton" joints.
- g. Flanged Joints:

1. Flanged joints shall conform to AWWA C115/ANSI A21.12. Flanges shall be ductile iron and shall be furnished by the pipe manufacturer.
 2. Gaskets shall be made of 1/8-inch thick, Buna-N. Gaskets may be ring type or full face type. Gaskets for all flanged piping 24-inches and larger shall be equal to ACIPCO Toruseal gaskets.
 3. Flanged ductile iron pipe 3 through 12-inch diameter shall have flanges cast solidly to the pipe barrel. Flanges on ductile iron pipe larger than 12-inches may be of the threaded type. Pipe threads shall be of such length that with flanges screwed home, the end of the pipe shall project beyond the face line of the flange. Flange and pipe shall then be machined to a flush finish to the pipe and the flange and surface shall be normal to the axis of the pipe. Ductile iron flanges shall be of such design that the flange neck completely covers the threaded portion of the pipe to protect same against corrosion. All pipes with threaded type flanges shall be assembled, faced, and drilled at the point of manufacture, unless otherwise approved by the Owner.
 4. Flange filler shall conform to AWWA C110/ANSI A21.10. Joint bolt length shall be increased by the thickness of the flange filler.
 5. Where tap or stud bolts are required, flanges shall be drilled and tapped accordingly.
 6. Bolt length and diameter shall conform to ANSI/AWWA C115 for Class 125 flanges shown in ANSI/ASME B16.1.
 7. Bolts for exposed service shall be zinc plated, cold pressed, steel machine bolts conforming to ASTM A-307, Grade B. Nuts for exposed service shall be zinc plated, heavy hex conforming to ASTM A-563. Zinc plating shall conform to ASTM B 633, Type II.
 8. Bolts for submerged service shall be stainless steel machine bolts conforming to ASTM A-193, Grade B8. Nuts shall be heavy hex, stainless steel conforming to ASTM A-194, Grade 8.
5. Restrained Joint Pipe (RJP): RJP shall be either the bolt type, or modified push-on type with joint restraint using ductile iron components. Restrained joint pipe on piers shall have bolted joints and shall be specifically designed for clear spans of at least 36 feet. Restrained joint pipe where required shall be American, U.S. Pipe, or equal.
 6. Cement Linings: Pipe and fittings shall be cement lined in accordance with

AWWA C104/ANSI/AWWA C104/A21.4.

7. Bituminous Coating: All pipe and fitting shall be furnished with a bituminous outside coating.
8. Pipe couplings shall be installed where shown on the Drawings or as directed by the Owner.
9. Wall Sleeves and Wall Pipes:
 - a. Where piping passes through concrete structures, furnish and install wall sleeves unless wall pipes or other provisions are specifically shown on the Drawings. Wall sleeves shall be accurately located and securely fastened into position before concrete is poured.
 - b. Wall Sleeves:
 1. For pipe sizes smaller than 3-inches, wall sleeves shall be steel oversize sleeves furnished with a full circle, integral, or continuously welded water stop collar. The sleeve seal shall be the mechanically expanded, synthetic rubber type. Provide all associated bolts, seals and seal fittings, pressure clamps, or plates necessary to achieve a watertight installation. Sleeves shall extend the full thickness of the concrete. Sleeves and seal shall be Link Seal.
 2. For pipe sizes larger than 3-inches, wall sleeves shall be statically cast ductile iron mechanical joint wall sleeves. Unless specified or shown otherwise for a specific situation, wall sleeves shall be mechanical joint bell-plain end type with water stop/thrust collar. The collar shall be capable of withstanding a thrust force caused by a 250 psi dead end load from either direction on that size pipe. Sleeves shall be constructed with studs and mechanical joint retainer gland on the air side of the concrete structure. Provide retainer gland where shown on the Drawings. Where the concrete structure is exposed to dirt on one side and is wet on the other side, construct with studs and glands on the dirt side. Wall sleeves shall be equal to ACIPCO A-10771.
 - c. Wall pipes:
 1. Wall pipes shall be either statically cast ductile iron with integral water stop/thrust collar or centrifugally cast ductile iron with a continuously welded water stop/thrust collar. The welded on collar shall be attached to the pipe by the manufacturer. The collar shall be capable of withstanding a thrust force caused by a 250 psi dead

end load from either direction on that size pipe. Wall pipes shall be furnished uncoated on the outside and cement lined on the inside. Unless specified or shown otherwise, wall pipes shall be flange end type.

2. Wall pipes shall be cast and/or fabricated and lines in one manufacturer's facilities and delivered to the job site ready to use.

10. Hydrant Tees: Hydrant tees shall be equal to ACIPCO A-10180 or U.S. Pipe U-592.

B. Polyvinyl Chloride (PVC) Pipe

1. Pipe sizes smaller than 4-inch outside diameter:
 - a. PVC pipe shall conform to ASTM D 1785 (Schedule 40).
 - b. Fittings shall be solvent weld socket type, schedule 40, ASTM D 2466 or D 2467.
 - c. Cement shall conform to ASTM D 2564.
2. Pipe equal to and larger than 4-inch outside diameter:
 - a. Shall be PVC Class 150, DR 18, C-900 for 12-inch and smaller and Class 165, DR 25, C-905 for 14-inch and larger. All pipe shall conform to ASTM D-2241 and be installed in accordance with ASTM D-2321. Joints shall be in accordance with ASTM D-3036. Sizes and dimensions shall be as follows:

150 PSI, DR 18, C-900			165 PSI, DR 25, C-905		
Nom. Pipe Size	O.D. (in.)	Min. Wall Thickness (in.)	Nom. Pipe Size	O.D. (in.)	Min. Wall Thickness (in.)
4"	4.800	0.267	14"	15.300	0.612
6"	6.900	0.383	16"	17.400	0.696
8"	9.050	0.503	18"	19.500	0.780
10"	11.100	0.617	20"	21.600	0.864
12"	13.200	0.733	24"	25.800	1.032
			30"	32.000	1.280
			36"	38.300	1.530

- b. Pipe shall bear the National Sanitation Foundation seal of approval and shall comply with the requirements of Type I, Grade I (PVC 1120) of the ASTM resin specification D-1784 (AWWA C 151-76). Certificates of conformance with the foregoing specifications shall be furnished with each lot of pipe supplied. Plastic pipe shall be jointed by means of a rubber ring bell joint which shall be an integral part of the barrel or

solvent welded at the factory. The joints shall have a space to provide expansion and contraction of the pipe without leaking. Fittings for plastic pipes shall be PVC with ring tight rubber joints; or ductile iron with adapters to PVC pipe.

- c. The bell shall consist of an integral wall section with a bound-in solid cross section shall be designed to be at least as hydrostatically strong as the pipe wall and meet the requirements of UNI-BELL-B-11.
 - d. Each standard and random length of pipe shall be tested to two times the rated pressure of the pipe for a minimum of 5 seconds. The integral bell shall be tested with the pipe.
 - e. Pipe shall be supplied in minimum lengths of 20 feet.
 - f. Acceptance will be on the basis of the Owner's inspection and the manufacturer's written certification that the pipe was manufactured and tested in accordance with the applicable standards, including the National Sanitation Foundation. Additionally, each piece of pipe shall be stamped "NSF Approved".
- C. Plastic Tubing – Tubing for house service lines shall be Polyethylene Tubing – CTS PE 3408 conforming to all requirements of AWWA C-901 and ASTM D-2737 (SDR9). The tubing shall be copper tubing size and rated for a minimum working pressure of 200 psi. Marking on the tubing shall include – nominal tubing pipe size; type of tubing material – PE 3408; SDR 9; pressure rating – 200 psi; ASTM D-2737; manufacturer's name and seal of the National Sanitation Foundation.

2.2 GATE VALVES

- A. 3-Inches in Diameter and Smaller: Shall be bronze, heavy duty, non-rising stem, and wedge type with screwed or union bonnet. Valve ends shall be threaded or solder type as appropriate. Valves shall have a minimum 200 psi working pressure for water (125 psi working pressure for steam). Valves shall be made in the U.S.A. Gate valves shall be equal to Crane No.428 (threaded), Crane No. 1334 (solder end), Watts, Wilkins, or Mueller, or equal.
- B. 4-Inches Through 12-Inches in Diameter: Shall be mechanical joint resilient wedge type conforming to the requirements of AWWA C509 rated for 200 psi working pressure and test pressure of 400 psi.
 - 1. Valves shall be provided with two O-ring stem seals with one O-ring located above and one O-ring below the stem collar. The area between the O-rings shall be filled with lubricant to provide lubrication to the thrust collar bearing surfaces each time the valve is operated. At least one anti-friction washer shall be utilized to further minimize operating torque. All seals between valve parts, such as body and bonnet, bonnet and bonnet cover, shall be flat gaskets or O-rings.
 - 2. The valve gate shall be made of ductile iron having a vulcanized, synthetic rubber coating, or a seat ring attached to the disc with retaining screws. Sliding of the rubber on the seating surfaces to compress the rubber will not

be allowed. The design shall be such that compression-set of the rubber shall not affect the ability of the valve to seal when pressure is applied to either side of the gate. The sealing mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction.

3. All internal ferrous surfaces shall be coated with epoxy to a minimum thickness of 4 mils. The epoxy shall be non-toxic, impart no taste to the water and shall conform to AWWA C550, latest revision.
 4. Gate valves 4 through 12-inches shall be manufactured by Mueller, U.S. or M & H Valve, or equal.
- C. 14-Inches in Diameter and Larger: Valves shall be U.S. Metro Seal or equal conforming to the requirements of AWWA C509.
1. Valve ends shall be mechanical joint type except where flanged or restrained joint ends are shown. Flanged joints shall meet the requirements of ANSI B16.1, Class 125.
 2. Buried valves shall be equipped with valve boxes unless access to the operator is provided by a manhole.
 3. Manually operated valves, shall be non-rising stem type having O-ring seals.
 4. Valves shall be installed in a vertical position without a bypass valve. Valves shall be metro seal 250 R/S resilient seated manufactured by U.S. Pipe. Resilient seat gate valves shall conform to AWWA Standard Specification C-509.
 5. Valves shall be designed for a water working pressure of 150 psi and a test pressure of 300 psi.

2.3 BUTTERFLY VALVE

- A. Butterfly valves shall be resilient seated, short body design, and shall be designed, manufactured, and tested in accordance with all requirements of AWWA C504. Valves shall be designed for a rated working pressure of 150 psi, unless shown otherwise on the drawings.
- B. Valve bodies shall be ductile iron conforming to ASTM A-536, Grade 65-45-12 or ASTM A-126, Grade B cast iron. Shafts shall be 18-8, Type 304 stainless steel, machined and polished. Valve discs shall be ductile iron, ASTM A-536, Grade 65-45-12 or ASTM A-126, Grade B cast iron. The resilient valve seat shall be located either on the valve disc or in the valve body and shall be fully field replaceable for valves 30" and larger.
- C. Valves shall be equipped with geared actuators designed, manufactured and tested in accordance with AWWA C504. Actuators shall be capable of holding the disc in any position between full open and full closed without any movement or fluttering of the disc. Actuators shall be furnished with fully adjustable mechanical stop-limiting devices. Actuators that utilize the sides of the actuator housing to limit disc travel are unacceptable. Valve actuators shall be capable of withstanding a minimum of

450 foot pounds of input torque in either the open or closed position without damage.

- D. Valves shall be installed with the valve shafts horizontal. Valves and actuators shall have seals on all shafts and gaskets on valve actuator covers to prevent the entry of water. Actuator mounting brackets shall be totally enclosed and shall have gasket seals.
- E. Valve ends shall be mechanical joint type, except where flanged or restrained joint ends are shown. Flange joints shall meet the requirements of ANSI B16.1, Class 125.
- F. Butterfly valves shall be manufactured by Henry Pratt, Dezurik, Keystone, or equal.

2.4 VALVE BOXES

- A. All valves shall be equipped with valve boxes. The valve boxes shall be cast iron two-piece screw type with drop covers. Valve boxes shall have a 5.25-inch inside diameter. Valve box covers shall weigh a minimum of 13 pounds. The valve boxes shall be adjustable to 6-inches up or down from the nominal required cover over the pipe. Valve boxes shall be of sufficient length that bottom flange of the lower belled portion of the box is below the valve operating nut. Ductile or cast iron extensions shall be provided as necessary. Covers shall have "WATER VALVE" or "WATER" cast into them. Valve boxes shall be manufactured in the United States and shall be equal to U.S. Foundry No. 7500 screw type.
- B. Extension stems shall be provided so as to set the top of the operating nut 30-inches below finished grade. Connection to the valve shall be with a wrench nut coupling and a set screw to secure the coupling to the valve's operating nut. The coupling and square wrench nut shall be welded to the extension stem. Extension stems shall be equal to Mueller A-26441 or M & H Valve Style 3801.
- C. Post Indicator Valves: 175 pound, cast iron body (ASTM A-126 Class B), cast iron split wedge disc, bronze discs rings, stem and threaded renewable seat rings, inside screw, non-rising stem, bolted bonnet, mechanical joint ends (ANSI/AWWA C111), indicator post flange, adjustable indicator post with tamper switch mounting bracket, UL listed and FM approved.

2.5 FIRE HYDRANTS

- A. All fire hydrants shall conform to the requirements of AWWA C502 and shall have a minimum of 200 psi working pressure. Hydrants shall be the compression type, closing with line pressure. The valve opening shall not be less than 5-1/4 inches.
- B. In the event of a traffic accident, the hydrant barrel shall break away from the standpipe at a point above grade and in a manner which will prevent damage to the barrel and stem, preclude opening of the valve, and permit rapid and inexpensive restoration without digging or cutting off the water.
- C. The means for attaching the barrel to the standpipe shall permit facing the hydrant a minimum of eight different directions.
- D. Hydrants shall be fully bronze mounted with all working parts of bronze. Valve seat

ring shall be bronze and shall screw into a bronze retainer.

- E. All working parts, including the seat ring shall be removable through the top without disturbing the barrel of the hydrant.
- F. The operating nut shall match those on the existing hydrants. The operating threads shall be totally enclosed in an operating chamber separated from the hydrant barrel by a rubber O-ring stem seal and lubricated by a grease or oil reservoir. A stop nut shall be positioned in the top operating mechanism so that the valve cannot contact the bottom of the shoe when fully open.
- G. Hydrant shall be a non-freezing design and provided with a simple, positive, and automatic drain which shall be fully closed whenever the main valve is opened.
- H. Hose and pump-truck connections shall be breech-locked, pinned, and then caulked with lead; or threaded and pinned, to seal them permanently into the hydrant barrel. Each hydrant shall have two 2-1/2 inch hose connections and one 4 inch pump connection all with National Standard threads and each equipped with cap and non-kinking chain.
- I. Hydrants shall be furnished with a mechanical joint shoe connection to the spigot of the 6-inch hydrant lead.
- J. Minimum depth of bury shall be 4.5 feet. Provide extension section where necessary for vertical installation and in accordance with manufacturer's recommendations to achieve the 15" minimum height above ground specified in the typical fire hydrant setting detail.
- K. All outside surfaces of the barrel above grade shall be painted with Koppers Glamortex 501 enamel or equal in a color to be selected by the using Authority.
- L. Hydrants shall be traffic model and manufactured by M&H, Mueller, or American Darling.
- M. All new fire hydrants shall be covered with a cloth bag until the water mains and fire hydrants are in service.

2.6 TAPPING SADDLES

- A. Tapping saddles shall be ductile iron body type with O-ring gasket and stainless steel (type ESS) straps. Connection shall be flanged or mechanical joint as detailed on the Drawings. Tapping saddles shall be equal to ACIPCO A-30920.

2.7 TAPPING SLEEVES AND VALVES (TS&V)

- A. Tapping sleeves shall be cast or ductile iron of the split sleeve, mechanical joint type. The contractor shall be responsible for determining the outside diameter of the pipe to be connected to prior to ordering the sleeve. Valves shall be furnished in accordance with Section 02510 of these Specifications, with flanged connection to the tapping sleeve and mechanical joint connection to the branch pipe. The tapping sleeve and valve shall be supplied by the valve manufacturer. Tapping sleeves shall be Mueller or M&H Valve.

2.8 FLANGE ADAPTERS

- A. Flange adapters shall permit the connection of un-threaded, un-grooved, open ended, ductile iron pipe to ANSI/ASME B16.1, Class 125 flanges. Flange adapters shall meet the test requirements of ANSI/ASME B16.1 for Class 125 flanges. The adapter shall be a ductile iron casting incorporating a flange with extended throat, set screws and gasket. The gasket shall provide a compression seal between the adaptor, the pipe and the adjacent flange. Flange adapters are to be used only in locations specifically shown on the Drawings and in accordance with the manufacturer's recommendations. Flange adapters shall be manufactured by McWane, Uni Flange (Series 400) or EBAA Iron.

2.9 RETAINER GLANDS

- A. Retainer glands shall be Megalug, Series 1100, as manufactured by EBAA Iron.
- B. Retainer glands for polyvinyl chloride pipe shall be Megalug Series 2000 PV, as manufactured by EBAA Iron Sales, Inc.

2.10 HARNESS RODS

- A. Harness rods shall be manufactured in accordance with ASTM A 449. Harness rods shall be field coated with bitumastic before backfilling.
- B. Eye bolts shall be of the same diameter as specified in AWWA C111 for that pipe size. The eye shall be welded closed. Where eye bolts are used in conjunction with harness rods, an appropriate size washer shall be utilized with a nut on each end of the harness rod. Eye bolts shall be of the same material and coating as the harness rods.

2.11 VALVE MARKERS

- A. The Contractor shall provide a concrete valve marker as detailed on the Drawings for each valve installed. Valve markers shall be stamped "WATER". Contractor shall provide raised pavement markers that meet the specifications and requirements set forth in the most current edition of the State of Georgia Department of Transportation "Standard Specifications for the Construction of Roads and Bridges", Section 654. RPM shall be installed as specified in Part 3 of this Section.

2.12 CORPORATION COCKS AND CURB STOPS

- A. Corporation cocks and curb stops shall be ground key type, shall be made of bronze conforming to ASTM B 61 or B 62, and shall be suitable for the working pressure of the system. Ends shall be suitable for grip type joint. Threaded ends for inlet and outlet of corporation cocks shall conform to AWWA C800; coupling nut for connection to flared copper tubing shall conform to ANSI B16.26. Corporation cocks and curb stops shall be manufactured by Mueller or Ford.

2.13 HYDRANT TEES

- A. Hydrant tees shall be equal to ACIPCO A10180 or U.S. Pipe U-592.

2.14 ANCHOR COUPLINGS

- A. Lengths and sizes shall be as shown on the Drawings. Anchor couplings shall be equal to ACIPCO A-10895 or U.S. Pipe U-591.

2.15 CONCRETE

- A. Concrete shall have a compressive strength of not less than 3000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches. For job mixed concrete, submit the concrete mix design for approval by the Owner. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C 94. Reinforcing steel shall conform to the requirements of ASTM A-615, Grade 60.

2.16 DETECTION TAPE

- A. Detection tape shall be composed of a solid aluminum foil encased in a protective plastic jacket. Tapes shall be color coded in accordance with APWA color codes (Safety Precaution Blue) with the following text: "Caution Water Line Buried Below." Tape lettering shall be permanently printed with no surface printing allowed. Tape width shall be minimum 2-inches when buried less than 10 inches below the surface. Tape width shall be minimum 3-inches when buried greater than 10-inches and less than 20-inches.
- B. Detection tape shall be equal to Lineguard Type III Detectable or Allen Systems Detectatape.
- C. In addition to Detection Tape, a #12 insulated copper tracer wire shall be installed on all buried pipelines.

PART 3 EXECUTION

3.1 CONSTRUCTION ALONG HIGHWAYS, STREETS AND ROADWAYS

- A. Install pipe lines and accessories along highways, streets and roadways in accordance with the applicable regulations of City of Washington, Georgia Department of Transportation and/or the Georgia Environmental Protection Division with referenced to construction operations, safety, traffic control, road maintenance and repair.
- B. Traffic Control
 - 1. The Contractor shall supply, erect, and maintain all necessary barricades, suitable with sufficient lights and other traffic control devices; provide qualified flagmen where necessary to direct traffic; take all necessary precautions for the protection of the work and the safety of the public.
 - 2. Construction traffic control devices and their installation shall be in accordance with the current Manual on Uniform Traffic Control Devices for Streets and Highways, latest edition.

