

**SECTION 01 1100
SUMMARY**

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 SUMMARY

- A. This Section includes the following:
 - 1. Work covered by the Contract Documents.
 - 2. Type of the Contract.
 - 3. Use of premises.
 - 4. Work restrictions.
 - 5. Specification formats and conventions.
- B. Related Sections include the following:
 - 1. Division 1 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Pooler Fire Station #5
 - 1. Project Location: 204 Nordic Way, Pooler, GA 31322
- C. Owner: The City of Pooler.
 - 1. Owner's Representative: Matt Saxon
- D. The Work consists of the following:
 - 1. The Work includes: Construction and erection of a metal building located in The City of Pooler to be used for a fire station as shown on construction drawings.

1.4 TYPE OF CONTRACT

- A. Project will be constructed under a single prime build contract.

1.5 USE OF PREMISES

- A. General: Contractor shall have full use of premises for construction operations, including use of Project site, during construction period. Contractor's use of premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. Use of Site: Limit use of premises to work in areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1.6 WORK RESTRICTIONS

- A. On-Site Work Hours: Work shall be generally performed during normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, except as otherwise indicated.

1.7 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections.
 - 1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.

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2. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.
- B. 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. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

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.

END SECTION 01 1100

SECTION 01 1230

ALTERNATIVES

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 SUMMARY

- A. This Section includes administrative and procedural requirements for alternatives.

1.3 DEFINITIONS

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

1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration, Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as the other work of the Contract.
- D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION 01 1230

SECTION 01 1250

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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

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

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

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. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request 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.
- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes 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.

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6. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
- C. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

1.5 CHANGE ORDER PROCEDURES

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

1.6 CONSTRUCTION CHANGE DIRECTIVE

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

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 01 1250

SECTION 01 1290

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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
 - 1. Division 1 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 2. Division 1 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

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. Correlate 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. Submittals Schedule.
 - c. 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.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Submit draft of AIA Document G703 Continuation Sheets.
 - 3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.

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- f. Change Orders (numbers) that affect value.
- g. Dollar value.
 - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
- 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. Include separate line items under required principal subcontracts for operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training in the amount of 5 percent of the Contract Sum.
- 5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
- 6. 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 specified, include evidence of insurance or bonded warehousing.
- 7. 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.
- 8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
- 9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

Each 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.
 - A. 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.
 - B. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.
 - C. 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 of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 - D. Transmittal: Submit 5 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.
 - E. 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

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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 final or full waivers.
 3. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
- F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Submittals Schedule (preliminary if not final).
 5. Copies of building permits.
 6. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 7. Certificates of insurance and insurance policies.
 8. Performance and payment bonds.
- G. Application for Payment at Substantial Completion: After issuing 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 Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- H. Final Payment Application: 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.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 01 1290

SECTION 01 1310

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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Coordination Drawings.
 - 2. Administrative and supervisory personnel.
 - 3. Project meetings.
- B. Related Sections include the following:
 - 1. Division 1 Section "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
 - 2. Division 1 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

- 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 with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
 - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. 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. Pre-installation conferences.
 - 7. Project closeout activities.
 - 8. Startup and adjustment of systems.
 - 9. Project closeout activities.

1.4 SUBMITTALS

- A. Key Personnel Names: Within 10 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 and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
 - 1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: 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 a preconstruction conference before starting construction, at a time convenient to Owner, and Architect, but no later than 10 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
 - 1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for requests for interpretations (RFIs).
 - g. Procedures for testing and inspecting.
 - h. Procedures for processing Applications for Payment.
 - i. Distribution of the Contract Documents.
 - j. Submittal procedures.
 - k. Preparation of Record Documents.
 - l. Use of the premises.
 - m. Work restrictions.
 - n. Responsibility for temporary facilities and controls.
 - o. Parking availability.
 - p. Office, work, and storage areas.
 - q. Equipment deliveries and priorities.