3. Placement and removal of construction traffic control devices shall be coordinated with the Georgia Department of Transportation and local governing municipalities a minimum of 48 hours in advance of the activity.
4. Placement of construction traffic control devices shall be scheduled ahead of associated construction activities. Construction time in street right-of-way shall be conducted to minimize the length of time traffic is disrupted. Construction traffic control devices shall be removed immediately following their useful purpose. Traffic control devices used intermittently, such as "Flagmen Ahead", shall be removed and replaced when needed.
5. Existing traffic control devices within the construction work zone shall be protected from damage. Traffic control devices requiring temporary relocation shall be located as near as possible to their original vertical and horizontal locations. Original locations shall be measured from reference points and recorded in a log prior to relocation. Temporary locations shall provide the same visibility to affected traffic as the original location. Relocated traffic control devices shall be reinstalled in their original locations as soon as practical following construction.
6. Construction traffic control devices shall be maintained in good repair and shall be clean and visible to affected traffic for daytime and nighttime operation. Traffic control devices affected by the construction work zone shall be inspected daily.
7. Construction warning signs shall be black legend on an orange background. Regulatory signs shall be black legend on a white background. Construction sign panels shall meet the minimum reflective requirements of the Georgia Department of Transportation and local governing municipalities. Sign panels shall be of durable materials capable of maintaining their color, reflective character and legibility during the period of construction.
8. Traffic channel devices shall be positioned preceding an obstruction at a taper length as required by the current Manual On Uniform Traffic Control Devices for Streets and Highways, as appropriate for the speed limit at that location. Traffic channel devices shall be patrolled to insure that they are maintained in the proper position throughout their period of use.

C. Construction Operations

1. Perform all work along highways, streets and roadways to minimize interference with traffic.
2. Stripping: Where the pipe line is laid along road right-of-way, strip and stockpile all sod, topsoil and other material suitable for right-of-way restoration.
3. Trenching, Laying and Backfilling: Do not open the trench any further ahead of pipe laying operations than is necessary. Backfill and remove excess material immediately behind laying operations. Complete excavation and backfill for any portion of the trench in the same day.

4. Shaping: Reshape damaged slopes, side ditches, and ditch lines immediately after completing backfilling operations. Replace topsoil, sod and any other materials removed from shoulders.
 5. Construction operations shall be limited to 400 feet along areas, including clean-up and utility exploration unless otherwise approved by the Owner.
- D. Excavated Materials: Do not place excavated material along highways, streets and roadways in a manner which obstructs traffic. Sweep all scattered excavated material off of the pavement in a timely manner.
- E. Drainage Structures: Keep all side ditches, culverts, cross drains, and other drainage structures clear of excavated material. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.
- F. Landscaping Features: Landscaping features shall include, but are not necessarily limited to: fences; property corners; cultivated trees and shrubbery; manmade improvements; subdivision and other signs within the right-of-way and easement. The Contractor shall take extreme care in moving landscape features and promptly re-establishing these features.
- G. Maintaining Highways, Streets, Roadways and Driveways
1. Maintain streets, highways, roadways and driveways in suitable condition for movement of traffic until completion and final acceptance of the Work.
 2. During the time period between pavement removal and completing permanent pavement replacement, maintain highways, streets and roadways by the use of steel running plates. Running plate edges shall have asphalt placed around their perimeter to minimize vehicular impact. The backfill above the pipe shall be compacted as specified elsewhere up to the existing pavement surface to provide support for the steel running plates.
 3. Immediately repair all driveways that are cut or damaged. Maintain them in a suitable condition for use until completion and final acceptance of the Work.

3.2 EXISTING UNDERGROUND UTILITIES AND OBSTRUCTIONS

- A. It is the responsibility of the Contractor to locate all existing utilities along the path of construction. The drawings shall indicate underground utilities or obstructions that are known to exist. Where these or unforeseen underground utilities are encountered, the location and alignment of the water main may be changed, upon written approval of the Owner, to avoid interference.
- B. Existing Utility Location: The following steps shall be exercised to avoid interruption of existing utility service.
1. Provide the required notice to the utility owners and allow them to locate their facilities according to Georgia law. Field utility locations are valid for only 10 days after original notice. The Contractor shall ensure, at the time of any excavation that a valid utility location exists at the point of excavation.

2. Expose the facility, for a distance of at least 200 feet in advance of pipeline construction, to verify its true location and grade. Repair, or have repaired, any damage to utilities resulting from locating or exposing their true location.
3. Avoid utility damage and interruption by protection with means or methods recommended by the utility owner.
4. Maintain a log identifying when phone calls were made, who was called, area for which utility relocation was requested and work order number issued, if any. The Contractor shall provide the Owner an updated copy of the log as requested.

C. Conflict with Existing Utilities

1. Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed piping does not permit safe installation of the piping by the use of sheeting, shoring, tying-back, supporting, or temporarily suspending service of the parallel or crossing facility. The Contractor may change the proposed alignment of the piping to avoid horizontal conflicts if the new alignment remains within the available right-of way or easement, complies with regulatory agency requirements and after a written request to and subsequent approval by the Owner, the Contractor shall arrange to have the utility, main, or service relocated.
2. Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed piping does not permit the crossing without immediate or potential future damage to the utility, main, service, or the piping. The Contractor may change the proposed grade of the piping to avoid vertical conflicts if the new grade complies with regulatory agencies requirements and after written request to and subsequent approval by the Owner. Where such adjustment of the piping is approved by the Owner, the Contractor shall arrange to have the utility, main, or service relocated.

- D. Electronic Locator: Have available at all times an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.

3.3 CONNECTIONS TO EXISTING PIPE LINES

- A. Before laying pipe, the Contractor shall locate the points of connection to existing pipe lines and uncover as necessary for the Owner to confirm the nature of the connection to be made. The Contractor shall furnish materials and make the connection to all existing pipe lines as shown on the drawings. The Contractor will be observed during construction of tie-ins by the Owner. The Contractor shall use all available practices and resources to minimize the time the customers are without water. The Contractor shall notify all required utility companies and users of outages at least 72 hours in advance.
- B. Interruption of Services: Make connections to existing piping only when system operations permit. Operate existing valves only with the specific authorization and

direct supervision of the Owner.

C. Tapping Saddles and Tapping Sleeves

1. Holes in the new pipe shall be machine cut, either in the field or at the factory. No torch cutting of holes shall be permitted.
2. Prior to attaching the saddle or sleeve, the pipe shall be thoroughly cleaned, utilizing a brush and rag, as required.
3. Before performing field machine cut, the water tightness of the saddle or sleeve assembly shall be pressure tested. The interior of the assembly shall be filled with water. An air compressor shall be attached, which will induce a test pressure as specified in Section 02519. No leakage shall be permitted for a period of five minutes.
4. After attaching the saddle or sleeve to existing piping, but prior to making the tap, the interior of the assembly shall be disinfected. All surfaces to be exposed to potable water shall be swabbed or sprayed with one percent hypochlorite solution.

D. Connections Using Solid Sleeves: Where solid sleeves are shown on the Drawings, the Contractor shall furnish materials and labor necessary to make the connection using a solid sleeve to the existing pipe line.

E. Connections Using Flange Filler shall be used only where shown on the Drawings or approved by the Owner to make up minor differences in pipe length less than 3-inches. Joint bolt length shall be increased by the thickness of the flange filler.

F. Connections Using Mechanical Pipe Couplings: Where pipe couplings are shown on the Drawings, the Contractor shall furnish materials and labor necessary to make the connection using a pipe coupling to the existing pipe line, including all necessary cutting, plugging and backfill.

G. Connections to Pressure Mains

1. Connections to ductile iron pipe pressure mains shall be by the direct tap method or service clamp, as detailed on the Drawings in full accordance with AWWA requirements.
2. Connections to polyvinyl chloride pipe shall be made using a full body service clamp.
3. Pressure ratings for connections shall be the same as the pressure rating for the pipe.

H. Hydrants: Hydrants shall be attached to the water main by the following method:

1. For mains 12-inches and smaller, the isolation valve shall be attached to the main by connecting the valve to the hydrant tee.
2. For mains larger than 12-inches, the isolation valve shall be attached to the

main by providing an anchor coupling between the valve and tapping saddle.

3. The isolation valve shall be attached to the hydrant by providing an anchor coupling between the valve and hydrant.

3.4 PIPE DISTRIBUTION

- A. Pipe shall be distributed and placed in such a manner that will not interfere with traffic.
- B. No pipe shall be strung further along the route than 1,000 feet beyond the area in which the Contractor is actually working without written permission from the Owner. The Owner reserves the right to reduce this distance to a maximum distance of 200 feet in residential and commercial areas based on the effects of the distribution to the adjacent property owners.
- C. No street or roadway may be closed for unloading of pipe without first obtaining permission from the proper authorities. The Contractor shall furnish and maintain proper warning signs and obstruction lights for the protection of traffic along highways, streets and roadways upon which pipe is distributed.
- D. No distributed pipe shall be placed inside drainage ditches.
- E. Distributed pipe shall be placed as far as possible from the roadway pavement, but no closer than five feet from the roadway pavement, as measured edge-to-edge.

3.5 LOCATION AND GRADE

- A. The Drawings show the alignment of the water main and the location of valves, hydrants and other appurtenances.
- B. After the Contractor locates and marks the water main centerline or baseline, the Contractor shall perform clearing and grubbing.
- C. Construction shall begin at a connection location and proceed without interruption. Multiple construction sites shall not be permitted without written authorization from the Owner for each site.

3.6 LAYING PIPE

- A. Field Inspection: All pipe and accessories shall be laid, jointed, tested for defects and for leakage with pressure and chlorinated in the manner herein specified in the presence of the Owner and subject to their approval.
- B. Handling Pipe and Accessories:
 1. Care: PVC pipe, fittings, valves and other accessories shall be unloaded at the point of delivery, hauled to and distributed at the site of the project by the contractor; they shall at all times be handled with care to avoid damage. In loading and unloading they shall be lifted by hoists or slid or towed on skid-ways in such a manner as to avoid shock. Under no circumstances shall they be dropped. Pipe handled on skids must not be skidded or rolled against pipe already on the ground.

2. At Site of Work: In distributing the material at the site of the work, each piece shall be unloaded opposite or near the place where it is to be laid in the trench and shall be laid on high ground so that it will not be in a drainage way.
3. Bell Ends, How Faced: Pipe shall be placed on the site of the work parallel with the trench alignment and with the bell ends facing the direction in which the work will proceed, unless otherwise directed by the Owner.
4. Pipe Kept Clean: The interior of all pipes, fittings and other accessories shall be kept free from dirt and foreign matter at all times.
5. Detection tape shall be buried 2'-0" below the ground surface above the water main.
6. Twelve (12) gauge pipe detection wire shall also be installed by taping to the top of the pipe every fifty (50) feet during pipe installation.

C. Alignment and Grade:

1. General: All pipes shall be laid and maintained in the required lines and grades, with fittings and valves at the required locations, with joints centered and spigots home, and with all valve stems plumb.
2. Depth of Pipe: Where pipe is laid in roadways and parkways of streets, the top of the barrel of the pipe shall have a minimum cover of forty-eight inches below the curb line of the street or where no curb line has been established, below the existing ground line. Where the pipe is laid in open, un-subdivided areas, a minimum of thirty-six inches of cover is required. A greater depth of cover is required in certain sections of the main, such as railroad crossings, valve locations and other sections of special construction, and within State and Federal highway rights-of-way.
3. All PVC line smaller than 4" shall be aligned in the trench in a "snake" or "S" form to allow for elongation due to temperature changes.

D. Excavation and Preparation of Trench:

1. Description: The trench shall be dug to the alignment and depth required and not to exceed 200 feet in advance of the pipe laying. The trench shall be braced if work therein, safely and efficiently. It is essential that the discharge from any pumps be led to natural drainage channels, to drains or to storm sewers.
2. Width: Minimum width of trench shall be eighteen (18) inches or six (6) inches out-side the barrel of the pipe on each side of pipe. Maximum width of trench shall be nine (9) inches outside the barrel of the pipe on each side of pipe. Sides of trench shall be dug and maintained substantially vertical to a height 12 inches above the pipe.
3. Pipe Foundation: The pipe shall be laid upon a sound earthen foundation cut

true and even so that the barrel of the pipe will have a bearing for its full length.

4. Correcting Faulty Grade: Any part of the trench excavated below grade shall be corrected with approved materials and thoroughly compacted.
5. Bell Holes, Required: Bell holes of ample dimensions shall be dug in trenches at each joint to permit the joint to be made properly.
6. Braced and Sheeted Trenches: Wherever necessary to prevent caving, excavations shall be adequately sheeted and braced. Where sheeting and bracing are used, the trench width shall be increased accordingly. Trench sheeting shall remain in place until the pipe has been laid, tested for defects, and repaired if necessary, and the earth around it compacted to a depth of two feet over the top of the pipe.
7. Care of Surface Materials for Re-Use: If local conditions permit their re-use, all surface materials suitable for re-use in restoring the surface shall be kept separate from the general excavation material.
8. Manner of Piling Excavated Materials: All excavated materials shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Gutters shall be kept clear or other provisions made for street drainage.
9. Trenching by Machine or by Hand: The use of trench digging machinery will be permitted except in places where operation of same will cause damage to existing structures above or below ground; in which case hand methods shall be employed. Excavation shall be made by ladder type machine or backhoe.
10. Unsuitable Soil Conditions: Where the sub-grade is unsuitable material for the proper installation of the water main, the Contractor shall undercut the trench and backfill with No. 57 stone meeting the requirements of Georgia DOT Specification 800.01 at the Owner's direction. The stone shall be brought to grade and thoroughly compacted to conform to the outside of the main.
11. No separate payment will be made for unsuitable soil removal. The Contractor shall be paid at a price as negotiated by the Owner on an "as needed" basis.
12. Dewatering Trenches: Where subgrade with excessive water is encountered, dewatering shall be done by well pointing. If soil conditions are not suitable for well points, trench drains or crushed stone or gravel shall be constructed to carry the water to sumps and the water removed by pumps or bailing. No extra payment will be made for dewatering trenches.

E. Pipe Handling:

1. Manner of Hauling Pipe and Accessories: Proper implements, tools and facilities shall be provided and used by the contractor for the safe and

convenient execution of the work. All pipe, fittings and valves shall be carefully lowered into the trench piece by piece by means of derrick ropes or other suitable tools or equipment, in such a manner as to prevent damage to pipe or pipe coating. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.

2. Inspection: Before lowering and while still suspended, the pipe shall be inspected for defects. Any defective, damaged or unsound pipe shall be rejected.
 3. Pipe Kept Clean: All foreign matter or dirt shall be removed from the pipe, and it shall be kept clean by approved means throughout the process.
 4. Installation of the Pipe: The spigot shall be centered in the bell, the pipe forced "home" and brought into true alignment; it shall be secured there by earth carefully tamped under and on each side of it, except at the bell holes. Care shall be taken to prevent dirt from entering the joint space. No "blocking up" of pipe or joints will be permitted. The joint shall be made as hereinafter described.
 5. All PVC pipe smaller than 4" O.D. or less shall be solvent welded. Method of solvent weld jointing shall be approved by the Owner prior to installation.
 6. Trench Water Entering Pipe: At times when pipe installation is not in progress, the open ends of the pipe shall be closed by approved means and no trench water shall be permitted to enter the pipe.
 7. Cutting Pipe: Cutting of pipe for inserting valves, fittings or closure pieces shall be done in a neat workmanlike manner without damage to the pipe.
 8. Bell Ends Face Direction of Laying: Unless otherwise directed, pipe shall be laid with bell ends facing in the direction of installation; and for lines on an appreciable slope, bells shall, at the discretion of the Owner face up-grade.
 9. Permissible Deflections at Joints: Wherever necessary to deflect pipe from a straight line, either in the vertical or horizontal plane to avoid obstructions, the degree of deflection shall not exceed $\frac{2}{3}$ the maximum according to manufacturer's recommendations.
 10. Unsuitable Conditions for Installing Pipe: No pipe shall be laid in water, or when the trench conditions or the weather is unsuitable for such work.
- F. Jointing Pipe-Mechanical Joints: The following steps shall be taken in making mechanical joints:
1. All lumps, blisters and excess coal-tar enamel shall be removed from socket and spigot of the pipe.
 2. Wash socket and plain end with soapy water containing chloride solution; then slip gland and gasket over plain end. The small side of gasket and lip gland shall face bell.

3. Paint gasket with soapy solution containing chlorine.
 4. Push gasket into position, being sure it is evenly seated in socket.
 5. Slide gland into position; insert bolts and run nuts up finger tight.
 6. Tighten bolts to uniform tightness with correct ratchet wrench. The first bolt tightened shall be the bottom bolt, then top. All other bolts shall be tightened in sequence at 180 degrees apart.
- G. Setting Valves, Valve Boxes and Fittings:
1. General: Gate valves and pipe fittings shall be set and joined to new pipe in the manner heretofore specified for cleaning, laying and jointing pipe.
 2. Valve Boxes: Cast iron valve boxes shall be firmly supported and maintained centered and plumb over the wrench nut of the gate valve, with box cover.
- H. Plugging Dead Ends: Standard plugs shall be inserted into the bells of all dead ends of pipes, tees or crosses and spigot ends shall be capped. Plugs or caps shall be jointed to the pipe or fittings in the manner specified above.
- I. Hydrant Installation
1. Prior to installation, inspect all hydrants for direction of opening, nozzle threading, operating nut and cap nut dimensions, tightness of pressure-containing bolting, cleanliness of inlet elbow, handling damage and cracks. Defective hydrants shall be corrected or held for inspection by the Owner.
 2. All hydrants shall stand plumb and shall have their nozzles parallel with or at right angles to the roadway, with pump connection nozzle facing the roadway, except that hydrants having two-hose nozzles 90 degrees apart shall be set with each nozzle facing the roadway at an angle of 45 degrees.
 3. Hydrants shall be set to the established grade, with the centerline of the lowest nozzle at least 12-inches above the ground or as directed by the Owner.
 4. Each hydrant shall be connected to the main with a 6-inch branch controlled by an independent 6-inch valve. When a hydrant is set in soil that is pervious, drainage shall be provided at the base of the hydrant by placing coarse gravel or crushed stone mixed with coarse sand from the bottom of the trench to at least 6-inches above the drain port opening in the hydrant to a distance of 12-inches around the elbow.
 5. When a hydrant is set in clay or other impervious soil, a drainage pit 2 x 2 x 2 feet shall be excavated below each hydrant and filled with coarse gravel or crushed stone mixed with coarse sand under and around the elbow of the hydrant and to a level of 6-inches above the drain port.
 6. Hydrants shall be located as shown on the Drawings or as directed by the Owner. In the case of hydrants that are intended to fail at the ground-line joint

upon vehicle impact, specific care must be taken to provide adequate soil resistance to avoid transmitting shock moment to the lower barrel and inlet connection. In loose or poor load bearing soil, this may be accomplished by pouring a concrete collar approximately 6-inches thick to a diameter of 24-inches at or near the ground line around the hydrant barrel.

7. Raised pavement markers (RPM's) shall be provided and installed along the appropriate roadway centerline for each fire hydrant on Owner owned right-of-way. RPM's for in-line valves shall be Type I, two-way, and blue in color.

3.7 THRUST RESTRAINT

- A. Provide restraint at all points where hydraulic thrust may develop.
- B. Retainer Glands: Provide retainer glands where shown on the Drawings and on fire hydrants and all associated fittings, valves and related piping. Retainer glands shall be installed in accordance with the manufacturer's recommendations, particularly, the required torque of the set screws. The Contractor shall furnish a torque wrench to verify the torque on all set screws which do not have inherent torque indicators.
- C. Harnessing
 1. Provide harness rods only where specifically shown on the Drawings or directed by the Owner.
 2. Harness rods shall be manufactured in accordance with ASTM A36 and shall have an allowable tensile stress of no less than 22,000 psi. Harness rods shall be hot dip galvanized or field coated with bitumastic before backfilling.
 3. Where possible, harness rods shall be installed through the mechanical joint bolt holes. Where it is not possible, provide 90 degree bend eye bolts.
 4. Eye bolts shall be of the same diameter as specified in AWWA C111 for that pipe size. The eye shall be welded closed. Where eye bolts are used in conjunction with harness rods, an appropriate size washer shall be utilized with a nut on each end of the harness rod. Eye bolts shall be of the same material and coating as the harness rods.
- D. Hydrants: Hydrants shall be attached to the water main as shown on the Standard Detail.
- E. Thrust Collars: Collars shall be constructed as shown on the Drawings. Concrete and reinforcing steel shall meet the requirements as specified in this Section. The welded-on collar shall be designed to meet the minimum allowable load shown on the Drawings. The welded-on collar shall be attached to the pipe by the pipe manufacturer.
- F. Concrete Blocking
 1. Provide concrete blocking for all bends, tees, valves, and other points where thrust may develop, except where other exclusive means of thrust restraint are specifically shown on the Drawings.