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- r. First aid.
 - s. Security.
 - t. Progress cleaning.
 - u. Working hours.
3. Minutes: Record and distribute meeting minutes.
- C. Pre-Installation Conferences: Conduct a pre-installation 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 of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration:
 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 parties who should have been present.
 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. Progress Meetings: Conduct progress meetings monthly. Coordinate dates of meetings with preparation of payment requests.
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 conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. 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.
 1. Minutes: Record the meeting minutes.
 2. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 - 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.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 01 1310

SECTION 01 1320

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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Preliminary Construction Schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Submittals Schedule.
 - 4. Daily construction reports.
 - 5. Field condition reports.
 - 6. Special reports.
- B. Related Sections include the following:
 - 1. Division 1 Section "Payment Procedures" for submitting the Schedule of Values.
 - 2. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
 - 3. Division 1 Section "Submittal Procedures" for submitting schedules and reports.
 - 4. Division 1 Section "Quality Requirements" for submitting a schedule of tests and inspections.

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 activities are activities on the critical path. They must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the Schedule of Values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by Architect.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time belongs to Owner 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.

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- G. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- H. Major Area: A story of construction, a separate building, or a similar significant construction element.
- I. Milestone: A key or critical point in time for reference or measurement.
- J. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.
- K. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 SUBMITTALS

- A. Qualification Data: For scheduling consultant.
- B. Submittals Schedule: Submit five copies of schedule. Arrange the following information in a tabular format:
 - 1. Scheduled date for first submittal.
 - 2. Specification Section number and title.
 - 3. Submittal category (action or informational).
 - 4. Name of subcontractor.
 - 5. Description of the Work covered.
 - 6. Scheduled date for Architect's final release or approval.
- C. Contractor's Construction Schedule: Submit five opaque copies of initial schedule, large enough to show entire schedule for entire construction period.
- D. Daily Construction Reports: Submit five copies at weekly intervals.
- E. Field Condition Reports: Submit five copies at time of discovery of differing conditions.
- F. Special Reports: Submit five copies at time of unusual event.

1.5 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from parties involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 – PRODUCTS

2.1 SUBMITTALS SCHEDULE

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, re-submittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
 - 1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
 - 2. Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."
- B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial and Final Completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an

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- early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each story or separate area as a separate numbered activity for each principal 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.
 - 3. Startup and Testing Time: Include not less than days for startup and testing.
 - 4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 - D. 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. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 1 Section "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. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Startup and placement into final use and operation.
 - E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. CPM Schedule: Prepare Contractor's Construction Schedule using a computerized, cost-and resource-loaded, time-scaled CPM network analysis diagram for the Work.
 - 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for the Notice of Award.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.
 - 2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 - 3. Use "one workday" as the unit of time. Include list of nonworking days and holidays incorporated into the schedule.

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- C. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing and commissioning.
 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Sub-networks on separate sheets are permissible for activities clearly off the critical path.
- D. Initial Issue of Schedule: Prepare initial network diagram from a list of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Principal events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
- E. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.
 3. Changes in early and late finish dates.
 4. Changes in activity durations in workdays.
 5. Changes in the critical path.
 6. Changes in total float or slack time.
 7. Changes in the Contract Time.

2.4 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors at Project site.
 - 2. List of separate contractors at Project site.
 - 3. Approximate count of personnel at Project site.
 - 4. Equipment at Project site.
 - 5. Material deliveries.
 - 6. High and low temperatures and general weather conditions.
 - 7. Accidents.
 - 8. Meetings and significant decisions.
 - 9. Unusual events (refer to special reports).
 - 10. Stoppages, delays, shortages, and losses.
 - 11. Meter readings and similar recordings.
 - 12. Emergency procedures.
 - 13. Orders and requests of authorities having jurisdiction.
 - 14. Change Orders received and implemented.
 - 15. Construction Change Directives received and implemented.
 - 16. Services connected and disconnected.
 - 17. Equipment or system tests and startups.
 - 18. Partial Completions and occupancies.
 - 19. Substantial Completions authorized.
- B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, and response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 – EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.
 - 1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
 - 2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- B. 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

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- 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 Actual Completion percentage for each activity.
- C. 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 1320

**SECTION 01 1330
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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections include the following:
 - 1. Division 1 Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
 - 2. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
 - 3. Division 1 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
 - 4. Division 1 Section "Quality Requirements" for submitting test and inspection reports and for mockup requirements.
 - 5. Division 1 Section "Closeout Procedures" for submitting warranties.
 - 6. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 7. Division 1 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 8. Division 1 Section "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.
 - 9. Divisions 2 through 32 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

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

1.4 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals. Before drawings are provided a release from liability form will be required. Submittals shall be legible with minimum letter height of 3/32".
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related

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- construction activities.
- D. Processing Time: Allow enough time for submittal review, including time for re-submittals, 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 re-submittals.
1. Initial Review: Allow 15 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. Re-submittal Review: Allow 15 days for review of each re-submittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
 5. Additional re-submittals: Architect will provide up to two (2) reviews of each submittal. For each submittal that has to be re-submitted more than once, the Contractor will be liable for the expenses of the Architect or his consultants resulting from the additional reviews.
- E. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier. 3
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Re-submittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.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.
 - l. Other necessary identification.
- F. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
- G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.
1. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Specification Section number and title.
 - i. Drawing number and detail references, as appropriate.

- j. Transmittal number.
 - k. Submittal and transmittal distribution record.
 - l. Remarks.
 - m. Signature of transmitter.
- H. Re-submittals: Make re-submittals in same form and number of copies as initial submittal.
- 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked "Approved."
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Use only final approved submittals with mark indicating "approved".

1.5 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES

- A. General: At Contractor's written request, copies of Architect's CAD files will be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:
- 1. Sign waiver to be provided by the Architect.

PART 2 – PRODUCTS

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
- 1. Submit electronic submittals directly to extranet specifically established for Project.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
- 1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.
 - j. Standard product operation and maintenance manuals.
 - k. Compliance with specified referenced standards.
 - l. Testing by recognized testing agency.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
 - 4. Submit Product Data before or concurrent with Samples.
 - 5. Number of Copies: Submit 5 copies of Product Data, unless otherwise indicated. Mark up and retain one returned copy as a Project Record Document.
- 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 of Architect's CAD Drawings is otherwise permitted.
- 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

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- a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shop work manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 - m. Relationship to adjoining construction clearly indicated.
 - n. Seal and signature of professional engineer if specified.
 - o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
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 40 inches .
 3. Number of Copies: Submit (five) 5 opaque copies of each submittal, unless copies are required for operation and maintenance manuals. Mark up and retain one returned copy as a Project Record Drawing.
- 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 appropriate Specification Section.
 3. 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.
 4. 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 (five) 5 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 options selected.
 5. 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.

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- a. Number of Samples: Submit (five) 5 sets of Samples. 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. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation" for Construction Manager's action.
- F. Submittals Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."
- G. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures."
- H. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."
- I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.
 4. Number of Copies: Submit five (5) copies of subcontractor list, unless otherwise indicated.
 - a. Mark up and retain one returned copy as a Project Record Document. .

2.2 INFORMATIONAL SUBMITTALS

General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit five (5) copies of each submittal, unless otherwise indicated. .
 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section "Quality Requirements."
- A. Coordination Drawings: Comply with requirements specified in Division 1 Section "Project Management and Coordination."
 - B. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."
 - C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
 - D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
 - E. Installer Certificates: Prepare 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.
 - F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

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- G. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- I. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- J. Product Test Reports: Prepare written reports indicating 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.
- K. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- L. Schedule of Tests and Inspections: Comply with requirements specified in Division 1 Section "Quality Requirements."
- M. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- N. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- O. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- P. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section "Operation and Maintenance Data."
- Q. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- R. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
 - 1. Preparation of substrates.
 - 2. Required substrate tolerances.
 - 3. Sequence of installation or erection.
 - 4. Required installation tolerances.
 - 5. Required adjustments.

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6. Recommendations for cleaning and protection.
- S. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- T. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

2.3 DELEGATED DESIGN

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit five (5) copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 – EXECUTION

3.1 CONTRACTOR'S REVIEW

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

3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.
- C. Informational Submittals: Architect will review each submittal and will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01 1330

SECTION 01 1400

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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This 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.
- C. Related Sections include the following:
 - 1. Division 1 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
 - 2. Divisions 2 through 32 Sections for specific test and inspection requirements.

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. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.
- D. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- E. 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 industry standards.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

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- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. 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. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.
- J. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

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

1.5 SUBMITTALS

- A. Qualification Data: 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.
- B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Description of test and inspection.
 - 3. Identification of applicable standards.
 - 4. Identification of test and inspection methods.
 - 5. Number of tests and inspections required.
 - 6. Time schedule or time span for tests and inspections.
 - 7. Entity responsible for performing tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.
- C. Reports: Prepare and submit certified written reports that 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.

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9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and re-inspecting.
- 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.