2. Concrete shall be as specified in this Section.
3. Form and pour concrete blocking at fittings as shown on the Drawings and as directed by the Owner. Pour blocking against undisturbed earth. Increase dimensions when required by over excavation.

3.8 DETECTION TAPE

- A. Provide detection tape for all water mains.

3.9 BACKFILLING, CLEANING UP AND MAINTAINING SURFACES

- A. Time of Backfilling: As soon as practicable after the completion of laying and jointing of the pipe, the trench shall be backfilled, and at no time shall the completed backfilling of the trench be more than 300 feet behind the pipe laying.
- B. Compaction Requirements: All backfill for trenches under paved or roadway areas shall be compacted to 98% of the Standard Proctor maximum density (ASTM D-698). Backfill for trenches other than under paved or roadway areas shall be compacted to 95% of the Standard Proctor maximum density (ASTM D-698). The testing lab shall furnish the Owner proof of compaction at a point 18" above the crown of the sewer pipe at all pavement, driveway or roadway crossings. Additional compaction tests are required at each crossing 8" below the surface of the pavement or on the pavement subgrade before pavement placement. Contractor shall incur all cost for compaction test performed by a testing laboratory approved by the Owner and selected by the Contractor.
- C. Backfill Procedure at Pipe Zone: Select backfill material free from rock fragments shall be deposited in the trench simultaneously on both sides of the pipe for the full width of the trench and to an elevation of twelve inches above the top of the barrel of the pipe. The backfill material shall be moistened if necessary, tamped in thin (about 4-inch) layers and thoroughly compacted under and on each side of the pipe to provide solid backing against the external surface of the pipe. Backfill material within 6" of main shall be selected backfill aggregate no larger than 3/4" in diameter (#57 stone).
- D. Backfill Procedure Above the Pipe Zone: Succeeding layers of backfill may contain coarser materials, and shall be compacted thoroughly to the natural ground surface.
- E. Procedure Where Settlement is Important: Where it is important that the surface of the backfill be made safe for vehicular traffic at unpaved street crossings and along existing unpaved streets, the upper thirty-six inches of backfill shall be approved moist material, thoroughly compacted in eight inch layers by tamping, and shall be brought to the required surface grade.
- F. Deficiency of Backfill, by Whom Supplied: Any deficiency in the quantity of material for backfilling the trenches, or for filling depressions caused by settlement, shall be supplied by the contractor.
- G. Protection: Return all items and all areas disturbed, directly or indirectly by work under these specifications, to their original condition or better, as quickly as possible after work is started.

- H. Restoration of Surfaces: The contractor shall replace all curbing, sidewalks, gutters, shrubbery, fences, sod, and other surfaces disturbed to a condition equal to that before the work began, furnishing all labor and materials incidental thereto and complete the work in a manner satisfactory to the Owner. Replacement of street base and surface removed to permit installation of pipe lines shall be provided for elsewhere in these specifications.
- I. Man-Made Improvements: Protect, or remove and replace with the Owner's approval, all fences, piers, docks, walkways, mailboxes, pipe lines, drain culverts, power and telephone lines and cables, and other improvements that may be encountered in the work.
- J. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by the Owner. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.
- K. Cutting of Trees: Do not cut trees for the performance of the work except as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3 inches in diameter, (measured 4' from the ground) not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Contractor. No stumps, wood piles, or trash piles will be permitted on the work site.
- L. Surplus Earth: Surplus excavated materials from trenches in streets or at railroad crossings shall be disposed of by the contractor at his expense and in a manner satisfactory to the Owner.
- M. Cleaning Up: Surplus pipe line materials, tools, surplus excavated materials, rubbish, and temporary structures shall be removed by the contractor and the construction site shall be left clean, to the satisfaction of the Owner. The line shall be cleaned up immediately after a satisfactory pressure test has been made.
- N. Maintenance of Surfaces: Following the certification of completion by the Owner, the contractor shall maintain the surface of the unpaved trenches, adjacent curbs, sidewalks, gutters and other surfaces disturbed for a period of three months thereafter. All materials and labor required for the maintenance of the trenches and adjacent structures shall be supplied by the contractor and the work shall be done in a manner satisfactory to the Owner.
- O. Compaction Testing:
 - 1. Density: Tests for compaction and density shall be conducted by an independent testing laboratory selected in accordance with Section 02300 of these specifications.
 - 2. The soils testing laboratory is responsible for the following:

- a. Field compaction testing shall be based on using the maximum dry density determined by the Standard Proctor Compaction Test in accordance with ASTM D 698.
 - b. Maximum dry density for non-cohesive materials shall mean the maximum index density as determined by ASTM D 4253.
 - c. Determination of in-place backfill density shall be done in accordance with ASTM D 1556, ASTM D 2937, or ASTM D 2922.
 - d. Field density tests for each two feet of lift; one test for each 5,000 square feet of fill.
 - e. Inspecting and testing stripped site, subgrade and proposed fill materials.
- P. Contractor's duties relative to testing include – Refer to Sections 02300 and 02324.

3.10 WATER MAIN AND SEWER MAIN SEPARATION

- A. Water mains should maintain a minimum 10 foot edge-to-edge separation from sewer lines, whether gravity or pressure. If the main cannot be installed in the prescribed easement or right-of-way and provide the 10 foot separation, the separation may be reduced, provided the bottom of the water main is a minimum of 18-inches above the top of the sewer. If neither of these two separation criteria be possible, the water main shall be installed below the sewer with a minimum vertical separation of 18-inches.
- B. The water main, when installed below the sewer, shall be encased in concrete with a minimum 6-inch concrete depth to the first joint in each direction. Where water mains cross the sewer, the pipe joint adjacent to the pipe crossing the sewer shall be cut to provide maximum separation of the pipe joints from the sewer.
- C. No water main shall pass through, or come in contact with, any part of a sanitary sewer manhole.

3.11 TESTING

REFER TO SECTION 02519 - PIPING, TESTING AND ACCEPTANCE.

3.12 DISINFECTING PIPE LINES

REFER TO SECTION 02515 - DISINFECTION OF WATER DISTRIBUTION SYSTEMS.

3.13 PROTECTION AND RESTORATION OF WORK AREA

- A. General: Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is started.
 - 1. The Contractor shall plan, coordinate, and prosecute the work such that disruption to personal property and business is held to a practical minimum.

2. All construction areas abutting lawns and yards of residential or commercial property shall be restored promptly. Backfilling of underground facilities, ditches, and disturbed areas shall be accomplished on a daily basis as work is completed. Finishing, dressing, and grassing shall be accomplished immediately thereafter, as a continuous operation within each area being constructed and with emphasis placed on completing each individual yard or business frontage. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.
 3. Handwork, including raking and smoothing, shall be required to ensure that the removal of roots, sticks, rocks, and other debris is removed in order to provide a neat and pleasing appearance.
 4. The Department of Transportation's engineer shall be authorized to stop all work by the Contractor when restoration and cleanup are unsatisfactory and to require appropriate remedial measures.
- B. Man-Made Improvements: Protect, or remove and replace with the Owner's approval, all fences, walkways, mail boxes, pipe lines, drain culverts, power and telephone lines and cables, property pins and other improvements that may be encountered in the Work.
- C. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by the Owner. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.
- D. Cutting of Trees: Do not cut trees for the performance of the work except as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3-inches in diameter, not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Contractor. No stumps, wood piles, or trash piles will be permitted on the work site.
- E. Disposal of Rubbish: Dispose of all materials cleared and grubbed during the construction of the Project in accordance with the applicable codes and rules of the appropriate Owner, state and federal regulatory agencies.
- F. Swamps and Other Wetlands
1. The Contractor shall not construct permanent roadbeds, berms, drainage structures or any other structures which alter the original topographic features within the easement.
 2. All temporary construction or alterations to the original topography will incorporate measures to prevent erosion into the surrounding swamp or wetland. All areas within the easement shall be returned to their original topographic condition as soon as possible after work is completed in the area. All materials of construction and other non-native materials shall be disposed by the Contractor.

3. The Contractor shall provide temporary culverts or other drainage structures, as necessary, to permit the free migration of water between portions of a swamp, wetland or stream which may be temporarily divided by construction.
4. The Contractor shall not spread, discharge or dump any fuel oil, gasoline, pesticide, or any other pollutant to adjacent swamps or wetlands.

END SECTION

SECTION 33 05 61

MANHOLES AND APPURTENANCES

PART 1 GENERAL

1.1 DESIGN REQUIREMENTS

- A. Manholes shall be constructed of specified materials to the sizes, shapes and dimensions and at the locations shown on the Drawings. The height of depth of the manhole will vary with the location. Unless shown otherwise on the Drawings, the top of the manhole will vary with the location. Unless shown on the Drawings, the top of manhole frame will be at the finished grade of the pavement or ground surface and inverts will be at the elevations shown on the Drawings.

1.2 SUBMITTALS

- A. Complete product data on all precast manhole bottoms, riser sections, transition slabs and tops shall be submitted in accordance with these Specifications.
- B. Complete product data on frames, covers and steps shall be submitted to the Owner for approval.
- C. Complete product data on all piping appurtenances shall be submitted to the Owner for approval.

1.3 QUALITY ASSURANCE

- A. Prior to delivery, all basic materials specified herein shall be tested and inspected by an approved independent commercial testing laboratory. Certified copies of test reports prepared by the manufacturer's testing laboratory will be acceptable.

PART 2 PRODUCTS

2.1 MANHOLES

- A. Concrete and Reinforcement
 - 1. Concrete used in construction shall have a minimum compressive strength of 3000 psi unless noted or specified otherwise.
 - 2. Steel reinforcement shall be deformed bars conforming to ASTM A-615.

Reinforcement shall be manufactured from new billet steel of American Manufacture Grade 60.

3. Brick used in manhole construction shall be solid or cored, medium hard or better, Grade MS brick conforming to the requirements of ASTM C 32 for sewer and manhole brick.
4. Mortar shall be made of one part Portland cement and two parts clean sharp sand. Cement shall be Type 1 and shall conform to ASTM C 150, C175 and C33. Sand shall meet the requirements of ASTM C 144.

B. Round Precast Concrete Manholes: Provide manholes and other precast concrete products in accordance with the following:

1. Precast concrete sections shall meet the requirements of ASTM C 478. The minimum compressive strength of the concrete in precast sections shall be 4,000 psi.
2. The minimum wall thickness shall be one-twelfth of the inside diameter of the base, riser or the largest cone diameter. Additionally, the wall thickness shall be sufficient for the installation of the rubber boots.
3. Transition slabs which convert bases larger than four feet in diameter to four foot diameter risers shall be designed by the manhole manufacturer to carry the live and dead loads exerted on the slab.
4. Seal joints between precast sections by means of rubber O-ring gaskets or flexible butyl rubber sealant.
5. Manholes shall be coated and sealed to prevent interior corrosion and waterproofed as required to meet the minimum testing requirements.

2.2. MANHOLE FRAMES AND COVERS

- A. Cast iron frames and covers shall meet the requirements of ASTM A-48 for Class 30 gray iron and all applicable local standards. All castings shall be tough, close grained, smooth, and free from blow holes, blisters, shrinkage, strains, cracks, cold shots and other imperfections. No casting will be accepted which weighs less than 95 percent of the design weight. Shop drawings must indicate the design weight and provide sufficient dimensions to permit checking. All castings shall be thoroughly cleaned in the shop and given two coats of bituminous paint before rusting begins.

- B. Manhole frames and covers shall be as indicated on the Detail Drawings:
- C. All frames and covers shall have machined horizontal bearing surfaces.
- D. All manholes shall have standard frames and covers except where specifically shown otherwise on the Drawings.

2.3. JOINT SEALANT:

- A. Seal joints between precast sections by means of rubber O-ring gaskets or flexible butyl rubber sealant. Butyl rubber sealant shall meet the requirements of AASHTO M-198. Sealant shall be pre-formed type with a minimum nominal diameter of 1-inch. Butyl rubber sealant shall be equal to Kent Seal No.2 or concrete Sealant CS202.

2.4. RUBBER BOOTS

- A. Provide preformed rubber boots and fasteners as manufactured by Kor-N-Seal or Press Seal Gasket Corporation.

2.5. STEPS

- A. Manhole steps shall be plastic coated steel as manufactured by M.A. Industries, Model PS1-PF or approved equal meeting ASTM C-478. Steps shall be spaced 12 inches on center and vertically aligned.

PART 3 EXECUTION

3.1 GENERAL

- A. Excavation for backfilling for all manholes covered under this Section shall conform to the requirements of these Specifications.
- B. Top Elevations: Built manhole castings shall be flush with the finished grade unless otherwise shown on the Drawings.
- C. Drop Connections: Manholes requiring drop connections are shown on the Drawings. Construct drop connections of the same materials as the upstream sewer and in accordance with the details shown on the Drawings.
- D. Inlet and Outlet Pipe

1. Where required, inlet and outlet pipes shall be cut-off flush with the interior

surface of the manhole walls.

2. Inverts: All inverts shall be 3000 psi concrete and shall conform to the shape indicated on the Drawings. The invert shall be formed to the required size and grade by gradual and even changes in sections. Changes in directions of flow through the inlet shall be made to a true curve with as large a radius as the size of the inlet will permit.
- E. Invert Elevations: The invert elevations shown on the Drawings shall be for the invert elevation of the incoming and outgoing pipe. Prior to setting the laser or other vertical alignment control system for the sewer upstream of the manhole, the Contractor shall verify the elevation of the sewer installed at the manhole.
- F. Manholes shall be constructed with plumb walls.
- G. The cast iron frame for the manhole cover shall be set at the required elevation and anchored to the masonry. Where manholes are constructed in paved areas, the top surface of the frame and cover shall be tilted to conform to the exact slope, crown and grade of the existing adjacent pavement.
- H. Masonry work shall be allowed to set for a period of not less than 24 hours. Outside forms, if any, then shall be removed and the manhole backfilled and compacted. All loose or waste material shall be removed from the interior of the manhole. The manhole cover then shall be placed and the surface in the vicinity of the work cleaned off and left in a neat and orderly condition.

3.2 CONSTRUCTION OF CAST-IN-PLACE CONCRETE STRUCTURES

- A. Cast-in-place structures shall be constructed in place as shown and detailed on the Drawings.
- B. Should circumstances make a vertical joint necessary, a formed groove or reinforcing dowels shall be required in the top of the first placement for shear protection. Immediately before the second vertical placement is made, the surface of the cold joint shall be thoroughly cleaned and wetted with a layer of mortar being deposited on the surface.

3.3 PRECAST MANHOLE CONSTRUCTION

- A. Construct manholes as shown on the Drawings and in accordance with the

requirements of ASTM C 891.

- B. Precast Concrete: Handle sections to prevent cracking or chipping. Provide uniform bedding of the bottom section to prevent uneven loading. Install gaskets and joint sealants in accordance with manufacturer's recommendations to produce a watertight structure.
- C. Where bricks are used to adjust the frame and cover to grade, bed the bottom and sides of every brick in mortar. Apply a smooth coat of mortar, 3/4-inch thick, on the inside and outside.
- D. Pipe Connections: Seal the void between the pipe and the manhole with brick and mortar on both the inside and outside.
 - 1. Pipe 36-inch Diameter and Less: Connect pipe to manhole utilizing rubber boots.
 - 2. Pipe 42-inch Diameter and Larger: Construct manhole collars as shown on the Drawings after the pipe has been sealed into the manhole.
- E. Frames and Covers: Unless frame and cover is at grade, the frame shall be cast into the cone section.
- F. Seal all manhole joints and lift holes, both inside and out, with grout. Between precast sections, this is in addition to joint sealant.

3.4 INSPECTION AND TESTING

- A. All manholes shall be tested in accordance with the requirements of Section 02519 of these Specifications.

END SECTION

SECTION 33 14 13

WATER DISTRIBUTION MAINS AND ACCESSORIES

PART 1 GENERAL

1.1 SCOPE

- A. This Section describes products to be incorporated into the water mains and requirements for the installation and use of these items. Furnish all products and perform all labor necessary to fulfill the requirements of these Specifications. It includes, but is not limited to the construction of piping, valves, fittings, connection to existing systems, and all other appurtenances necessary to convey potable water.
- B. Warranty: Water distribution system installed by the Contractor shall be warranted and guaranteed for a period of one year from the date of final acceptance that the completed system is free from all defects due to faulty products or workmanship, and that the Contractor shall make such corrections as may be necessary by reason of such defects upon notice by the Owner.
- C. All construction shall meet the requirements of the City of Washington and EPD.

1.2 RELATED SECTIONS

- A. Section 31 11 00 – Clearing and Grubbing
- B. Section 31 41 00 – Sheeting, Shoring, and Bracing
- C. Section 31 23 33 – Trenching Excavation & Backfill
- D. Section 32920 - Grassing

1.3 REFERENCES

- A. ASTM Specifications:
 - 1. ASTM D 3740-94a – Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
 - 2. ASTM E 329-93b – Agencies Engaged in the Testing and/or Inspection of Materials as Used in Construction.
 - 3. ASTM D 3034-94 – Type PSM PVC Sewer Pipe and Fittings.
 - 4. ASTM D 2321-89 – Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Installations.
 - 5. ASTM A 746-95 – Ductile Iron Gravity Sewer Pipe.
 - 6. ASTM D 3212-92 – Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

7. ASTM F 477-95 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
8. ASTM D 2241-94 – PVC Pressure-Rated Pipe (SDR – Series).
9. ASTM D 3139-95 – Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seams.
10. ASTM A 139-93a – Electric-Fusion (Arc) Welded Steel Pipe (NPS 4 and Over).
11. ASTM C 478-94 – Precast Reinforced Concrete Manhole sections.
12. ASTM C 443-94 – Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
13. ASTM C 39-94 – Compressive Strength of Cylindrical Concrete Specimens.
14. ASTM C 890-91 – Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
15. ASTM C 891-90 – Installation of Underground Precast Concrete Utility Structures.
16. ASTM C 913-89 – Precast Concrete Water and Wastewater Structures.
17. ASTM A 615/A 615 M-95b – Deformed and Plain Billet – Steel Bars for Concrete Reinforcement.
18. ASTM D-2922-91 – Test methods for Density of Soil and Soil Aggregate In-Place by Nuclear Methods (Shallow Depth).
19. ASTM D-1557-91 – Laboratory Compaction Characteristics of Soil Using Modified Effort.
20. ASTM D 1556-90 – Density and Unit Weight of Soil In-Place By The Sand-Cone Method.
21. ASTM D 71-87 (reapproved 1994) – Evaluation Degree of Blistering of Paints.
22. ASTM D 2794-93 – Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
23. ASTM E 96-95 – Water Vapor Transmission of Materials.
24. ASTM G 53-95 – Operating Light and Water-Exposure Apparatus (Fluorescent UV – Condensation Type) for Exposure of Nonmetallic Materials.
25. ASTM A 377-95 – Index of Specifications for Ductile Iron Pressure Pipe.

B. ANSI/AWWA Specifications:

1. ANSI/AWWA C 150/A 21.50-96 – Thickness Design of Ductile Iron Pipe.

2. ANSI/AWWA C 151/A 21.51-91 – Ductile Iron Pipe, Centrifugally Cast, for Water or Other Liquids.
 3. ANSI/AWWA C-500-93 – Metal-Seated Gate Valves for Water Supply Service.
 4. ANSI/AWWA C-509-94 – Resilient-Seated Gate Valves for Water Supply Service.
 5. ANSI/AWWA C 111/A 21.11-95 – Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
 6. ANSI/AWWA C 600-93 – Installation of Ductile Iron Water Mains and their appurtenances.
- C. ACI Specifications:
1. ACI 318-89 – Building Code Requirements for Reinforced concrete.
- D. AASHTO Standards:
1. AASHTO T 191-91 – Density of Soil In-Place by the Sand-Cone Method.

1.4 SUBMITTALS

- A. Complete shop drawings and product data on all piping and accessories shall be submitted to the Owner in accordance with the requirements of these Specifications.
- B. Shop drawings shall indicate piping layout in plan and/or elevations and shall include a complete schedule of all pipe, fittings, special hangers and supports. Special castings shall be clearly detailed showing all pertinent dimensions. Special coatings shall be clearly identified.
- C. The Contractor shall furnish the Owner with lists of all pieces of pipe and fittings in each shipment received. These lists shall give the serial or mark number, weight, class, size and description of each item received.
- D. The Contractor shall submit written evidence to the Owner that the products furnished under this Section will conform to the material and mechanical requirements specified herein. Certified copies of independent laboratory test results or mill test results from the pipe supplier may be considered evidence of compliance provided such tests are performed in accordance with the appropriate testing standards by experienced, competent personnel. In case of doubt as to the accuracy or adequacy of mill tests, the Owner may require that the Contractor furnish test reports from an independent testing laboratory on samples of pipe materials.