1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. 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.
- C. 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.
- D. 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.
- 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 products that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications 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. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- 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 548; 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. 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.
- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing

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- results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- J. 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 size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. 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.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Demolish and remove mockups when directed, unless otherwise indicated.

1.7 QUALITY CONTROL

- A. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
- 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 - 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- 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 Division 1 Section "Submittal Procedures."
- C. 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.
- D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
- 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.

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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.
- E. 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.
- F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- G. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for Notice to Proceed.
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.

1.8 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect, with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, this 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

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3.1 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications 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.
 - i. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
- 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 1400

SECTION 01 1500

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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Sections include the following:
 - 1. Division 1 Section "Summary" for limitations on utility interruptions and other work restrictions.
 - 2. Division 1 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
 - 3. Division 1 Section "Execution Requirements" for progress cleaning requirements.
 - 4. Divisions 2 through 32 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.
 - 5. Division 2 Section "Termite Control" for pest control.

1.3 DEFINITIONS

- A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weather tight; exterior walls are insulated and weather tight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 USE CHARGES

- A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, 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.

1.5 QUALITY ASSURANCE

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

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Installer of each permanent service shall 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. Pavement: Comply with Division 2 pavement Sections.
- B. Portable Chain-Link Fencing: Minimum 2-inch, 9-gage, 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 and bottom rails. Provide bases for supporting posts.
- C. Lumber and Plywood: Comply with requirements in Division 6 Section "Rough Carpentry".
- D. Paint: Comply with requirements in Division 9 painting Sections.

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 construction personnel. 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 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack board.
 - 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 degrees F.
 - 6. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

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.
- 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.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for

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- construction.
- D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
 - E. 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.
 - F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 - H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line for each field office.
 - 1. Provide additional telephone lines for the following:
 - a. Provide a dedicated telephone line for each facsimile machine and computer in each field office.
 - 2. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Architect's office.
 - e. Engineers' offices.
 - f. Owner's office.
 - g. Principal subcontractors' field and home offices.
 - 3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
 - I. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail, in common-use facilities.
 - J. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
 - 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: Provide temporary parking areas for construction personnel.
- D. Project Identification and Temporary Signs: Provide Project identification and other signs. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.

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1. Provide temporary, directional signs for construction personnel and visitors.
 2. Maintain and touchup signs so they are legible at all times.
- E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.
- F. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
1. Comply with work restrictions specified in Division 1 Section "Summary."
- B. 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.
- C. 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. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.
- D. 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: Project site or portion determined sufficient to accommodate construction operations.
 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.
- E. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- F. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- G. 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 weather tight enclosure for building exterior.
1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- H. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
1. Prohibit smoking in hazardous fire-exposure areas.
 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose

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size with outlet size and equip with suitable nozzles.

3.5 OPERATION, TERMINATION, AND REMOVAL

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

END OF SECTION 01 1500

SECTION 01 1524

CONSTRUCTION WASTE MANAGEMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Recycling nonhazardous construction waste.
 - 2. Disposing of nonhazardous construction waste.
- B. Related Sections include the following:
 - 1. Division 1 Section "Temporary Facilities and Controls" for environmental-protection measures during construction, and location of waste containers at Project site.

1.3 DEFINITIONS

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

1.4 PERFORMANCE REQUIREMENTS

- A. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of 50 percent by weight of total waste generated by the Work.
 - 1. Construction Waste:
 - a. Site-clearing waste.
 - b. Masonry and CMU.
 - c. Lumber.
 - d. Wood sheet materials.
 - e. Wood trim.
 - f. Metals.
 - g. Roofing.
 - h. Insulation.
 - i. Carpet and pad.
 - j. Gypsum board.
 - k. Piping.
 - l. Electrical conduit.
 - m. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper
 - 2) Cardboard
 - 3) Boxes
 - 4) Plastic sheet and film
 - 5) Polystyrene packaging
 - 6) Wood crates

7) Plastic pails.

1.5 SUBMITTALS

- A. Waste Management Plan: Submit 5 copies of plan within 7 days of date established for the Notice to Proceed.
- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit 5 copies of report. Include the following information:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons (tonnes).
 - 4. Quantity of waste salvaged, both estimated and actual in tons (tonnes).
 - 5. Quantity of waste recycled, both estimated and actual in tons (tonnes).
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons (tonnes).
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- C. Waste Reduction Calculations: Before request for Substantial Completion, submit 5 copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.6 QUALITY ASSURANCE

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

1.7 WASTE MANAGEMENT PLAN

- A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or

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disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
2. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
4. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
5. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 PLAN IMPLEMENTATION

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

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

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

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4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE

A. Packaging:

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

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
 - a. Comply with requirements in Division 2 Section "Exterior Plants." for use of clean sawdust as organic mulch.

3.4 DISPOSAL OF WASTE

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

END OF SECTION 01 1524

SECTION 01 1700

EXECUTION REQUIREMENTS

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 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. General installation of products.
 - 3. Progress cleaning.
 - 4. Starting and adjusting.
 - 5. Protection of installed construction.
 - 6. Correction of the Work.
- B. Related Sections include the following:
 - 1. Division 1 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
 - 2. Division 1 Section "Submittal Procedures" for submitting surveys.
 - 3. Division 1 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 SUBMITTALS

- A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities 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; and underground electrical services.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator

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present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

Existing Utility Information: Furnish information to local utility 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.

- A. 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.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 4. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produces harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory

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- 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.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 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.
 - H. 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.
 - I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.4 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. 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 materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- 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: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to 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.

3.5 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.6 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.

3.7 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 1700

SECTION 01 1770

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 1 Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures
 - 2. Warranties
 - 3. Final cleaning
- B. Related Sections include the following:
 - 1. Division 1 Section “Payment Procedures” for requirements for Applications for Payment for Substantial and Final Completion.
 - 2. Division 1 Section “Execution Requirements” for progress cleaning of Project site.
 - 3. Division 1 Section “Project Record Documents” for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 4. Division 1 Section “Operation and Maintenance Data” for operation and maintenance manual requirements.
 - 5. Division 1 Section “Demonstration and Training” for requirements for instructing Owner’s personnel.
 - 6. Divisions 2 – 16 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 5. Prepare and submit Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 - 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer’s name and model number where applicable.

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7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 8. Complete startup testing of systems.
 9. Submit test/adjust/balance records.
 10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 11. Advise Owner of changeover in heat and other utilities.
 12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 13. Complete final cleaning requirements, including touchup painting.
 14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Re-inspection: Request re-inspection 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.
 3. Architect will provide one (1) inspection for substantial completion.
 4. Contractor False Start: In the event that the Contractor requests an inspection for Substantial Completion, and the Architect determines that the Contractor is not ready for inspection, it shall be deemed a false start and the Contractor shall be liable for the Architect's expenses resulting there from. They include, but are not limited to, salary, professional fees, travel expenses, and living expenses incurred by the Architect or his consultants inconvenienced by the false start.

1.4 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
 2. Submit a certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report and warranty.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements.

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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. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Architect will provide one (1) inspection for final completion.
3. Contractor False Start: In the event that the Contractor requests an inspection for Final Completion, and the Architect determines that the Contractor is not ready for inspection, it shall be deemed a false start and the Contractor shall be liable for the Architect's expenses resulting there from. They include, but are not limited to, salary, professional fees, travel expenses, and living expenses incurred by the Architect or his consultants inconvenienced by the false start.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit five (5) copies of the list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 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

1.6 WARRANTIES

- A. Submittal Time: 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.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 1. Bind warranties and bonds into heavy-duty, 3-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.
- C. 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.

PART 3 – EXECUTION

3.1 FINAL CLEANING

- A. General: Provide 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 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.
 - 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; shampoo 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. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

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- n. Replace parts subject to unusual operating conditions.
 - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - q. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - s. Leave Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 1770

SECTION 01 1781

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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
- B. Related Sections include the following:
 - 1. Division 1 Section "Closeout Procedures" for general closeout procedures.
 - 2. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Divisions 2 through 16 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set of marked-up Record Prints.
 - a. Initial Submittal: Submit one set of marked-up Record Prints. Architect will initial and date each print and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return prints for organizing into sets, printing, binding, and final submittal.
 - b. Final Submittal: Submit one set of marked-up Record Prints. Include all corrections identified by Architect.
- B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.

PART 2 – PRODUCTS

RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue-or black-line white prints of the Contract Drawings and Shop Drawings.
 - 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 prepare the 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 understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - 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.