1.5 QUALITY ASSURANCE

- A. Material and equipment shall be the standard product of a manufacturer who has manufactured them for a minimum of 2 years and who provides published data on the quality and performance of the product.

- B. A Subcontractor for any part of the work must have experience on similar work and if required, furnish the Owner with a list of projects and reference contacts.
- C. Devices, equipment, structures, and systems not designated by the Engineer that the Contractor wishes to furnish shall be designed either by a registered professional engineer or by someone the Owner approved as qualified. If required, complete design calculations and assumptions shall be furnished to the Owner before acceptance.
- D. All testing of the piping shall be made by the Contractor with equipment qualified by the Owner or utility company and in the presence of the Owner and utility company. The Owner reserves the right to accept or reject testing equipment.
- E. Soil testing shall be done by a testing laboratory regularly engaged in soil testing, and shall be approved by the Owner prior to engagement. Mill certificates of test on materials made by manufactures will be accepted provided the manufacturer maintains an adequate testing laboratory, makes regularly scheduled tests that are spot checked by an outside laboratory, and furnishes satisfactory certificates with the name of the one making the test.
- F. The details of all welded joints shall comply with all of the requirements for joints, which are accepted without qualification test under the "Code of Arc and Gas Welding in Building Construction of the American Welding Society". Workmanship shall conform to A.I.S.C. Specifications for Fabrication and Erection. All work shall be executed by skilled workmen under experienced supervision. All welding shall be done by welders who have been previously qualified by tests as prescribed in the "American Welding Society Standard Qualification Procedure" to perform the type of work required. Welders shall have passed the qualification test (Qualification tests using procedures covered in AWSS B3.0 Part II) within the preceding 12 months.

1.6 TRANSPORTATION AND HANDLING

- A. Unloading: Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings, valves and accessories. Make equipment available at all times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification. Pipe handled on skids shall not be rolled or skidded against the pipe on the ground.
- B. Handling: Handle pipe, fittings, valves and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift, or front end loader. Do not use material damaged in handling. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior coatings or internal lining of the pipe.
- C. Distribution: Distribute and place pipe and materials to not interfere with traffic. Do not string pipe more than 250 feet beyond the area where pipe is being laid. Do not obstruct drainage ditches.

1.7 STORAGE AND PROTECTION

- A. Store all pipes which cannot be distributed along the route. Make arrangements for the use of suitable storage areas. Do not interfere with other Contractor's right to

access.

- B. Stored materials shall be kept safe from damage. The interior of all pipes, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times. Valves and hydrants shall be drained and stored in a manner that will protect them from damage by freezing.
- C. Pipe shall not be stacked higher than the limits recommended by the manufacturer. The bottom tier shall be kept off the ground on timbers, rails or concrete. Pipe in tiers shall be alternated: bell, plain end; bell, plain end. The timbers shall be large enough to prevent contact between the pipes in adjacent tiers.
- D. Stored mechanical and push-on joint gaskets shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.
- E. Mechanical-joint bolts shall be handled and stored in such manner that will ensure proper use with respect to types and sizes.

1.8 SEQUENCING, SCHEDULING

- A. The Contractor shall arrange his work so that sections of mains between valves are tested, sterilized, placed in service as soon as reasonable after it is placed.

1.9 ALTERNATIVES

- A. The intention of these specifications is to produce the best system for the Owner. If the Contractor suggests that alternate material, equipment or procedures will improve the results at no additional cost, the Owner will examine the suggestion and determine if acceptable for use. The basis upon which acceptance of an alternate will be given is its value to the Owner, and not for the convenience of the Contractor.

1.10 GUARANTEE

- A. The Contractor shall guarantee the quality of the materials, equipment, and workmanship for 12 months after acceptance of the completed Project. Defects discovered during that period shall be repaired by the Contractor, at no cost to the Owner. The Performance Bond shall reflect this guarantee.
- B. The manufacturers of equipment, valves, pumps, controls, measuring devices and special equipment shall test the equipment at field conditions for compliance with the specifications. The manufacturer shall guarantee the product to be free from defects in material and factory workmanship for a period of 12 months from date of acceptance of the completed project, provided the product is properly installed, serviced and operated under normal conditions and according to the manufacturer's instructions. The manufacturer shall furnish a replacement for any component that proves defective during the guarantee period, except such items which are seals. The Contractor shall furnish the services of a representative of the manufacturer to check the installation after it is completed and to furnish the Owner with a certificate that the equipment meets the specifications and will perform as required.

1.11 EXISTING UTILITIES

- A. All known utility facilities are shown schematically on plans, and are not necessarily accurate in location as to plan or elevation. Utilities such as service lines or unknown facilities not shown on plans will not relieve the contractor of his responsibility under this requirement. "Existing Utility Facilities" means any utility that exists on the project in its original, relocated or newly installed position. The Contractor will be held responsible for the cost of repairs to damaged underground facilities; even when such facilities are not shown on the plans. The Contractor shall contact all utility companies prior to beginning the work and request an accurate field location of their respective utility lines.
- B. Damage to any part of the existing water system and facilities by the Contractor or Subcontractors, that is required by the Owner's forces, shall be charged to the Contractor on the basis of time and material, plus 30% for overhead and administration.

1.12 REQUIREMENTS OF REGULATORY AGENCIES

- A. Water mains shall be sterilized to meet the requirements of the appropriate Health/Public Works Department. Sterilization shall be in accordance with AWWA Standards C-651, latest revision.

1.13 CONNECT NEW MAIN TO EXISTING SYSTEM

- A. The Contractor shall furnish the necessary pipe and perform all excavation, dewatering, shoring, backfilling, etc. necessary to make the connection of a new main to the existing water system. The Contractor shall contact the Superintendent of the Water Utility a minimum of 48 hours in advance of construction. The Contractor shall be responsible for coordinating his construction with the utility operator.

1.14 ACCEPTANCE OF PORTIONS OF WORK

- A. The Owner reserves the right to accept and use any portion of the work whenever it is considered in the public interest to do so.

1.15 RECORD DATA

- A. It will be required of the Contractor to keep accurate, legible records of the location of any deviations from the construction drawings, any additional items or structures to the construction drawings, and all utilities encountered which are not shown on the construction drawings. These records will be made available to the Owner before his inspection for incorporation into the "Drawing of Record".

1.16 OPTIONS

- A. Several materials are described within these specifications. Where manufacturer and model of equipment is named in the specification, it is intended that these are to describe the quality and function required. The Contractor may use equipment or material of other manufacturers provided they are reviewed and accepted by the Owner as meeting the specifications.
- B. The Contractor will furnish the Owner a description of all materials before ordering.

The Owner will review the Contractor's submittals and provide in writing an acceptance or rejection of material. However, an acceptance of any material by the Owner does not relieve the Contractor of this responsibility to meet the requirements of the construction plans or these specifications.

PART 2 PRODUCTS

2.1 PIPING MATERIALS AND ACCESSORIES

A. Ductile Iron Pipe (DIP) :

1. Ductile iron pipe shall be manufactured in accordance with AWWA C151. All pipes, except as specials, shall be furnished in nominal lengths of 18 to 20 feet. Diameters will be as shown on the Drawings. All pipes shall have a minimum pressure rating of 350 pounds per square inch (psi), and corresponding minimum wall thickness, unless otherwise specified or shown on the Drawings.
2. Flanged pipe minimum wall thickness shall be equal to Special Class 53 for pipe sizes 4"-54". Flanges shall be furnished by the pipe manufacturer.
3. Fittings and Accessories:
 - a. Fittings shall be ductile iron and shall conform to AWWA C110/ANSI A21.10. The minimum rated working pressure for fittings shall be 350.
 - b. Flanged elbow fittings shall be ANSI pattern using short radius elbows except where noted differently on the Drawings. Special fittings, ductile iron wall pipes and sleeves shall conform to the dimensions and details as shown on the Drawings.
 - c. All grooved-end fittings shall conform to the laying length requirements of AWWA C110/ANSI A21.10, end preparation requirements of AWWA C606, and wall thickness requirements of AWWA C110/ANSI A21.10.
 - d. Thrust Collars: Thrust collars shall be welded-on ductile iron body type capable of withstanding a thrust due to 250 psi internal pressure on a dead end from either direction on that pipe size. Weld on collars shall be continuously welded to the pipe by the pipe manufacturer.
 - e. Bosses: Shall be welded-on ductile iron body type and shall be faced and tapped for AWWA C110/ANSI A21.10 flange connection. All welding, fabrication and outlet hole drilling shall be performed by the manufacturer. Outlets shall be free of burrs. Sizes shall be as indicated on the Drawings. The bosses shall be welded on a minimum Class 51 ductile iron pipe greater than 12 inches and Class 52 for smaller pipe. Bosses shall be equal to ACIPCO A-96945 for mechanical joint or A-96946 for flanged joints.
 - f. Solid Sleeves: Shall permit the connection of plain end ductile iron

pipe and plain end PVC pipe. Solid sleeves shall meet the requirements of ANSI/AWWA C110 for long pattern and have a minimum pressure rating of 250 psi. Solid sleeves shall have a mechanical or restrained joint as specified in this Section and as shown on the Drawings. Solid sleeves shall be provided with gaskets suitable for the type of pipe to be connected. Solid sleeves shall be used only in locations shown on the Drawings. Solid sleeves shall be manufactured by J.C.M. or equal.

4. Joints for Ductile Iron Pipe and Fittings

- a. Joints for ductile iron pipe and fittings shall be mechanical joint, flanged joint, restrained joint, push-on joint or grooved-end joint as shown on the Drawings or specified herein.
- b. Unless otherwise shown on the Drawings, specified or directed, all ductile iron pipe laid underground shall be joined using mechanical joints or push-on type joints.
- c. In all cases, gaskets shall be made of material that will not be damaged by the fluid being transported or by the environment in which the pipe is installed.
- d. Provide the necessary bolts for connections. All bolts and nuts shall be threaded in accordance with ANSI B1.1, Coarse Thread Series, Class 2A external and 2B internal fit. All bolts and nuts shall be made in the U.S.A.
- e. Mechanical Joints:
 1. Joints shall conform to AWWA C111/ANSI A21.11.
 2. Bolts and nuts shall be Tee Head Bolts and nuts of high strength low-alloy steel in accordance with ASTM A-242 to the dimensions shown in AWWA C111/ANSI A21.11.
 3. Gaskets shall be in accordance with AWWA C111/ANSI A21.11 and shall be constructed of 1/8" thick cloth reinforced rubber; gaskets may be ring type or full face type.
 4. Mechanical joint glands shall be ductile iron.
- f. Push-On Joints: Push-on joints and gaskets shall conform to AWWA C111/ANSI A21.11. Details of the joint design shall be in accordance with the manufacturer's standard practice such as ACIPCO "Fastite", McWane (Clow) "Bell-Tite", or U.S. Pipe "Tyton" joints.
- g. Flanged Joints:

1. Flanged joints shall conform to AWWA C115/ANSI A21.12. Flanges shall be ductile iron and shall be furnished by the pipe manufacturer.
 2. Gaskets shall be made of 1/8-inch thick, Buna-N. Gaskets may be ring type or full face type. Gaskets for all flanged piping 24-inches and larger shall be equal to ACIPCO Toruseal gaskets.
 3. Flanged ductile iron pipe 3 through 12-inch diameter shall have flanges cast solidly to the pipe barrel. Flanges on ductile iron pipe larger than 12-inches may be of the threaded type. Pipe threads shall be of such length that with flanges screwed home, the end of the pipe shall project beyond the face line of the flange. Flange and pipe shall then be machined to a flush finish to the pipe and the flange and surface shall be normal to the axis of the pipe. Ductile iron flanges shall be of such design that the flange neck completely covers the threaded portion of the pipe to protect same against corrosion. All pipes with threaded type flanges shall be assembled, faced, and drilled at the point of manufacture, unless otherwise approved by the Owner.
 4. Flange filler shall conform to AWWA C110/ANSI A21.10. Joint bolt length shall be increased by the thickness of the flange filler.
 5. Where tap or stud bolts are required, flanges shall be drilled and tapped accordingly.
 6. Bolt length and diameter shall conform to ANSI/AWWA C115 for Class 125 flanges shown in ANSI/ASME B16.1.
 7. Bolts for exposed service shall be zinc plated, cold pressed, steel machine bolts conforming to ASTM A-307, Grade B. Nuts for exposed service shall be zinc plated, heavy hex conforming to ASTM A-563. Zinc plating shall conform to ASTM B 633, Type II.
 8. Bolts for submerged service shall be stainless steel machine bolts conforming to ASTM A-193, Grade B8. Nuts shall be heavy hex, stainless steel conforming to ASTM A-194, Grade 8.
5. Restrained Joint Pipe (RJP): RJP shall be either the bolt type, or modified push-on type with joint restraint using ductile iron components. Restrained joint pipe on piers shall have bolted joints and shall be specifically designed for clear spans of at least 36 feet. Restrained joint pipe where required shall be American, U.S. Pipe, or equal.
 6. Cement Linings: Pipe and fittings shall be cement lined in accordance with

AWWA C104/ANSI/AWWA C104/A21.4.

7. Bituminous Coating: All pipe and fitting shall be furnished with a bituminous outside coating.
8. Pipe couplings shall be installed where shown on the Drawings or as directed by the Owner.
9. Wall Sleeves and Wall Pipes:
 - a. Where piping passes through concrete structures, furnish and install wall sleeves unless wall pipes or other provisions are specifically shown on the Drawings. Wall sleeves shall be accurately located and securely fastened into position before concrete is poured.
 - b. Wall Sleeves:
 1. For pipe sizes smaller than 3-inches, wall sleeves shall be steel oversize sleeves furnished with a full circle, integral, or continuously welded water stop collar. The sleeve seal shall be the mechanically expanded, synthetic rubber type. Provide all associated bolts, seals and seal fittings, pressure clamps, or plates necessary to achieve a watertight installation. Sleeves shall extend the full thickness of the concrete. Sleeves and seal shall be Link Seal.
 2. For pipe sizes larger than 3-inches, wall sleeves shall be statically cast ductile iron mechanical joint wall sleeves. Unless specified or shown otherwise for a specific situation, wall sleeves shall be mechanical joint bell-plain end type with water stop/thrust collar. The collar shall be capable of withstanding a thrust force caused by a 250 psi dead end load from either direction on that size pipe. Sleeves shall be constructed with studs and mechanical joint retainer gland on the air side of the concrete structure. Provide retainer gland where shown on the Drawings. Where the concrete structure is exposed to dirt on one side and is wet on the other side, construct with studs and glands on the dirt side. Wall sleeves shall be equal to ACIPCO A-10771.
 - c. Wall pipes:
 1. Wall pipes shall be either statically cast ductile iron with integral water stop/thrust collar or centrifugally cast ductile iron with a continuously welded water stop/thrust collar. The welded on collar shall be attached to the pipe by the manufacturer. The collar shall be capable of withstanding a thrust force caused by a 250 psi dead

end load from either direction on that size pipe. Wall pipes shall be furnished uncoated on the outside and cement lined on the inside. Unless specified or shown otherwise, wall pipes shall be flange end type.

2. Wall pipes shall be cast and/or fabricated and lines in one manufacturer's facilities and delivered to the job site ready to use.

10. Hydrant Tees: Hydrant tees shall be equal to ACIPCO A-10180 or U.S. Pipe U-592.

B. Polyvinyl Chloride (PVC) Pipe

1. Pipe sizes smaller than 4-inch outside diameter:
 - a. PVC pipe shall conform to ASTM D 1785 (Schedule 40).
 - b. Fittings shall be solvent weld socket type, schedule 40, ASTM D 2466 or D 2467.
 - c. Cement shall conform to ASTM D 2564.
2. Pipe equal to and larger than 4-inch outside diameter:
 - a. Shall be PVC Class 150, DR 18, C-900 for 12-inch and smaller and Class 165, DR 25, C-905 for 14-inch and larger. All pipe shall conform to ASTM D-2241 and be installed in accordance with ASTM D-2321. Joints shall be in accordance with ASTM D-3036. Sizes and dimensions shall be as follows:

150 PSI, DR 18, C-900			165 PSI, DR 25, C-905		
Nom. Pipe Size	O.D. (in.)	Min. Wall Thickness (in.)	Nom. Pipe Size	O.D. (in.)	Min. Wall Thickness (in.)
4"	4.800	0.267	14"	15.300	0.612
6"	6.900	0.383	16"	17.400	0.696
8"	9.050	0.503	18"	19.500	0.780
10"	11.100	0.617	20"	21.600	0.864
12"	13.200	0.733	24"	25.800	1.032
			30"	32.000	1.280
			36"	38.300	1.530

- b. Pipe shall bear the National Sanitation Foundation seal of approval and shall comply with the requirements of Type I, Grade I (PVC 1120) of the ASTM resin specification D-1784 (AWWA C 151-76). Certificates of conformance with the foregoing specifications shall be furnished with each lot of pipe supplied. Plastic pipe shall be jointed by means of a rubber ring bell joint which shall be an integral part of the barrel or

solvent welded at the factory. The joints shall have a space to provide expansion and contraction of the pipe without leaking. Fittings for plastic pipes shall be PVC with ring tight rubber joints; or ductile iron with adapters to PVC pipe.

- c. The bell shall consist of an integral wall section with a bound-in solid cross section shall be designed to be at least as hydrostatically strong as the pipe wall and meet the requirements of UNI-BELL-B-11.
 - d. Each standard and random length of pipe shall be tested to two times the rated pressure of the pipe for a minimum of 5 seconds. The integral bell shall be tested with the pipe.
 - e. Pipe shall be supplied in minimum lengths of 20 feet.
 - f. Acceptance will be on the basis of the Owner's inspection and the manufacturer's written certification that the pipe was manufactured and tested in accordance with the applicable standards, including the National Sanitation Foundation. Additionally, each piece of pipe shall be stamped "NSF Approved".
- C. Plastic Tubing – Tubing for house service lines shall be Polyethylene Tubing – CTS PE 3408 conforming to all requirements of AWWA C-901 and ASTM D-2737 (SDR9). The tubing shall be copper tubing size and rated for a minimum working pressure of 200 psi. Marking on the tubing shall include – nominal tubing pipe size; type of tubing material – PE 3408; SDR 9; pressure rating – 200 psi; ASTM D-2737; manufacturer's name and seal of the National Sanitation Foundation.

2.2 GATE VALVES

- A. 3-Inches in Diameter and Smaller: Shall be bronze, heavy duty, non-rising stem, and wedge type with screwed or union bonnet. Valve ends shall be threaded or solder type as appropriate. Valves shall have a minimum 200 psi working pressure for water (125 psi working pressure for steam). Valves shall be made in the U.S.A. Gate valves shall be equal to Crane No.428 (threaded), Crane No. 1334 (solder end), Watts, Wilkins, or Mueller, or equal.
- B. 4-Inches Through 12-Inches in Diameter: Shall be mechanical joint resilient wedge type conforming to the requirements of AWWA C509 rated for 200 psi working pressure and test pressure of 400 psi.
 - 1. Valves shall be provided with two O-ring stem seals with one O-ring located above and one O-ring below the stem collar. The area between the O-rings shall be filled with lubricant to provide lubrication to the thrust collar bearing surfaces each time the valve is operated. At least one anti-friction washer shall be utilized to further minimize operating torque. All seals between valve parts, such as body and bonnet, bonnet and bonnet cover, shall be flat gaskets or O-rings.
 - 2. The valve gate shall be made of ductile iron having a vulcanized, synthetic rubber coating, or a seat ring attached to the disc with retaining screws. Sliding of the rubber on the seating surfaces to compress the rubber will not

be allowed. The design shall be such that compression-set of the rubber shall not affect the ability of the valve to seal when pressure is applied to either side of the gate. The sealing mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction.

3. All internal ferrous surfaces shall be coated with epoxy to a minimum thickness of 4 mils. The epoxy shall be non-toxic, impart no taste to the water and shall conform to AWWA C550, latest revision.
 4. Gate valves 4 through 12-inches shall be manufactured by Mueller, U.S. or M & H Valve, or equal.
- C. 14-Inches in Diameter and Larger: Valves shall be U.S. Metro Seal or equal conforming to the requirements of AWWA C509.
1. Valve ends shall be mechanical joint type except where flanged or restrained joint ends are shown. Flanged joints shall meet the requirements of ANSI B16.1, Class 125.
 2. Buried valves shall be equipped with valve boxes unless access to the operator is provided by a manhole.
 3. Manually operated valves, shall be non-rising stem type having O-ring seals.
 4. Valves shall be installed in a vertical position without a bypass valve. Valves shall be metro seal 250 R/S resilient seated manufactured by U.S. Pipe. Resilient seat gate valves shall conform to AWWA Standard Specification C-509.
 5. Valves shall be designed for a water working pressure of 150 psi and a test pressure of 300 psi.