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- 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.
 - n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 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. 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 paper cover sheets. Include identification on cover sheets.
 2. 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 Product Data has been submitted in operation and maintenance manuals.
 5. Note related Change Orders and Record Drawings where applicable.

2.3 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.

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 modifications to Project Record Documents as they occur; do not wait until the 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 reference during normal working hours.

END OF SECTION 01 1781

SECTION 01 1782

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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This 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. Maintenance manuals for the care and maintenance of products, materials, and finishes systems and equipment.
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Division 1 Section "Closeout Procedures" for submitting operation and maintenance manuals.
 - 3. Division 1 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
 - 4. Divisions 2 through 16 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

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 SUBMITTALS

- A. Submit one copy of each manual in final form at least 15 days after substantial completion. Architect will return copy with comments within 15 days.
 - 1. Correct or modify each manual to comply with Architect's comments. Submit 1 copies of each corrected manual within 15 days of receipt of Architect's comments.

1.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 – PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: 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

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- 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."

2.2 MANUALS, GENERAL

- 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: Enclose title page in transparent plastic sleeve. 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, address, and telephone number of Contractor.
 - 6. Name and address of Architect.
 - 7. 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.
 - 1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 - 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 - 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
 - 4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.

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5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 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.
 2. Performance and design criteria if Contractor is 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.
 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.

2.4 PRODUCT MAINTENANCE MANUAL

- 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.
- B. Source Information: List each product included in manual, identified by product name and

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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.

- 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.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- 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.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard printed 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 videotape, 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.

Stillwell-Clyo Road Fire Station

- 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 provides an organized reference to emergency, operation, and maintenance manuals.
- B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. 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.
- D. 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.
- E. 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 Division 1 Section "Project Record Documents."
- F. Comply with Division 1 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 1782

SECTION 01 1820

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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This 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. Related Sections include the following:
 - 1. Division 1 Section "Project Management and Coordination" for requirements for pre-instruction conferences.
 - 2. Divisions 2 through 16 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 SUBMITTALS

- A. Instruction Program: Submit three copies of outline of instructional program for demonstration and training, including 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. At completion of training, submit one complete training manual(s) for Owner's use.
- B. Attendance Record: For each training module, submit list of participants and length of instruction time.
- C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 QUALITY ASSURANCE

- A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 1 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
- B. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "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.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time,

and course content.

- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 – PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and 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:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project Record Documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
 - 4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.

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5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.
- 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. 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, through Architect, with at least seven days' advance notice.
- C. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- D. Cleanup: Collect used and leftover educational materials and remove from Project site. . Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 01 1820

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SECTION 02 2200
EXCAVATION, FILLING AND GRADING

1. SCOPE:

Under this heading shall be included the following:

- a) Excavation required for structures.
- b) Sub-cut excavation as required or designated.
- c) Excavation as required for roadways.
- d) Shoring, sheeting and bracing as required.
- e) Wasting and disposal of excess or unsuitable materials.
- f) Furnishing and placing borrow material.
- g) Furnishing and placing granular foundation material.
- h) Compaction of all materials.
- i) Dewatering or unwatering as necessary to complete the excavations to the required depths and as necessary to maintain the excavation sufficiently dry so that all work can be accomplished.
- j) Site grading as required, including excavation and backfill.
- k) Preparation of subgrades.
- l) All other work specified herein.

2. GENERAL:

The Contractor shall accept the site in its existing condition, and shall assume the risk of encountering whatever materials as may occur.

3. SOILS:

The Contractor shall make his own determination of the soil structure and site conditions as it may affect the work. If soils information is provided by the Owner it is for guidance only and shall not serve as relief for the Contractor in complying with the previous statement.

4. DEWATERING AND PROTECTION AGAINST WATER:

The Contractor shall remove water from the site and shall lower the ground water level as necessary to complete the excavations to the required depths and as required to maintain the excavations sufficiently dry so that all required work can be accomplished. The Contractor shall do such well construction, well pointing, sheeting, ditching, diking and pumping and shall construct necessary drains, channels, sumps and cofferdams to keep his excavations and new structures clear of ground water, storm water or sewage and to keep his construction areas dry during the progress of the work and until the finished work is accepted by the Owner, except as otherwise specified.

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The Contractor shall be responsible for the effect of dewatering operations on adjacent property and for the effect on water supplies located in the vicinity of the project.