2.3 BUTTERFLY VALVE

- A. Butterfly valves shall be resilient seated, short body design, and shall be designed, manufactured, and tested in accordance with all requirements of AWWA C504. Valves shall be designed for a rated working pressure of 150 psi, unless shown otherwise on the drawings.
- B. Valve bodies shall be ductile iron conforming to ASTM A-536, Grade 65-45-12 or ASTM A-126, Grade B cast iron. Shafts shall be 18-8, Type 304 stainless steel, machined and polished. Valve discs shall be ductile iron, ASTM A-536, Grade 65-45-12 or ASTM A-126, Grade B cast iron. The resilient valve seat shall be located either on the valve disc or in the valve body and shall be fully field replaceable for valves 30" and larger.
- C. Valves shall be equipped with geared actuators designed, manufactured and tested in accordance with AWWA C504. Actuators shall be capable of holding the disc in any position between full open and full closed without any movement or fluttering of the disc. Actuators shall be furnished with fully adjustable mechanical stop-limiting devices. Actuators that utilize the sides of the actuator housing to limit disc travel are unacceptable. Valve actuators shall be capable of withstanding a minimum of

450 foot pounds of input torque in either the open or closed position without damage.

- D. Valves shall be installed with the valve shafts horizontal. Valves and actuators shall have seals on all shafts and gaskets on valve actuator covers to prevent the entry of water. Actuator mounting brackets shall be totally enclosed and shall have gasket seals.
- E. Valve ends shall be mechanical joint type, except where flanged or restrained joint ends are shown. Flange joints shall meet the requirements of ANSI B16.1, Class 125.
- F. Butterfly valves shall be manufactured by Henry Pratt, Dezurik, Keystone, or equal.

2.4 VALVE BOXES

- A. All valves shall be equipped with valve boxes. The valve boxes shall be cast iron two-piece screw type with drop covers. Valve boxes shall have a 5.25-inch inside diameter. Valve box covers shall weigh a minimum of 13 pounds. The valve boxes shall be adjustable to 6-inches up or down from the nominal required cover over the pipe. Valve boxes shall be of sufficient length that bottom flange of the lower belled portion of the box is below the valve operating nut. Ductile or cast iron extensions shall be provided as necessary. Covers shall have "WATER VALVE" or "WATER" cast into them. Valve boxes shall be manufactured in the United States and shall be equal to U.S. Foundry No. 7500 screw type.
- B. Extension stems shall be provided so as to set the top of the operating nut 30-inches below finished grade. Connection to the valve shall be with a wrench nut coupling and a set screw to secure the coupling to the valve's operating nut. The coupling and square wrench nut shall be welded to the extension stem. Extension stems shall be equal to Mueller A-26441 or M & H Valve Style 3801.
- C. Post Indicator Valves: 175 pound, cast iron body (ASTM A-126 Class B), cast iron split wedge disc, bronze discs rings, stem and threaded renewable seat rings, inside screw, non-rising stem, bolted bonnet, mechanical joint ends (ANSI/AWWA C111), indicator post flange, adjustable indicator post with tamper switch mounting bracket, UL listed and FM approved.

2.5 FIRE HYDRANTS

- A. All fire hydrants shall conform to the requirements of AWWA C502 and shall have a minimum of 200 psi working pressure. Hydrants shall be the compression type, closing with line pressure. The valve opening shall not be less than 5-1/4 inches.
- B. In the event of a traffic accident, the hydrant barrel shall break away from the standpipe at a point above grade and in a manner which will prevent damage to the barrel and stem, preclude opening of the valve, and permit rapid and inexpensive restoration without digging or cutting off the water.
- C. The means for attaching the barrel to the standpipe shall permit facing the hydrant a minimum of eight different directions.
- D. Hydrants shall be fully bronze mounted with all working parts of bronze. Valve seat

ring shall be bronze and shall screw into a bronze retainer.

- E. All working parts, including the seat ring shall be removable through the top without disturbing the barrel of the hydrant.
- F. The operating nut shall match those on the existing hydrants. The operating threads shall be totally enclosed in an operating chamber separated from the hydrant barrel by a rubber O-ring stem seal and lubricated by a grease or oil reservoir. A stop nut shall be positioned in the top operating mechanism so that the valve cannot contact the bottom of the shoe when fully open.
- G. Hydrant shall be a non-freezing design and provided with a simple, positive, and automatic drain which shall be fully closed whenever the main valve is opened.
- H. Hose and pump-truck connections shall be breech-locked, pinned, and then caulked with lead; or threaded and pinned, to seal them permanently into the hydrant barrel. Each hydrant shall have two 2-1/2 inch hose connections and one 4 inch pump connection all with National Standard threads and each equipped with cap and non-kinking chain.
- I. Hydrants shall be furnished with a mechanical joint shoe connection to the spigot of the 6-inch hydrant lead.
- J. Minimum depth of bury shall be 4.5 feet. Provide extension section where necessary for vertical installation and in accordance with manufacturer's recommendations to achieve the 15" minimum height above ground specified in the typical fire hydrant setting detail.
- K. All outside surfaces of the barrel above grade shall be painted with Koppers Glamortex 501 enamel or equal in a color to be selected by the using Authority.
- L. Hydrants shall be traffic model and manufactured by M&H, Mueller, or American Darling.
- M. All new fire hydrants shall be covered with a cloth bag until the water mains and fire hydrants are in service.

2.6 TAPPING SADDLES

- A. Tapping saddles shall be ductile iron body type with O-ring gasket and stainless steel (type ESS) straps. Connection shall be flanged or mechanical joint as detailed on the Drawings. Tapping saddles shall be equal to ACIPCO A-30920.

2.7 TAPPING SLEEVES AND VALVES (TS&V)

- A. Tapping sleeves shall be cast or ductile iron of the split sleeve, mechanical joint type. The contractor shall be responsible for determining the outside diameter of the pipe to be connected to prior to ordering the sleeve. Valves shall be furnished in accordance with Section 02510 of these Specifications, with flanged connection to the tapping sleeve and mechanical joint connection to the branch pipe. The tapping sleeve and valve shall be supplied by the valve manufacturer. Tapping sleeves shall be Mueller or M&H Valve.

2.8 FLANGE ADAPTERS

- A. Flange adapters shall permit the connection of un-threaded, un-grooved, open ended, ductile iron pipe to ANSI/ASME B16.1, Class 125 flanges. Flange adapters shall meet the test requirements of ANSI/ASME B16.1 for Class 125 flanges. The adapter shall be a ductile iron casting incorporating a flange with extended throat, set screws and gasket. The gasket shall provide a compression seal between the adaptor, the pipe and the adjacent flange. Flange adapters are to be used only in locations specifically shown on the Drawings and in accordance with the manufacturer's recommendations. Flange adapters shall be manufactured by McWane, Uni Flange (Series 400) or EBAA Iron.

2.9 RETAINER GLANDS

- A. Retainer glands shall be Megalug, Series 1100, as manufactured by EBAA Iron.
- B. Retainer glands for polyvinyl chloride pipe shall be Megalug Series 2000 PV, as manufactured by EBAA Iron Sales, Inc.

2.10 HARNESS RODS

- A. Harness rods shall be manufactured in accordance with ASTM A 449. Harness rods shall be field coated with bitumastic before backfilling.
- B. Eye bolts shall be of the same diameter as specified in AWWA C111 for that pipe size. The eye shall be welded closed. Where eye bolts are used in conjunction with harness rods, an appropriate size washer shall be utilized with a nut on each end of the harness rod. Eye bolts shall be of the same material and coating as the harness rods.

2.11 VALVE MARKERS

- A. The Contractor shall provide a concrete valve marker as detailed on the Drawings for each valve installed. Valve markers shall be stamped "WATER". Contractor shall provide raised pavement markers that meet the specifications and requirements set forth in the most current edition of the State of Georgia Department of Transportation "Standard Specifications for the Construction of Roads and Bridges", Section 654. RPM shall be installed as specified in Part 3 of this Section.

2.12 CORPORATION COCKS AND CURB STOPS

- A. Corporation cocks and curb stops shall be ground key type, shall be made of bronze conforming to ASTM B 61 or B 62, and shall be suitable for the working pressure of the system. Ends shall be suitable for grip type joint. Threaded ends for inlet and outlet of corporation cocks shall conform to AWWA C800; coupling nut for connection to flared copper tubing shall conform to ANSI B16.26. Corporation cocks and curb stops shall be manufactured by Mueller or Ford.

2.13 HYDRANT TEES

- A. Hydrant tees shall be equal to ACIPCO A10180 or U.S. Pipe U-592.

2.14 ANCHOR COUPLINGS

- A. Lengths and sizes shall be as shown on the Drawings. Anchor couplings shall be equal to ACIPCO A-10895 or U.S. Pipe U-591.

2.15 CONCRETE

- A. Concrete shall have a compressive strength of not less than 3000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches. For job mixed concrete, submit the concrete mix design for approval by the Owner. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C 94. Reinforcing steel shall conform to the requirements of ASTM A-615, Grade 60.

2.16 DETECTION TAPE

- A. Detection tape shall be composed of a solid aluminum foil encased in a protective plastic jacket. Tapes shall be color coded in accordance with APWA color codes (Safety Precaution Blue) with the following text: "Caution Water Line Buried Below." Tape lettering shall be permanently printed with no surface printing allowed. Tape width shall be minimum 2-inches when buried less than 10 inches below the surface. Tape width shall be minimum 3-inches when buried greater than 10-inches and less than 20-inches.
- B. Detection tape shall be equal to Lineguard Type III Detectable or Allen Systems Detectatape.
- C. In addition to Detection Tape, a #12 insulated copper tracer wire shall be installed on all buried pipelines.

PART 3 EXECUTION

3.1 CONSTRUCTION ALONG HIGHWAYS, STREETS AND ROADWAYS

- A. Install pipe lines and accessories along highways, streets and roadways in accordance with the applicable regulations of City of Washington, Georgia Department of Transportation and/or the Georgia Environmental Protection Division with referenced to construction operations, safety, traffic control, road maintenance and repair.
- B. Traffic Control
 - 1. The Contractor shall supply, erect, and maintain all necessary barricades, suitable with sufficient lights and other traffic control devices; provide qualified flagmen where necessary to direct traffic; take all necessary precautions for the protection of the work and the safety of the public.
 - 2. Construction traffic control devices and their installation shall be in accordance with the current Manual on Uniform Traffic Control Devices for Streets and Highways, latest edition.

3. Placement and removal of construction traffic control devices shall be coordinated with the Georgia Department of Transportation and local governing municipalities a minimum of 48 hours in advance of the activity.
4. Placement of construction traffic control devices shall be scheduled ahead of associated construction activities. Construction time in street right-of-way shall be conducted to minimize the length of time traffic is disrupted. Construction traffic control devices shall be removed immediately following their useful purpose. Traffic control devices used intermittently, such as "Flagmen Ahead", shall be removed and replaced when needed.
5. Existing traffic control devices within the construction work zone shall be protected from damage. Traffic control devices requiring temporary relocation shall be located as near as possible to their original vertical and horizontal locations. Original locations shall be measured from reference points and recorded in a log prior to relocation. Temporary locations shall provide the same visibility to affected traffic as the original location. Relocated traffic control devices shall be reinstalled in their original locations as soon as practical following construction.
6. Construction traffic control devices shall be maintained in good repair and shall be clean and visible to affected traffic for daytime and nighttime operation. Traffic control devices affected by the construction work zone shall be inspected daily.
7. Construction warning signs shall be black legend on an orange background. Regulatory signs shall be black legend on a white background. Construction sign panels shall meet the minimum reflective requirements of the Georgia Department of Transportation and local governing municipalities. Sign panels shall be of durable materials capable of maintaining their color, reflective character and legibility during the period of construction.
8. Traffic channel devices shall be positioned preceding an obstruction at a taper length as required by the current Manual On Uniform Traffic Control Devices for Streets and Highways, as appropriate for the speed limit at that location. Traffic channel devices shall be patrolled to insure that they are maintained in the proper position throughout their period of use.

C. Construction Operations

1. Perform all work along highways, streets and roadways to minimize interference with traffic.
2. Stripping: Where the pipe line is laid along road right-of-way, strip and stockpile all sod, topsoil and other material suitable for right-of-way restoration.
3. Trenching, Laying and Backfilling: Do not open the trench any further ahead of pipe laying operations than is necessary. Backfill and remove excess material immediately behind laying operations. Complete excavation and backfill for any portion of the trench in the same day.

4. Shaping: Reshape damaged slopes, side ditches, and ditch lines immediately after completing backfilling operations. Replace topsoil, sod and any other materials removed from shoulders.
 5. Construction operations shall be limited to 400 feet along areas, including clean-up and utility exploration unless otherwise approved by the Owner.
- D. Excavated Materials: Do not place excavated material along highways, streets and roadways in a manner which obstructs traffic. Sweep all scattered excavated material off of the pavement in a timely manner.
- E. Drainage Structures: Keep all side ditches, culverts, cross drains, and other drainage structures clear of excavated material. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.
- F. Landscaping Features: Landscaping features shall include, but are not necessarily limited to: fences; property corners; cultivated trees and shrubbery; manmade improvements; subdivision and other signs within the right-of-way and easement. The Contractor shall take extreme care in moving landscape features and promptly re-establishing these features.
- G. Maintaining Highways, Streets, Roadways and Driveways
1. Maintain streets, highways, roadways and driveways in suitable condition for movement of traffic until completion and final acceptance of the Work.
 2. During the time period between pavement removal and completing permanent pavement replacement, maintain highways, streets and roadways by the use of steel running plates. Running plate edges shall have asphalt placed around their perimeter to minimize vehicular impact. The backfill above the pipe shall be compacted as specified elsewhere up to the existing pavement surface to provide support for the steel running plates.
 3. Immediately repair all driveways that are cut or damaged. Maintain them in a suitable condition for use until completion and final acceptance of the Work.

3.2 EXISTING UNDERGROUND UTILITIES AND OBSTRUCTIONS

- A. It is the responsibility of the Contractor to locate all existing utilities along the path of construction. The drawings shall indicate underground utilities or obstructions that are known to exist. Where these or unforeseen underground utilities are encountered, the location and alignment of the water main may be changed, upon written approval of the Owner, to avoid interference.
- B. Existing Utility Location: The following steps shall be exercised to avoid interruption of existing utility service.
1. Provide the required notice to the utility owners and allow them to locate their facilities according to Georgia law. Field utility locations are valid for only 10 days after original notice. The Contractor shall ensure, at the time of any excavation that a valid utility location exists at the point of excavation.

2. Expose the facility, for a distance of at least 200 feet in advance of pipeline construction, to verify its true location and grade. Repair, or have repaired, any damage to utilities resulting from locating or exposing their true location.
3. Avoid utility damage and interruption by protection with means or methods recommended by the utility owner.
4. Maintain a log identifying when phone calls were made, who was called, area for which utility relocation was requested and work order number issued, if any. The Contractor shall provide the Owner an updated copy of the log as requested.

C. Conflict with Existing Utilities

1. Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed piping does not permit safe installation of the piping by the use of sheeting, shoring, tying-back, supporting, or temporarily suspending service of the parallel or crossing facility. The Contractor may change the proposed alignment of the piping to avoid horizontal conflicts if the new alignment remains within the available right-of way or easement, complies with regulatory agency requirements and after a written request to and subsequent approval by the Owner, the Contractor shall arrange to have the utility, main, or service relocated.
2. Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed piping does not permit the crossing without immediate or potential future damage to the utility, main, service, or the piping. The Contractor may change the proposed grade of the piping to avoid vertical conflicts if the new grade complies with regulatory agencies requirements and after written request to and subsequent approval by the Owner. Where such adjustment of the piping is approved by the Owner, the Contractor shall arrange to have the utility, main, or service relocated.

- D. Electronic Locator: Have available at all times an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.

3.3 CONNECTIONS TO EXISTING PIPE LINES

- A. Before laying pipe, the Contractor shall locate the points of connection to existing pipe lines and uncover as necessary for the Owner to confirm the nature of the connection to be made. The Contractor shall furnish materials and make the connection to all existing pipe lines as shown on the drawings. The Contractor will be observed during construction of tie-ins by the Owner. The Contractor shall use all available practices and resources to minimize the time the customers are without water. The Contractor shall notify all required utility companies and users of outages at least 72 hours in advance.
- B. Interruption of Services: Make connections to existing piping only when system operations permit. Operate existing valves only with the specific authorization and

direct supervision of the Owner.

C. Tapping Saddles and Tapping Sleeves

1. Holes in the new pipe shall be machine cut, either in the field or at the factory. No torch cutting of holes shall be permitted.
2. Prior to attaching the saddle or sleeve, the pipe shall be thoroughly cleaned, utilizing a brush and rag, as required.
3. Before performing field machine cut, the water tightness of the saddle or sleeve assembly shall be pressure tested. The interior of the assembly shall be filled with water. An air compressor shall be attached, which will induce a test pressure as specified in Section 02519. No leakage shall be permitted for a period of five minutes.
4. After attaching the saddle or sleeve to existing piping, but prior to making the tap, the interior of the assembly shall be disinfected. All surfaces to be exposed to potable water shall be swabbed or sprayed with one percent hypochlorite solution.

D. Connections Using Solid Sleeves: Where solid sleeves are shown on the Drawings, the Contractor shall furnish materials and labor necessary to make the connection using a solid sleeve to the existing pipe line.

E. Connections Using Flange Filler shall be used only where shown on the Drawings or approved by the Owner to make up minor differences in pipe length less than 3-inches. Joint bolt length shall be increased by the thickness of the flange filler.

F. Connections Using Mechanical Pipe Couplings: Where pipe couplings are shown on the Drawings, the Contractor shall furnish materials and labor necessary to make the connection using a pipe coupling to the existing pipe line, including all necessary cutting, plugging and backfill.

G. Connections to Pressure Mains

1. Connections to ductile iron pipe pressure mains shall be by the direct tap method or service clamp, as detailed on the Drawings in full accordance with AWWA requirements.
2. Connections to polyvinyl chloride pipe shall be made using a full body service clamp.
3. Pressure ratings for connections shall be the same as the pressure rating for the pipe.

H. Hydrants: Hydrants shall be attached to the water main by the following method:

1. For mains 12-inches and smaller, the isolation valve shall be attached to the main by connecting the valve to the hydrant tee.
2. For mains larger than 12-inches, the isolation valve shall be attached to the

main by providing an anchor coupling between the valve and tapping saddle.

3. The isolation valve shall be attached to the hydrant by providing an anchor coupling between the valve and hydrant.

3.4 PIPE DISTRIBUTION

- A. Pipe shall be distributed and placed in such a manner that will not interfere with traffic.
- B. No pipe shall be strung further along the route than 1,000 feet beyond the area in which the Contractor is actually working without written permission from the Owner. The Owner reserves the right to reduce this distance to a maximum distance of 200 feet in residential and commercial areas based on the effects of the distribution to the adjacent property owners.
- C. No street or roadway may be closed for unloading of pipe without first obtaining permission from the proper authorities. The Contractor shall furnish and maintain proper warning signs and obstruction lights for the protection of traffic along highways, streets and roadways upon which pipe is distributed.
- D. No distributed pipe shall be placed inside drainage ditches.
- E. Distributed pipe shall be placed as far as possible from the roadway pavement, but no closer than five feet from the roadway pavement, as measured edge-to-edge.

3.5 LOCATION AND GRADE

- A. The Drawings show the alignment of the water main and the location of valves, hydrants and other appurtenances.
- B. After the Contractor locates and marks the water main centerline or baseline, the Contractor shall perform clearing and grubbing.
- C. Construction shall begin at a connection location and proceed without interruption. Multiple construction sites shall not be permitted without written authorization from the Owner for each site.

3.6 LAYING PIPE

- A. Field Inspection: All pipe and accessories shall be laid, jointed, tested for defects and for leakage with pressure and chlorinated in the manner herein specified in the presence of the Owner and subject to their approval.
- B. Handling Pipe and Accessories:
 1. Care: PVC pipe, fittings, valves and other accessories shall be unloaded at the point of delivery, hauled to and distributed at the site of the project by the contractor; they shall at all times be handled with care to avoid damage. In loading and unloading they shall be lifted by hoists or slid or towed on skid-ways in such a manner as to avoid shock. Under no circumstances shall they be dropped. Pipe handled on skids must not be skidded or rolled against pipe already on the ground.

2. At Site of Work: In distributing the material at the site of the work, each piece shall be unloaded opposite or near the place where it is to be laid in the trench and shall be laid on high ground so that it will not be in a drainage way.
3. Bell Ends, How Faced: Pipe shall be placed on the site of the work parallel with the trench alignment and with the bell ends facing the direction in which the work will proceed, unless otherwise directed by the Owner.
4. Pipe Kept Clean: The interior of all pipes, fittings and other accessories shall be kept free from dirt and foreign matter at all times.
5. Detection tape shall be buried 2'-0" below the ground surface above the water main.
6. Twelve (12) gauge pipe detection wire shall also be installed by taping to the top of the pipe every fifty (50) feet during pipe installation.

C. Alignment and Grade:

1. General: All pipes shall be laid and maintained in the required lines and grades, with fittings and valves at the required locations, with joints centered and spigots home, and with all valve stems plumb.
2. Depth of Pipe: Where pipe is laid in roadways and parkways of streets, the top of the barrel of the pipe shall have a minimum cover of forty-eight inches below the curb line of the street or where no curb line has been established, below the existing ground line. Where the pipe is laid in open, un-subdivided areas, a minimum of thirty-six inches of cover is required. A greater depth of cover is required in certain sections of the main, such as railroad crossings, valve locations and other sections of special construction, and within State and Federal highway rights-of-way.
3. All PVC line smaller than 4" shall be aligned in the trench in a "snake" or "S" form to allow for elongation due to temperature changes.

D. Excavation and Preparation of Trench:

1. Description: The trench shall be dug to the alignment and depth required and not to exceed 200 feet in advance of the pipe laying. The trench shall be braced if work therein, safely and efficiently. It is essential that the discharge from any pumps be led to natural drainage channels, to drains or to storm sewers.
2. Width: Minimum width of trench shall be eighteen (18) inches or six (6) inches out-side the barrel of the pipe on each side of pipe. Maximum width of trench shall be nine (9) inches outside the barrel of the pipe on each side of pipe. Sides of trench shall be dug and maintained substantially vertical to a height 12 inches above the pipe.
3. Pipe Foundation: The pipe shall be laid upon a sound earthen foundation cut

true and even so that the barrel of the pipe will have a bearing for its full length.

4. Correcting Faulty Grade: Any part of the trench excavated below grade shall be corrected with approved materials and thoroughly compacted.
5. Bell Holes, Required: Bell holes of ample dimensions shall be dug in trenches at each joint to permit the joint to be made properly.
6. Braced and Sheeted Trenches: Wherever necessary to prevent caving, excavations shall be adequately sheeted and braced. Where sheeting and bracing are used, the trench width shall be increased accordingly. Trench sheeting shall remain in place until the pipe has been laid, tested for defects, and repaired if necessary, and the earth around it compacted to a depth of two feet over the top of the pipe.
7. Care of Surface Materials for Re-Use: If local conditions permit their re-use, all surface materials suitable for re-use in restoring the surface shall be kept separate from the general excavation material.
8. Manner of Piling Excavated Materials: All excavated materials shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Gutters shall be kept clear or other provisions made for street drainage.
9. Trenching by Machine or by Hand: The use of trench digging machinery will be permitted except in places where operation of same will cause damage to existing structures above or below ground; in which case hand methods shall be employed. Excavation shall be made by ladder type machine or backhoe.
10. Unsuitable Soil Conditions: Where the sub-grade is unsuitable material for the proper installation of the water main, the Contractor shall undercut the trench and backfill with No. 57 stone meeting the requirements of Georgia DOT Specification 800.01 at the Owner's direction. The stone shall be brought to grade and thoroughly compacted to conform to the outside of the main.
11. No separate payment will be made for unsuitable soil removal. The Contractor shall be paid at a price as negotiated by the Owner on an "as needed" basis.
12. Dewatering Trenches: Where subgrade with excessive water is encountered, dewatering shall be done by well pointing. If soil conditions are not suitable for well points, trench drains or crushed stone or gravel shall be constructed to carry the water to sumps and the water removed by pumps or bailing. No extra payment will be made for dewatering trenches.

E. Pipe Handling:

1. Manner of Hauling Pipe and Accessories: Proper implements, tools and facilities shall be provided and used by the contractor for the safe and

convenient execution of the work. All pipe, fittings and valves shall be carefully lowered into the trench piece by piece by means of derrick ropes or other suitable tools or equipment, in such a manner as to prevent damage to pipe or pipe coating. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.

2. Inspection: Before lowering and while still suspended, the pipe shall be inspected for defects. Any defective, damaged or unsound pipe shall be rejected.
 3. Pipe Kept Clean: All foreign matter or dirt shall be removed from the pipe, and it shall be kept clean by approved means throughout the process.
 4. Installation of the Pipe: The spigot shall be centered in the bell, the pipe forced "home" and brought into true alignment; it shall be secured there by earth carefully tamped under and on each side of it, except at the bell holes. Care shall be taken to prevent dirt from entering the joint space. No "blocking up" of pipe or joints will be permitted. The joint shall be made as hereinafter described.
 5. All PVC pipe smaller than 4" O.D. or less shall be solvent welded. Method of solvent weld jointing shall be approved by the Owner prior to installation.
 6. Trench Water Entering Pipe: At times when pipe installation is not in progress, the open ends of the pipe shall be closed by approved means and no trench water shall be permitted to enter the pipe.
 7. Cutting Pipe: Cutting of pipe for inserting valves, fittings or closure pieces shall be done in a neat workmanlike manner without damage to the pipe.
 8. Bell Ends Face Direction of Laying: Unless otherwise directed, pipe shall be laid with bell ends facing in the direction of installation; and for lines on an appreciable slope, bells shall, at the discretion of the Owner face up-grade.
 9. Permissible Deflections at Joints: Wherever necessary to deflect pipe from a straight line, either in the vertical or horizontal plane to avoid obstructions, the degree of deflection shall not exceed $\frac{2}{3}$ the maximum according to manufacturer's recommendations.
 10. Unsuitable Conditions for Installing Pipe: No pipe shall be laid in water, or when the trench conditions or the weather is unsuitable for such work.
- F. Jointing Pipe-Mechanical Joints: The following steps shall be taken in making mechanical joints:
1. All lumps, blisters and excess coal-tar enamel shall be removed from socket and spigot of the pipe.
 2. Wash socket and plain end with soapy water containing chloride solution; then slip gland and gasket over plain end. The small side of gasket and lip gland shall face bell.

3. Paint gasket with soapy solution containing chlorine.
 4. Push gasket into position, being sure it is evenly seated in socket.
 5. Slide gland into position; insert bolts and run nuts up finger tight.
 6. Tighten bolts to uniform tightness with correct ratchet wrench. The first bolt tightened shall be the bottom bolt, then top. All other bolts shall be tightened in sequence at 180 degrees apart.
- G. Setting Valves, Valve Boxes and Fittings:
1. General: Gate valves and pipe fittings shall be set and joined to new pipe in the manner heretofore specified for cleaning, laying and jointing pipe.
 2. Valve Boxes: Cast iron valve boxes shall be firmly supported and maintained centered and plumb over the wrench nut of the gate valve, with box cover.
- H. Plugging Dead Ends: Standard plugs shall be inserted into the bells of all dead ends of pipes, tees or crosses and spigot ends shall be capped. Plugs or caps shall be jointed to the pipe or fittings in the manner specified above.
- I. Hydrant Installation
1. Prior to installation, inspect all hydrants for direction of opening, nozzle threading, operating nut and cap nut dimensions, tightness of pressure-containing bolting, cleanliness of inlet elbow, handling damage and cracks. Defective hydrants shall be corrected or held for inspection by the Owner.
 2. All hydrants shall stand plumb and shall have their nozzles parallel with or at right angles to the roadway, with pump connection nozzle facing the roadway, except that hydrants having two-hose nozzles 90 degrees apart shall be set with each nozzle facing the roadway at an angle of 45 degrees.
 3. Hydrants shall be set to the established grade, with the centerline of the lowest nozzle at least 12-inches above the ground or as directed by the Owner.
 4. Each hydrant shall be connected to the main with a 6-inch branch controlled by an independent 6-inch valve. When a hydrant is set in soil that is pervious, drainage shall be provided at the base of the hydrant by placing coarse gravel or crushed stone mixed with coarse sand from the bottom of the trench to at least 6-inches above the drain port opening in the hydrant to a distance of 12-inches around the elbow.
 5. When a hydrant is set in clay or other impervious soil, a drainage pit 2 x 2 x 2 feet shall be excavated below each hydrant and filled with coarse gravel or crushed stone mixed with coarse sand under and around the elbow of the hydrant and to a level of 6-inches above the drain port.
 6. Hydrants shall be located as shown on the Drawings or as directed by the Owner. In the case of hydrants that are intended to fail at the ground-line joint

upon vehicle impact, specific care must be taken to provide adequate soil resistance to avoid transmitting shock moment to the lower barrel and inlet connection. In loose or poor load bearing soil, this may be accomplished by pouring a concrete collar approximately 6-inches thick to a diameter of 24-inches at or near the ground line around the hydrant barrel.

7. Raised pavement markers (RPM's) shall be provided and installed along the appropriate roadway centerline for each fire hydrant on Owner owned right-of-way. RPM's for in-line valves shall be Type I, two-way, and blue in color.

3.7 THRUST RESTRAINT

- A. Provide restraint at all points where hydraulic thrust may develop.
- B. Retainer Glands: Provide retainer glands where shown on the Drawings and on fire hydrants and all associated fittings, valves and related piping. Retainer glands shall be installed in accordance with the manufacturer's recommendations, particularly, the required torque of the set screws. The Contractor shall furnish a torque wrench to verify the torque on all set screws which do not have inherent torque indicators.
- C. Harnessing
 1. Provide harness rods only where specifically shown on the Drawings or directed by the Owner.
 2. Harness rods shall be manufactured in accordance with ASTM A36 and shall have an allowable tensile stress of no less than 22,000 psi. Harness rods shall be hot dip galvanized or field coated with bitumastic before backfilling.
 3. Where possible, harness rods shall be installed through the mechanical joint bolt holes. Where it is not possible, provide 90 degree bend eye bolts.
 4. Eye bolts shall be of the same diameter as specified in AWWA C111 for that pipe size. The eye shall be welded closed. Where eye bolts are used in conjunction with harness rods, an appropriate size washer shall be utilized with a nut on each end of the harness rod. Eye bolts shall be of the same material and coating as the harness rods.
- D. Hydrants: Hydrants shall be attached to the water main as shown on the Standard Detail.
- E. Thrust Collars: Collars shall be constructed as shown on the Drawings. Concrete and reinforcing steel shall meet the requirements as specified in this Section. The welded-on collar shall be designed to meet the minimum allowable load shown on the Drawings. The welded-on collar shall be attached to the pipe by the pipe manufacturer.
- F. Concrete Blocking
 1. Provide concrete blocking for all bends, tees, valves, and other points where thrust may develop, except where other exclusive means of thrust restraint are specifically shown on the Drawings.

2. Concrete shall be as specified in this Section.
3. Form and pour concrete blocking at fittings as shown on the Drawings and as directed by the Owner. Pour blocking against undisturbed earth. Increase dimensions when required by over excavation.

3.8 DETECTION TAPE

- A. Provide detection tape for all water mains.

3.9 BACKFILLING, CLEANING UP AND MAINTAINING SURFACES

- A. Time of Backfilling: As soon as practicable after the completion of laying and jointing of the pipe, the trench shall be backfilled, and at no time shall the completed backfilling of the trench be more than 300 feet behind the pipe laying.
- B. Compaction Requirements: All backfill for trenches under paved or roadway areas shall be compacted to 98% of the Standard Proctor maximum density (ASTM D-698). Backfill for trenches other than under paved or roadway areas shall be compacted to 95% of the Standard Proctor maximum density (ASTM D-698). The testing lab shall furnish the Owner proof of compaction at a point 18" above the crown of the sewer pipe at all pavement, driveway or roadway crossings. Additional compaction tests are required at each crossing 8" below the surface of the pavement or on the pavement subgrade before pavement placement. Contractor shall incur all cost for compaction test performed by a testing laboratory approved by the Owner and selected by the Contractor.
- C. Backfill Procedure at Pipe Zone: Select backfill material free from rock fragments shall be deposited in the trench simultaneously on both sides of the pipe for the full width of the trench and to an elevation of twelve inches above the top of the barrel of the pipe. The backfill material shall be moistened if necessary, tamped in thin (about 4-inch) layers and thoroughly compacted under and on each side of the pipe to provide solid backing against the external surface of the pipe. Backfill material within 6" of main shall be selected backfill aggregate no larger than 3/4" in diameter (#57 stone).
- D. Backfill Procedure Above the Pipe Zone: Succeeding layers of backfill may contain coarser materials, and shall be compacted thoroughly to the natural ground surface.
- E. Procedure Where Settlement is Important: Where it is important that the surface of the backfill be made safe for vehicular traffic at unpaved street crossings and along existing unpaved streets, the upper thirty-six inches of backfill shall be approved moist material, thoroughly compacted in eight inch layers by tamping, and shall be brought to the required surface grade.
- F. Deficiency of Backfill, by Whom Supplied: Any deficiency in the quantity of material for backfilling the trenches, or for filling depressions caused by settlement, shall be supplied by the contractor.
- G. Protection: Return all items and all areas disturbed, directly or indirectly by work under these specifications, to their original condition or better, as quickly as possible after work is started.

- H. Restoration of Surfaces: The contractor shall replace all curbing, sidewalks, gutters, shrubbery, fences, sod, and other surfaces disturbed to a condition equal to that before the work began, furnishing all labor and materials incidental thereto and complete the work in a manner satisfactory to the Owner. Replacement of street base and surface removed to permit installation of pipe lines shall be provided for elsewhere in these specifications.
- I. Man-Made Improvements: Protect, or remove and replace with the Owner's approval, all fences, piers, docks, walkways, mailboxes, pipe lines, drain culverts, power and telephone lines and cables, and other improvements that may be encountered in the work.
- J. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by the Owner. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.
- K. Cutting of Trees: Do not cut trees for the performance of the work except as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3 inches in diameter, (measured 4' from the ground) not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Contractor. No stumps, wood piles, or trash piles will be permitted on the work site.
- L. Surplus Earth: Surplus excavated materials from trenches in streets or at railroad crossings shall be disposed of by the contractor at his expense and in a manner satisfactory to the Owner.
- M. Cleaning Up: Surplus pipe line materials, tools, surplus excavated materials, rubbish, and temporary structures shall be removed by the contractor and the construction site shall be left clean, to the satisfaction of the Owner. The line shall be cleaned up immediately after a satisfactory pressure test has been made.
- N. Maintenance of Surfaces: Following the certification of completion by the Owner, the contractor shall maintain the surface of the unpaved trenches, adjacent curbs, sidewalks, gutters and other surfaces disturbed for a period of three months thereafter. All materials and labor required for the maintenance of the trenches and adjacent structures shall be supplied by the contractor and the work shall be done in a manner satisfactory to the Owner.
- O. Compaction Testing:
 - 1. Density: Tests for compaction and density shall be conducted by an independent testing laboratory selected in accordance with Section 02300 of these specifications.
 - 2. The soils testing laboratory is responsible for the following:

- a. Field compaction testing shall be based on using the maximum dry density determined by the Standard Proctor Compaction Test in accordance with ASTM D 698.
 - b. Maximum dry density for non-cohesive materials shall mean the maximum index density as determined by ASTM D 4253.
 - c. Determination of in-place backfill density shall be done in accordance with ASTM D 1556, ASTM D 2937, or ASTM D 2922.
 - d. Field density tests for each two feet of lift; one test for each 5,000 square feet of fill.
 - e. Inspecting and testing stripped site, subgrade and proposed fill materials.
- P. Contractor's duties relative to testing include – Refer to Sections 02300 and 02324.

3.10 WATER MAIN AND SEWER MAIN SEPARATION

- A. Water mains should maintain a minimum 10 foot edge-to-edge separation from sewer lines, whether gravity or pressure. If the main cannot be installed in the prescribed easement or right-of-way and provide the 10 foot separation, the separation may be reduced, provided the bottom of the water main is a minimum of 18-inches above the top of the sewer. If neither of these two separation criteria be possible, the water main shall be installed below the sewer with a minimum vertical separation of 18-inches.
- B. The water main, when installed below the sewer, shall be encased in concrete with a minimum 6-inch concrete depth to the first joint in each direction. Where water mains cross the sewer, the pipe joint adjacent to the pipe crossing the sewer shall be cut to provide maximum separation of the pipe joints from the sewer.
- C. No water main shall pass through, or come in contact with, any part of a sanitary sewer manhole.

3.11 TESTING

REFER TO SECTION 02519 - PIPING, TESTING AND ACCEPTANCE.

3.12 DISINFECTING PIPE LINES

REFER TO SECTION 02515 - DISINFECTION OF WATER DISTRIBUTION SYSTEMS.

3.13 PROTECTION AND RESTORATION OF WORK AREA

- A. General: Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is started.
 - 1. The Contractor shall plan, coordinate, and prosecute the work such that disruption to personal property and business is held to a practical minimum.

2. All construction areas abutting lawns and yards of residential or commercial property shall be restored promptly. Backfilling of underground facilities, ditches, and disturbed areas shall be accomplished on a daily basis as work is completed. Finishing, dressing, and grassing shall be accomplished immediately thereafter, as a continuous operation within each area being constructed and with emphasis placed on completing each individual yard or business frontage. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.
 3. Handwork, including raking and smoothing, shall be required to ensure that the removal of roots, sticks, rocks, and other debris is removed in order to provide a neat and pleasing appearance.
 4. The Department of Transportation's engineer shall be authorized to stop all work by the Contractor when restoration and cleanup are unsatisfactory and to require appropriate remedial measures.
- B. Man-Made Improvements: Protect, or remove and replace with the Owner's approval, all fences, walkways, mail boxes, pipe lines, drain culverts, power and telephone lines and cables, property pins and other improvements that may be encountered in the Work.
- C. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by the Owner. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.
- D. Cutting of Trees: Do not cut trees for the performance of the work except as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3-inches in diameter, not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Contractor. No stumps, wood piles, or trash piles will be permitted on the work site.
- E. Disposal of Rubbish: Dispose of all materials cleared and grubbed during the construction of the Project in accordance with the applicable codes and rules of the appropriate Owner, state and federal regulatory agencies.
- F. Swamps and Other Wetlands
1. The Contractor shall not construct permanent roadbeds, berms, drainage structures or any other structures which alter the original topographic features within the easement.
 2. All temporary construction or alterations to the original topography will incorporate measures to prevent erosion into the surrounding swamp or wetland. All areas within the easement shall be returned to their original topographic condition as soon as possible after work is completed in the area. All materials of construction and other non-native materials shall be disposed by the Contractor.

3. The Contractor shall provide temporary culverts or other drainage structures, as necessary, to permit the free migration of water between portions of a swamp, wetland or stream which may be temporarily divided by construction.
4. The Contractor shall not spread, discharge or dump any fuel oil, gasoline, pesticide, or any other pollutant to adjacent swamps or wetlands.

END SECTION

SECTION 33 30 00

SANITARY SEWERS

PART 1 GENERAL

1.1 SCOPE

- A. This Section describes products to be incorporated into sewers and accessories and requirements for the installation and use of these items. Furnish all products and perform all labor necessary to fulfill the requirements of these Specifications.
- B. General: Supply all products and perform all work in accordance with applicable American Society for Testing and Material (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI), or other recognized standards. Latest revisions of all standards are applicable.
- C. All work shall be done in accordance with the appropriate Water Works Department Standards.
- D. Bypassing of raw wastewater onto the ground or into a receiving stream is prohibited.

1.2 RELATED SECTIONS

- A. Section 31 11 00 – Clearing and Grubbing
- B. Section 31 14 00 – Sheeting, Shoring, and Bracing
- C. Section 31 00 00 – Earthwork
- D. Section 32 23 16 – Trench Excavation and Support
- E. Section 32920 – Grassing

1.3 REFERENCES

- A. ASTM Specifications
 - 1. ASTM D 3740-94a – Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
 - 2. ASTM E 329-93b – Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
 - 3. ASTM D 3034-94 – Type PSM PVC Sewer Pipe and Fittings.
 - 4. ASTM D 2321-89 – Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Installations.
 - 5. ASTM A 746-95 – Ductile Iron Gravity Sewer Pipe.
 - 6. ASTM D 3212-92 – Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric

Seals.

7. ASTM F 477-95 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
8. ASTM D 3139-95 – PVC Pressure-Rated Pipe (SDR-Series).
9. ASTM D 3139-95 – Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seams.
10. ASTM A 139-93a – Electric-Fusion (Arc) Welded Steel Pipe (NPS 4 and over).
11. ASTM C 478-94 – Precast Reinforced Concrete Manhole Sections.
12. ASTM C 443-94 – Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
13. ASTM C 39-94 - Compressive Strength of Cylindrical Concrete Specimens.
14. ASTM C 890-91 – Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
15. ASTM C 891-90 – Installation of Underground Precast Concrete Utility Structures.
16. ASTM C 913-89 – Precast Concrete Water and Wastewater Structures.
17. ASTM A 615/A 615 M-95b – Deformed and Plain Billet – Steel Bars for Concrete Reinforcement.
18. ASTM D 2922-91 – Test Methods for Density of Soil and Soil Aggregate In Place By Nuclear Methods (Shallow Depths).
19. ASTM D 1557-91 – Laboratory Compaction Characteristics of Soil Using Modified Effort.
20. ASTM D 1556-90 – Density and Unit Weight of Soil in Place by the Sand Cone Method.
21. ASTM D 714-87 (Reapproved 1994) – Evaluation Degree of Blistering Paints.
22. ASTM D 2794-93 – Resistance of organic Coatings to the Effects of Rapid Deformation (Impact).
23. ASTM E 96-95 – Water Vapor Transmission of Materials.
24. ASTM A 377-95 – Index and Specifications for Ductile Iron Pressure Pipe and Fittings.
25. ASTM C890-73 (Latest Revision) – Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete for Water and Wastewater Structures.
26. ASTM C891-78 (Latest Revision) – Standard Practice for Installation of Underground Precast Concrete Utility Structures.

27. ASTM C913-79 (Latest Revision) – Precast Concrete Water and Wastewater Structures.

B. ANSI/AWWA Specifications

1. ANSI/AWWA C 150/A-21.50-96 – Thickness Design of Ductile Iron Pipe.
2. ANSI/AWWA C 151/A-21.51-91 – Ductile Iron Pipe, Centrifugally Cast, for Water or Other Liquids.
3. ANSI/AWWA C-500-93 – Metal-Seated Gate Valves for Water Supply Service.
4. ANSI/AWWA C-509-94 – Resilient-Seated Gate Valves for Water Supply Service.
5. ANSI/AWWA C 111/A 21.11-95 – Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
6. ANSI/AWWA C 600-93 – Installation of Ductile Iron Water Mains and their appurtenances.

C. ACI Specifications

1. ACI 318-89 – Building code Requirements for Reinforced Concrete.

D. AASHTO Guidelines

1. AASHTO T 191-91 – Density of Soil in-Place by the Sand-Cone Method.

1.4 QUALIFICATIONS

- A. If requested by the Owner, submit evidence that manufacturers have consistently produced products of satisfactory quality and performance for a period of at least two years.

1.5 SUBMITTALS

- A. Submittals Required: The Contractor shall furnish to the Owner for review in accordance with the procedure outlined below, drawings and descriptive literature for all manufactured or fabricated products. Additional information such as special drawings, schedules, calculations and curves, shall be provided as specifically requested by the Owner.
- B. Contractor's Review: The Contractor shall review and check drawings and submittals. He shall indicate his review by initials and date. The Contractor shall furnish the Owner with a minimum of five copies of all submittals. A transmittal form shall accompany each submittal or group of submittals.
- C. Owner's Review:
1. All submittals will be reviewed, stamped, and dated by the Owner before they are returned to the Contractor.
 2. One copy of reviewed submittals will be returned to the Contractor and the remaining

copies retained by the Owner.

3. Submittals requiring minor corrections will be so noted. Drawings must be resubmitted for review prior to installation or use of products.
- D. Drawings for Construction: Drawings or submittals not bearing the Engineer's or Owner's review notation shall not be issued to subcontractors or utilized for construction purposes. The Contractor shall maintain at the job site a complete set of construction drawings bearing the Engineer's review.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Unloading: Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings, valves and accessories. Make equipment available at all times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification.
- B. Handling: Handle pipe, fittings, valves and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift, or front loader. Do not use material damaged in handling.
- C. Lined pipe shall be handled and transported to prevent damage to linings.
- D. Store all pipes which cannot be distributed along the route. Make arrangements for the use of suitable storage areas.
- E. Stored materials shall be kept safe from damage. The interior of all pipes, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times.
- F. Pipe shall not be stacked higher than the limits recommended by the manufacturer. The bottom tier shall be kept off the ground on timbers, rails or concrete. Pipe in tiers shall be alternated: bell, plain end; bell, plain end. At least two rows of timbers shall be placed between tiers and chocks, affixed to each other in order to prevent movement. The timbers shall be large enough to prevent contact between the pipes in adjacent tiers.
- G. Store joint gaskets in a cool location, out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.
- H. Conditions for Delivery and Handling of Pump Station: The manufacturer shall coordinate with the Contractor so that the station is delivered to the job site on the day of, or the day before the installation. Lifting pins shall be provided by the manufacturer to insure proper handling of the station structures. After delivery to the job site, the contractor shall store the control panel off the ground in a dry location until such time as it is mounted and supplied with electrical service. The contractor shall also insure that all pump power and control cables, as well as float cables are protected from submergence until they are properly installed.

1.7 QUALITY ASSURANCE

- A. Product manufacturers shall provide the Owner with written certification that all products furnished comply with all applicable provisions of these Specifications.

- B. If ordered by the Owner, each pipe manufacturer shall furnish the services of a competent factory representative to supervise and/or inspect the installation of pipe. This service will be furnished for a minimum of five days during initial pipe installation.
- C. The Contractor shall furnish the Owner a description of all material before ordering. The Owner will review the Contractor's submittals and provide in writing an acceptance or rejection of material.
- D. Where ductile iron pipe is indicated on the plans, or required by the Owner, it shall be used.
- E. Material and equipment shall be the standard product of a manufacturer who has manufactured them for a minimum of 2 years and who provides published data on the quality and performance of the product.
- F. Qualifications of Pump Manufacturer: The manufacturer shall demonstrate the ability to fabricate the various pump station structure components, as specified, utilizing adequate numbers of skilled workmen, tools, and facilities. To insure proper quality control and supervision, all factory cast concrete units shall be poured and vibrated, using steel forms, in the same PCI (Pre-stressed Concrete Institute) certified manufacturing facility used for the complete assembly of all pump station components and their equipment.
- G. A subcontractor for any part of the work must have experience on similar work and if required, furnish the Owner with a list of projects and the Owner(s) who is familiar with his competence.
- H. Devices, equipment, structures, and systems not designed by the Design Professional that the Contractor wishes to furnish shall be designed by either a registered professional engineer or by someone the Design Professional accepts as qualified. If required, the Design Professional or Owner shall be furnished complete design calculations and assumptions before acceptance.
- I. Soil testing shall be done by a testing laboratory, which operates in accordance with ASTM D 3740 and E 329 latest revision and be acceptable to the Owner prior to engagement.
- J. Infiltration, line and grade of sewer, pump performance, and hydrostatic tests on force mains shall be made by the Contractor with equipment qualified by the Owner and in the presence of the Owner. The Owner reserves the right to accept or reject testing equipment.

1.8 WARRANTY

- A. The Contractor shall guarantee the quality of the materials, equipment, and workmanship for 12 months after acceptance of the completed Project. Defects discovered during that period shall be repaired by the Contractor at no cost to the Owner. The Performance Bond shall reflect this guarantee.
- B. The manufacturer shall guarantee the complete pump station to be free from defects in material and workmanship for a period of five years from the date of start-up and acceptance.

1.9 EXISTING UTILITIES

- A. All known utility facilities are shown schematically on plans, and are not necessarily accurate in location as to plan or elevation. Utilities such as service lines are unknown facilities not shown on plans will not relieve the Contractor of his

responsibility under this requirement. "Existing Utilities Facilities" means any utility that exist on the project in its original, relocated, or newly installed position. The Contractor will be held responsible for the cost of repairs to damaged underground facilities, even when such facilities are not shown on the plans. The Contractor shall contact all utility companies prior to beginning work and request an accurate field location of their respective utility lines.

PART 2 PRODUCTS

2.1 MATERIALS

- A. All pipes shall be subject to inspection at the pipe plant, trench or other point of delivery for the purpose of culling and rejecting pipe, independent of laboratory tests, which do not conform to the requirements of these specifications. The manufacturer of the pipe shall submit evidence of having consistently produced both pipe and joints of satisfactory quality and performance results in service over a period of at least five (5) years.
- B. Stone: All bedding, haunching, and trench stabilization stone shall be crushed granite.

2.2 POLYVINYL CHLORIDE (PVC) GRAVITY SEWER PIPE

- A. Acceptability of PVC pipe for gravity sewers is indicated in the following table:

Standard Min Thick Type PVC ¹	Wall	Acceptable Manufacturers	≤ 6	8 to 15	18	21	24
ASTM D 3034 SDR 35 12454B	SW	Open	Yes	Yes	No	No	No
ASTM F 679 T-1 12454C	SW	Open	No	No	Yes	Yes	Yes
ASTM F 794 Series 46 12454C	OP	Open	No	No	No	No	Yes
ASTM F 794 Series 46 12454C	CP	Open	Yes	No	No	No	Yes

¹ As specified in ASTM D 1784
 SW Solid Wall
 OP Open Profile
 CP Closed Profile

Open shall mean any manufacturer whose products meet the specified standard is acceptable.

- B. All pipes shall have a minimum pipe stiffness of 46 psi at five percent deflection as determined by ASTM D 2412.
- C. Each length of pipe shall be marked with the manufacturer's name, trade name, nominal size,

class, hydrostatic test pressure, manufacturer's standard symbol to signify it was tested, and date of manufacture. Each rubber ring shall be marked with the manufacturer's identification, the size, the year of manufacture, and the classes of pipe with which it can be used.

- D. Fittings 15 inches in diameter and less shall be manufactured in accordance with ASTM D 3034. PVC compound shall be 12454B or 12454C as specified in ASTM D 1784.
1. For sizes 8-inches and less in diameter, fittings shall be molded in one-piece with no solvent welded joints. Minimum socket depths shall be as specified in ASTM D 3034, Table 2.
 2. For sizes 10-inches and larger in diameter, fittings shall be fabricated from pipe conforming to ASTM D 3034 using solvent welding. No field fabrication of fittings will be allowed. All such fabrication shall be performed at the factory and the fittings shall be delivered ready for use.
- E. Joints: Joints for pipe and fittings shall be of the integral bell and spigot type with a confined elastomeric gasket having the capability of absorbing expansion and contraction without leakage, when tested in accordance with ASTM D 3212. Gaskets shall meet the requirements of ASTM F 477. The joint system shall be subject to the approval of the Owner and shall be identical for pipe and fittings.
- F. Manhole Connections
1. Solid Wall and Closed Profile Wall Pipe: The sewer shall be connected to manholes utilizing a standard pipe section.
 2. Open Profile Wall Pipe: The sewer shall be connected to manholes with an adapter piece. The adapter piece shall have an open profile pipe bell and a solid wall pipe spigot for penetrating the manhole wall.
- G. Acceptance: Acceptance will be on the basis of the Owner's inspection and the manufacturer's written certification that the pipe and fittings were manufactured and tested in accordance with the applicable standards.

2.3 DUCTILE IRON PIPE (DIP)

- A. Ductile iron pipe shall be utilized where shown on the Drawings. All pipes, except specials, shall be furnished in nominal lengths of 18 to 20 feet, with a bituminous outside coating.
- B. Ductile iron pipe shall be manufactured in accordance with AWWA C151. All pipes, except specials, shall be furnished in nominal lengths of 18 to 20 feet. Sizes will be as shown on the Drawings. All pipes shall have a minimum pressure rating as indicated in the following table, and corresponding minimum wall thickness, unless otherwise specified or shown on the Drawings:

Pipe Sizes (inches)	Pressure Class (psi)
4 - 12	350

16 - 24	250

- C. Flexible Joint (Ball Joint) Pipe: Flexible, restrained joint pipe shall be minimum Thickness Class 56. Appropriate transition pieces shall be utilized on each end of run of flexible joint pipe.
- D. Fittings and Accessories
1. Fittings shall be ductile iron and shall conform to AWWA C110/ANSI A21.10 or AWWA C153/ANSI A21.53 with a minimum rated working pressure of 250 psi, and shall be furnished with a bituminous outside coating.
 2. Thrust Collars: Thrust collars shall be welded-on ductile iron body type capable of withstanding a thrust due to 250 psi internal pressure on a dead end from either direction on that pipe size. Weld-on collars shall be continuously welded to the pipe by the pipe manufacturer.
 3. Solid Sleeves: Solid sleeves shall permit the connection of plain end ductile iron pipe and plain end PVC pipe. Solid sleeves shall meet the requirements of ANSI/AWWA C110 for long pattern and have a minimum pressure rating of 250 psi. Solid sleeves shall have a mechanical or restrained joint as specified in this Section and as shown on the Drawings. Solid sleeves shall be provided with gaskets suitable for the type of pipe to be connected. Solid sleeves shall be used only in locations shown on the Drawings or at the direction of the Owner. Solid sleeves shall be manufactured by ACIPCO, U.S. Pipe or Clow.
- E. Joints for Ductile Iron Pipe and Fittings
1. Joints for ductile iron pipe and fittings shall be mechanical joint, flanged joint, ball joint, restrained joint, or push-on joint as shown on the Drawings or specified herein.
 2. Unless otherwise shown on the Drawings, specified or directed, all ductile iron pipe laid underground shall be joined using push-on type joints.
 3. In all cases, gaskets shall be made of material that will not be damaged by the fluid being transported or by the environment in which the pipe is installed.
 4. Provide the necessary bolts for connections. All bolts and nuts shall be threaded in accordance with ANSI B1.1, Coarse Thread Series, Class 2A external and 2B internal fit. All bolts and nuts shall be made in the U.S.A.
 5. Mechanical Joints:
 - a. Joints shall conform to AWWA C111/ANSI A21.11.
 - b. Bolts and nuts shall be Tee Head Bolts and nuts of high strength low-alloy steel in accordance with ASTM A242 to the dimensions shown in AWWA C111/ANSI A21.11.
 - c. Gaskets shall be in accordance with AWWA C111/ANSI A21.11 and shall be constructed of plain rubber.

- d. Mechanical joint glands shall be ductile iron.
- 6. Push-On Joints: Push-on joints and gaskets shall conform to AWWA C111/ANSI A21.11. Details of the joint design shall be in accordance with the manufacturer's standard practice such as ACIPCO "Fastite", McWane (Clow) "Bell-Tite", or U.S. Pipe "Tyton" joints.
- 7. Flanged Joints:
 - a. Flanged joints shall conform to AWWA C115/ANSI A21.15. Flanges shall be ductile iron and shall be furnished by the pipe manufacturer.
 - b. Gaskets shall be made of 1/8-inch thick, cloth reinforced rubber. Gaskets may be ring type or full face type.
 - c. Flanged ductile iron pipe shall have flanges cast solidly or threaded to the pipe barrel. Pipe threads shall be of such length that with flanges screwed home, the end of the pipe shall project beyond the face line of the flange. Flange and pipe shall then be machined to give a flush finish to the pipe and the flange and surface shall be normal to the axis of the pipe. Ductile iron flanges shall be of such design that the flange neck completely covers the threaded portion of the pipe to protect same against corrosion. All pipes with threaded type flanges shall be assembled, faced, and drilled at the point of manufacture, unless otherwise approved by the Owner.
 - d. Flange filler shall conform to AWWA C110/ANSI A21.10. Joint bolt length shall be increased by the thickness of the flange filler.
 - e. Where tap or stud bolts are required, flanges shall be drilled and tapped accordingly.
 - f. Bolt length and diameter shall conform to ANSI/AWWA C115 for Class 125 flanges shown in ANSI/ASME B16.1.
 - g. Bolts for exposed service shall be zinc plated, cold pressed, steel machine bolts conforming to ASTM A307, Grade B. Nuts for exposed service shall be zinc plated, heavy hex conforming to ASTM A563. Zinc plating shall conform to ASTM B633, Type II.
 - h. Bolts for submerged service shall be stainless steel machine bolts conforming to ASTM A193, Grade B8. Nuts shall be heavy hex, stainless steel conforming to ASTM A194, Grade 8.
- 8. Restrained Joints:
 - a. Restrained joints shall be ACIPCO "FLEX-RING" or "FAST-GRIP", or U.S. "TR-FLEX" or "FIELD LOK".
 - b. Bolts and nuts shall be in accordance with the manufacturer's recommendations.
 - c. Gaskets shall be in accordance with the manufacturer's recommendations.

F. Interior Lining: Ductile iron pipe and fittings shall be lined with polyethylene, polyurethane or epoxy, as specified below:

1. Linings shall cover all exposed surfaces of pipe and fittings subject to contact with sewer liquid or gas. The lining of the pipe barrel shall extend from spigot end through the socket to the edge of the gasket sealing area or recess for pipe using push-on gaskets, and to the edge of the gasket seat for mechanical joints. The lining shall also cover the exterior of the spigot end from the end of the pipe to beyond the gasket sealing area. The lining in fittings shall cover the interior surfaces including the socket areas as defined above. All linings shall be hermetically sealed at the ends.

2. Lining Materials:

a. Polyethylene lining material for pipe barrel shall conform to ASTM D 1248, compounded with inert filler and with sufficient carbon black to resist ultraviolet rays during aboveground storage. The polyethylene shall be bonded to the interior of the pipe or fitting by heat. Lining material for exterior of spigot and interior of socket shall be equal to Roskote Mastic B-151 or Madewell 1104 Coal Tar Epoxy. Polyethylene lining system shall be ACIPCO Polybond or U.S. Pipe Polylined.

b. Polyurethane lining material shall consist of a two-part polyurethane coating system conforming to ASTM D 16, Type V, consisting of a polyisocyanate resin and a polyol resin. Polyurethane for pipe barrel and fittings shall be Corropipe II Wasteliner as manufactured by Madison Chemical Industries, Inc. Polyurethane lining material for exterior of spigot and interior of socket shall be equal to Corropipe 'S' as manufactured by Madison Chemical Industries, Inc. Polyurethane lining system shall be equal to U.S. Pipe Polythane.

c. Epoxy: The lining material shall be Protecto 401 Ceramic Epoxy, a two component, modified epoxy formulated for corrosion control with the following minimum requirements:

1. A permeability rating of 0.0 perms when measured by ASTM E 96, Procedure A. Duration of test shall be six weeks.

2. A direct impact resistance of 125 inch-pounds with no cracking when measured by ASTM D 2794.

3. The ability to build at least 50 mils, dry, in one coat.

4. The material shall be recoatable with itself for at least seven days with no additional surface preparation when exposed to direct summer sun and a temperature of 90 degrees F.

5. The material shall contain at least 20 percent by volume of ceramic quartz pigment.

6. A test and service history demonstrating the ability of the material to withstand the service expected.

7. Possess a minimum solids volume content of 88 percent, $\pm$ one percent.
 8. Possess a maximum drying time to allow recoating as follows: 50 degrees F - 72 hours; 75 degrees F - 18 hours; 90 degrees F - 8 hours. If recoating cannot be accomplished within seven days, a light brush blast shall be performed to improve intercoat adhesion.
3. All surfaces to be lined with polyethylene shall be blast cleaned equal to the requirements of SSPC-SP6. All surfaces to be lined with polyurethane shall be blast cleaned equal to the requirements of SSPC-SP10. All surfaces to be lined with epoxy shall be blasted and cleaned to remove all loose laitance, scale, or other loose material. No lining shall take place over grease, oil, etc., that would be detrimental to the adhesion of the compound to the substrate.
 4. Application:
 - a. Lining of pipe barrel and fittings shall be 40 mils nominal thickness; minimum lining thickness shall be 30 mils. Lining thickness for exterior of spigot and interior of socket shall be 8 to 10 mils.
 - b. The lining shall be applied using a centrifugal lance applicator by applicators certified by the lining manufacturer. The workers shall be experienced and competent in the surface preparation, application and inspection of the lining to be applied. The compound shall not be applied when the substrate temperature is below 40 degrees F or in adverse atmospheric conditions which will cause detrimental blistering, pin holing or porosity of the film.
 5. All pipe and fitting linings shall be tested for pinholes in accordance with ASTM G 62, Method B.
 6. All pipe linings shall be checked for thickness using a magnetic film thickness gauge.
 7. Each pipe joint and fitting shall be marked with the date of application of the lining system and with the numerical sequence of application of that date.
- G. Polyethylene Encasement: Where shown on the Drawings, ductile iron pipe shall be encased with polyethylene film. Polyethylene film shall have a minimum thickness of 8 mils.

2.4 MISCELLANEOUS ACCESSORIES

A. Flexible Adaptor Couplings

1. Couplings for pipe sizes 15-inches in diameter and less shall be elastomeric plastic sleeves designed to connect pipes of dissimilar materials. Adapters shall provide a positive seal against infiltration and exfiltration and remain leak proof and root proof up to 4.3 psi. The adaptor manufacturer shall provide all stainless steel clamps and required accessories.
2. Couplings shall be products of Fernco and shall be installed in accordance with the

manufacturer's recommendations.

B. Flexible Adaptor Donuts

1. Adaptor donuts shall be elastomeric polyvinyl chloride (PVC), compressible seals designed for sealing joints between sewer pipes of different sizes and/or dissimilar materials. Adaptors shall provide a positive seal against infiltration and exfiltration and remain leak proof and root proof up to 4.3 psi.
2. Donuts shall be products of Fernco and shall be installed in accordance with the manufacturer's recommendations.

- C. Detection Tape:** Detection tape shall be composed of a solid aluminum foil encased in a protective plastic jacket. Tapes shall be color coded in accordance with APWA color codes with the following legends: Sanitary Sewerage Systems, Safety Green, "Caution: Sewer Line Buried Below". Colors may be solid or striped. Tape shall be permanently printed with no surface printing allowed. Tape width shall be minimum 2-inches when buried less than 10-inches below the surface. Tape width shall be minimum 3-inches when buried greater than 10-inches and less than 20-inches. Detection tape shall be equal to Lineguard Type III Detectable or Allen Systems Detectatape.

PART 3 EXECUTION

3.1 GENERAL

- A.** The contractor shall excavate the trenches and manholes to the required dimensions; excavate the bell holes; construct and maintain all bridges required for traffic control; sheet, brace and support the adjoining ground or structures where necessary; handle all drainage or ground water; guard the site; unload, haul, distribute, lay the pipe, fittings and accessories; rearrange other conduits, ducts or pipes where necessary; replace all damaged water services, drains, sewers, or other structures; backfill trenches; restore the roadway surfaces; remove surplus excavated materials; clean the site of the work of any trees and stumps and maintain the street or other surfaces over the trenches.
- B.** Manholes shall be constructed at the locations shown on the plans. Manholes shall be the type and to the depth shown on the plans. Details of manhole are shown on the plans and construction shall be in accordance with these details.
- C.** Where inlet leads and main or lateral pipe sewers enter a manhole, such pipes shall be cut off flush with the inside of the manhole, and any irregularities shall be touched up with mortar.
- D.** The inverts of the sewer lines entering manholes at or near the flow line elevation of the manhole shall be shaped and routed across the floor of the manhole using concrete and mortar to obtain the proper contour.
- E.** Where the sewers enter the manhole, a neoprene boot shall be used to positively seal against infiltration or exfiltration.
- F.** Where sewers enter an existing manhole, the seal will be fully grouted with non-shrink grout to positively seal against infiltration or exfiltration.

- G. Do not connect any sewage flow to new work until authorized by the appropriate Water Works Department. Contact the appropriate Water Works Department a minimum of 72 hours prior to connection.

3.2 SERVICE FITTINGS

- A. Location of Service Fittings: All wyes and other fittings shall be placed at the points indicated on the plans or by the Owner. They shall not be covered until the representative has measured their exact location in relation to the nearest manhole, and recorded it clearly on a record plan for the Owner's permanent records.
- B. Wye branches shall be laid to correspond with the sewers and house service lines entering them. When service lines are not laid, or whenever wyes are installed and short runs of service lines are constructed to a point for future extension, they shall be closed with caps from the same pipe material and sealed with like joint material as used for jointing bell and sockets of regular sewer pipe.
- C. Each wye branch shall be provided with a 45 degree bend connected to the branch.
- D. Service lines, unless otherwise shown on the Drawings or requested by the Owner are to be installed to suit field conditions at a minimum grade of 1.0 percent and with a minimum pipe cover of 30 inches.
- E. Provide cleanouts in service lines at not more than 75 foot intervals and where pipe horizontal deflection equals or exceeds 45 degrees. Unless noted otherwise, furnish cleanouts consisting of wye and 45 degree fittings, vertical pipe, and threaded brass or plastic removal plug. Arrange cleanout to permit cleaning in the direction of flow.

3.3 INSPECTION

- A. Materials at Delivery Point: During the process of unloading all pipe and accessories shall be inspected by the contractor for loss or damage in transit.
- B. Field Inspection: All pipe and accessories shall be laid and jointed in the manner herein specified in the presence of the owners authorized inspector.
- C. Disposition of Defective Material: All material found during the process of the work to have cracks, flaws or other defects will be rejected and the contractor shall promptly remove such material from the job site.
- D. Contractor's Responsibility for Materials: The contractor shall be responsible for all material furnished to him and he shall replace at his own expense all such materials that have become damaged in handling after delivery. The contractor shall be responsible for the safe storage of materials furnished by or to him, and accepted by him intended for the work until it has been incorporated in the completed project.
- E. Handling Pipe and Accessories: Pipe, fittings and other accessories shall be unloaded at the point of delivery, hauled to and distributed at the site of the project by the contractor; they shall at all times be handled with care to avoid damage. Under no circumstances shall they be dropped. Pipe and fittings shall be properly distributed in such a manner as to be convenient for laying and so as to be of as little inconvenience to the public as practicable.

3.4 ALIGNMENT AND GRADE

- A. General: All pipes shall be laid and maintained in the required lines and grades, with wyes or fittings at the required locations, and with joints centered and spigots home. The contractor shall, at his own expense, furnish and place in position all necessary stakes and batter boards for locating the work. The Contractor must also furnish, at his own expense, good spun twilled lines or wire for use in giving lines and grades and the necessary plummets and grade poles. The laser beam method of establishing pipe grade is preferred.
- B. Protecting Underground and Surface Structures: Temporary support, adequate protection and maintenance of all underground and surface utility structures, water services, gas services, poles, guy wires, drains, sewers and other obstructions encountered in the progress of the work shall be furnished by the Contractor at his own expense.

3.5 PROTECTION OF WATER SUPPLIES

- A. Water Supply Interconnections: There shall be no physical connection between a public or private potable water supply system and a sewer, or appurtenance thereto which would permit the passage of any sewage or polluted water into the potable supply.
- B. Relation to Water Works Structures: While no general statement can be made to cover all conditions, it is generally recognized that sewers shall meet the requirements of the approving agency with respect to minimum distances from public water supply wells or other water supply sources and structures.
- C. Relation to Water Mains:
 - 1. Horizontal Separation: Whenever possible, sewers should be laid at least 10 feet, horizontally, from any existing or proposed water main. Should local conditions prevent a lateral separation of 10 feet, a sewer may be laid closer than 10 feet to a water main if:
 - a. It is laid in a separate trench.
 - b. It is laid in the same trench with the water mains located at one side on a bench of undisturbed earth.
 - c. In either case the elevation of the crown of the sewer is at least 18 inches below the invert of the water main.
 - 2. Vertical Separation: Whenever sewers must cross under water mains, the sewer shall be laid at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. When the elevation of the sewer cannot be buried to meet the above requirement, the water main shall be relocated to provide this separation or reconstructed with slip-on or mechanical-joint cast-iron pipe, asbestos-cement pressure pipe or pre-stressed concrete cylinder pipe for a distance of 10 feet on each side of the sewer. One full length of water main should be centered over the sewer so that both joints will be as far from the sewer as possible.
- D. Deviations Occasioned by Other Utility Structures: Wherever existing utility structures or

branch connections leading to main sewers or storm sewers, or other conduits, ducts, pipes or structures present obstructions to the grade and alignment of the pipe, they shall be permanently supported, removed, relocated or reconstructed by the Contractor through cooperation with the owner of the utility structures, or obstruction. Where necessary to move service poles, guy wires, pipe lines or other obstructions, the Contractor shall notify and cooperate with the utility owner. In those instances where their location or reconstruction is impracticable, a deviation from line and grade will be ordered, and the change shall be made in the manner directed.

- E. Sub-Surface Explorations: Whenever necessary to determine the location of existing pipes, valves, or other underground structures, the Contractor, after examination of available records, shall make the explorations and excavations for such purpose, at his own expense.
- F. Pipe Alignment and Grade: The pipes and specials shall be laid in the trench so that after the sewer is completed, the interior surface thereof shall conform accurately to the grades and alignments fixed and shown on the plans. On completion, no pipe sewer will be accepted unless a clear lamp may be seen from manhole to manhole.

3.6 EXISTING UNDERGROUND UTILITIES AND OBSTRUCTIONS

- A. It is the responsibility of the Contractor to locate all existing utilities along the path of his construction. The drawings shall indicate underground utilities or obstructions that are known to exist. Where these or unforeseen underground utilities are encountered, the location and alignment of the water main may be changed, upon written approval of the Owner, to avoid interference.
- B. Existing Utility Location: The following steps shall be exercised to avoid interruption of existing utility service.
 - 1. Provide the required notice to the utility owners and allow them to locate their facilities according to Georgia Law. Field utility locations are valid for only 10 days after original notice. The Contractor shall ensure, at the time of any excavation that a valid utility location exists at the point of excavation.
 - 2. Expose the facility, for a distance of at least 200 feet in advance of pipeline construction, to verify its true location and grade. Repair, or have repaired, any damage to utilities resulting from locating or exposing their true location.
 - 3. Avoid utility damage and interruption by protection with means or methods recommended by the utility owner.
 - 4. Maintain a log identifying when phone calls were made, who was called, area for which utility relocation was requested and work order number issued, if any. The Contractor shall provide the Owner an updated copy of the log.
- C. Conflict with Existing Utilities
 - 1. Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed piping does not permit safe installation of the piping by the use of sheeting, shoring, tying-back, supporting, or temporarily suspending service of the parallel or crossing facility. The Contractor may change the

proposed alignment of the piping to avoid horizontal conflicts if the new alignment remains within the available right-of way or easement, complies with regulatory agency requirements and after a written request to and subsequent approval by the Owner. Where such relocation of the piping is denied by the Owner, the Contractor shall arrange to have the utility, main, or service relocated.

2. Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed piping does not permit the crossing without immediate or potential future damage to the utility, main, service, or the piping. The Contractor may change the proposed grade of the piping to avoid regulatory agencies requirements after written request to and subsequent approval by the Owner. Where such relocation of the piping is denied by the Owner, the Contractor shall arrange to have the utility, main, or service relocated.

- D. Electronic Locator: Have available at all times an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.

3.7 TRENCHING

- A. Additional directives for Utility Trenching are covered in Section 02324 of these Specifications.
- B. Description: The trench shall be dug to the alignment and grade required. The trench shall be braced if necessary and drained in order that workmen therein may work safely and efficiently. It is essential that the discharge from any pumps be led to natural drainage channels or to drains.
- C. Width: Minimum width of trench shall be six (6) inches outside of barrel of pipe on each side of pipe. Maximum width of trench shall be nine (9) inches outside of barrel of pipe on each side of pipe. Sides of trench shall be dug and maintained substantially vertical.
- D. Correcting Faulty Grade: Any part of the trench excavated below grade shall be corrected with approved material thoroughly compacted.
- E. Trench Stabilization: Wherever the material at the bottom of the trench is unsuitable for the proper installation of the pipe, the Owner will direct the removal and replacement of the unsuitable material. When so directed, undercut the trench and backfill with bedding material (#57 stone). Place and compact this material to bring the trench to the required grade.
- F. Haunching of Sewer: Haunch pipelines in accordance with the detail drawings in the plans and the following specifications. Haunching will be required for all gravity sewers.
- G. Haunching Materials - PVC and Ductile Iron Sewer: All haunching materials shall be crushed granite stone.

3.8 BEDDING OF SEWER

- A. Types of Piping Sewer
 1. Ductile Iron Sewer: All bedding materials shall be crushed stone unless shown or specified otherwise. Crushed stone bedding material shall meet the requirements of Georgia Department of Transportation Specification 800.01 for No. 57 Stone.

2. PVC: All bedding materials shall be or crushed stone bedding material meeting the requirements of Georgia Department of Transportation Specification 800.01 for No. 78 stone.
 3. Sewer Laterals: The bedding requirement for the laterals from the main sewer to the designation shall be the same as applicable to the main sewer, (same type material) and as explained above.
 4. Manholes: All bedding materials shall be crushed stone unless shown or specified otherwise. Crushed stone bedding material shall meet the requirements of Georgia Department of Transportation Specification 800.01 for No. 57 Stone.
- B. Compact stone bedding material by tamping or slicing with a flat blade shovel. Prepare the trench bottom to support the pipe uniformly throughout its length. Provide bell holes to relieve pipe bells of all loads. If the trench is excavated to excessive width or depth, provide the next better class of bedding. In rock trenches, be pipe in at least six inches of suitable earth material.
- C. Bedding Classifications: Refer to Section 02315 – Trench Excavation

3.9 CONSTRUCTION

- A. PVC and Ductile Iron Pipe: Excavate the bottom of the trench flat at a minimum depth shown on the Drawings below the bottom of the pipe barrel. If required, place and compact bedding material to the proper grade. Haunching material shall then be carefully placed by hand and compacted to provide full support under the pipe and to the height above the pipe as shown on the detailed plans.
- B. Manholes: Excavate to a minimum of 12 inches below the planned elevation of the base of the manhole. The Contractor shall place and compact bedding material to the required grade before constructing the manhole.
- C. Compaction: Bedding under pipe and manholes shall be compacted to a minimum of 95 percent of the maximum dry density as determined by the Standard Proctor Compaction Test, ASTM D698.
- D. Care of Surface Material for Reuse: If local conditions permit their reuse, all surface materials suitable for reuse in restoring the surface shall be kept separate from the general excavation material.
- E. Manner of Piling Excavated Materials: All excavated material shall be piled so that it will not endanger the work and so that it will avoid obstructing roads and driveways. Drainage channels shall be kept clear or other satisfactory provisions made for drainage.
- F. Trenching by Machine or by Hand: The use of trench digging machinery will be permitted except in places where operation of same will cause damage to existing structures above or below the ground; in which case, hand methods shall be employed.

3.10 PIPE HANDLING

- A. Manner of Handling Pipe: Proper implements, tools and facilities shall be provided and used by the Contractor for convenient prosecution of the work. All pipes shall be carefully lowered into the trench piece by piece by means of suitable tools or equipment in such manner as to prevent damage to pipe. Under no circumstances shall pipe be dropped or dumped into the trench.
- B. Inspection: Before lowering and while suspended, the pipe shall be inspected for defects. Any defective, damaged or unsound pipe shall be rejected.
- C. Pipe Kept Clean: All foreign matter or dirt shall be removed from the pipe, and it shall be kept clean by approved means during and after installation.
- D. Installation of Pipe: The laying of pipe in finished trenches shall be constructed at the lowest point, so that spigot ends point in the direction of flow. All pipes shall be laid with ends abutting true to line and grade. They shall be fitted and matched so that when laid in the work they will form a sewer with a smooth and uniform invert. All possible care shall be taken when shoving the pipes together so that the joints will not be unnecessarily large. Sockets and spigots shall be carefully cleaned and lubricated according to manufacturer's recommendations before pipes are jointed.
- E. Unsuitable Conditions for Installing Pipe: No pipe shall be laid in water, or when the trench conditions or weather is unsuitable for such work, except in an emergency. Owner must be informed of such emergency.
- F. Encasement and Blocking of Sewer Pipes: Where specifically indicated on the plans the Contractor shall encase or block sewer pipes in conformity with details and type of concrete specified. Sewer lines to be encased shall be encased in 3000 psi concrete, a minimum of six (6) inches on all sides of the pipe.

3.11 BACKFILLING TRENCHES AND AROUND MANHOLES

- A. Time of Backfilling: As soon as practicable after the completion of laying and jointing of the pipe, the trench shall be backfilled, and at no time shall the completed backfilled trench be more than 200 feet behind the pipe laying.
- B. Backfill Procedure:
 - 1. The backfill material shall be moistened if necessary, tamped in thin (about 6" layers) and thoroughly compacted under and on each side of the pipe, with mechanical tamps to provide solid backing against external surface of the pipe. Walking or working on the completed pipe line, except as may be necessary in tamping or backfilling will not be permitted until the trench has been backfilled to a height of at least 12" over the top of the pipe.
 - 2. The backfill in all the trenches shall be compacted to 98% of the maximum dry density under and within 10 feet of pavement or dirt roadways, and 95% elsewhere, determined by the Standard Proctor Compaction Test. The testing agency shall run as a minimum one (1) Proctor for each type of soil encountered.
 - 3. During the backfilling, loose lifts shall not exceed eight (8) inches in thickness. Field density determination (compaction tests) should be made at a minimum of one (1)

test per 1000 linear feet one foot above the pipe. Additional tests may be required for special conditions such as backfill around manholes in streets and other critical areas. The range of moisture content should be maintained within plus or minus three (3) percent of the optimum moisture content.

- C. Rock and Rock Fragment Exclusion: No rock or rock fragments shall be used in the backfill for at least 18" above the top of the pipe, and no stone larger than eight inches in its greatest dimension shall be used in the backfill.
- D. Deficiency of Backfill: Any deficiency in the quantity of material for backfilling the trenches, or for filling depressions caused by settlement, shall be supplied by the Contractor.

3.12 RESTORATION OF SURFACES

- A. The Contractor shall replace all curbing, sidewalks, pavements, gutters, shrubbery, fences, sod and other surfaces disturbed to a condition equal to that before the work began, furnishing all labor and materials incidental thereto.

3.13 UNSUITABLE SOIL CONDITIONS

- A. Where the subgrade is too soft or mucky for the proper installation of the sewer pipe, areas where the subgrade is not capable of in-situ compaction, the Contractor shall undercut the trench and backfill with fill type S1 or A1 and compact to density equal to or greater than requirements for backfill material. The stone shall be brought to grade and thoroughly compacted to conform to the outside of the pipe barrel.

3.14 DEWATERING TRENCHES

- A. Where high groundwater is encountered, dewatering shall be done by well pointing. If soil conditions are not suitable for well points, trench drains or crushed stone or gravel shall be constructed to carry the water to sumps and the water removed by pumps or bailing. No extra payment will be made for dewatering trenches.

3.15 CLEANING UP

- A. Any surplus pipe line materials, tools, rubbish, temporary structures, or Contractor's trash shall be removed by the Contractor and the construction site shall be left clean.

3.16 INSPECTION AND TESTING:

- A. The Owner reserves the right to inspect construction methods to insure compliance with these specifications. Sewer lines and related facilities will be inspected by the Owner before acceptance or tie-in to the Owner's system is permitted. All lines must be clean and all obstructions removed prior to requesting inspection.
- B. The Contractor will test the system for leakage as set forth in Section 02519 - Piping, Testing and Acceptance. The Owner will inspect for construction or material defects, and will randomly check PVC sewer for excessive deflection.

3.17 SAFETY AND PROPERTY INSPECTION

- A. Barricades, Guards and Safety Provision: To protect persons from injury and to avoid property damage, adequate barricades, construction signs, torches, red lanterns and guards shall be placed and maintained during the progress of the construction work and until it is safe for traffic to use the trenched areas. Rules and regulations of the local authorities respecting safety provisions shall be observed.
- B. Traffic and Utility Controls: Excavations for pipe laying operations shall be conducted in a manner to cause the least interruption to traffic. Where traffic must cross open trenches the Contractor shall provide suitable bridges. Hydrants under pressure, valve pit covers, valves boxes, curb stop boxes, fire or police call boxes or other utility controls shall be left unobstructed and accessible during the construction period.
- C. Flow of Drains and Sewers Maintained: Provisions shall be made for the flow of storm and sanitary sewers, drains and water courses encountered during construction, and the structures which may have been disturbed shall be satisfactorily restored upon completion of the work.
- D. Protection and Restoration of Work Area:
 - 1. General: Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is started.
 - 2. Man-Made Improvements: Protect, or remove and replace with the Owner's approval, all fences, piers, docks, walkways, mail boxes, pipe lines, drain culverts, power and telephone lines and cables, and other improvements that may be encountered in the work.
 - 3. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by the Owner. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.
 - 4. Cutting of Trees: Do not cut trees for the performance of the work except as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3-inches in diameter, not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Contractor. No stumps, wood piles, or trash piles will be permitted on the work site.
 - 5. Grassing: See Section 02920 for detailed information.
 - 6. Erosion Control: Plan excavation work to prevent erosion and the washing of soil into adjacent streams. Limit the amount of open excavation at any one time. Place spoil in the proper place and keep natural water routes open. See Erosion and Sedimentation Control Section.

7. Disposal of Rubbish: Dispose of all materials cleaned and grubbed during the construction of the project in accordance with the applicable codes and rules of the appropriate regulatory agencies, county, state and federal.

END SECTION