Adequate measures and protection shall be provided by the Contractor to protect his work from damage from uplift due to ground water, storm water, or flood water. Any damages which may result shall be the Contractor's responsibility.

The Contractor shall accept all responsibility for damage to the work of this Contract because of floods and water pressures and other water damages and shall accept all risks of floods and other events which may occur.

All water discharged by pumping operations shall be discharged so as not to interfere with work under this Contract or with existing structures and operations. Route of dewatering pipe shall be subject to the Engineer's review. Discharge facilities and water quality shall comply with applicable regulations of State and Federal agencies.

Dewatering operations shall be uninterrupted and continuous during the course of the work so as not to endanger any construction in place or to present a hazard to workmen in and around the site. The Contractor shall take all measures necessary including, but not limited to, standby equipment and constant attendance to ensure that the dewatering system remains operational and effective throughout the period of time that it is required.

5. MATERIALS:

a) Earth Fill.

Earth fill, including pavement subgrades, shall consist of all suitable materials from required excavations. Suitable materials for earth fill shall generally be composed of sands, clay-sand mixtures and silt-sand mixtures. Clay-sand and silt-sand mixtures shall be approved by the soil technician prior to being incorporated in fills. Clays, silts, and organic soils will be considered as unsuitable materials.

b) Excavated Materials.

All suitable materials from excavations shall be used in the permanent construction required under these Specifications. Suitable materials shall be excavated separately from materials to be wasted and the suitable materials shall be segregated by loads during the excavation operations and shall be placed in temporary stockpiles and later placed in the designated locations. Excavated materials, which, after drainage, are suitable for the embankment but which, when excavated are too wet for immediate compaction in the embankment, shall be placed temporarily in stockpiles until the moisture content is reduced sufficiently to permit them to be placed in the earth fills.

c) Excess Materials.

All excess material from required excavations shall be removed from the site unless written authorization is given by the Owner to stockpile the material on the site.

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6. EXCAVATION:

Excavation shall include the loosening, loading, removing, transporting, stockpiling and disposing of all materials, wet or dry, necessary to be removed to construct all structures included in this Contract to the lines and grades, and at the locations, shown on the Contract Drawings.

Excavation for structures shall conform to the depth and dimensions necessary for the proper installation of all structures detailed on the Contract Drawings. Unless shown on the Drawings excavation shall not be carried below the elevations shown on the Drawings. Where bottoms of excavations are slightly unstable and the Drawings do not require a stabilized granular backfill and the Owner=s representative does not direct additional excavation and replacement, the Contractor may provide a gravel course, but such work will be considered as for the Contractor's convenience and will not be considered as extra work.

Where any unauthorized excavation is made below the elevation indicated on the Contract Drawings, the excavation shall be restored to the proper elevation with compacted, well graded granular backfill. Such backfill shall be compacted as specified in the Article entitled "Compaction".

Excavations shall be made to the required depths, grades, alignment, and trench widths required for the installation of the pipe. Temporary sheeting and bracing shall be used as required to confine the trench size and width.

Excavation shall be made for roadways and other site work to the required depths, grades and alignment.

Excavations, where conditions require, shall be properly shored, sheeted and braced by the Contractor to maintain excavation in a condition to permit the safe and efficient installation of all items of Contract work. Upon completion of the various Contract items, all temporary forms, shores and bracing shall be removed. While being withdrawn, all voids left by the sheeting and bracing shall be carefully filled with sand and compacted.

7. UNSUITABLE MATERIAL:

Where material encountered is unsuitable for subgrade construction of roads, buildings and walks, such material shall be excavated to the required depth of compaction (generally two feet below pavement base course or finished floor elevation), disposed of off the site and property of the Owner and replaced with suitable material. Unsuitable materials are those classified as MH, CH, OH, OL, and Peat in accordance with the Unified Soil Classification System. Excess water in material will not be a basis for establishing unsuitable material regardless of gradation. The Owner=s representative shall be notified immediately upon encountering of unsuitable material.

8. BORROW:

It is anticipated that some suitable material for required fill and backfill can be obtained from required excavation. Additional suitable materials shall be secured by the Contractor from off-site sources acceptable to the Owner.

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9. BACKFILLING:

All excavation shall be backfilled to the lines and grades shown on the Contract Drawings. Backfill adjacent to structures shall not be placed until forms, form lumber and all debris from construction has been entirely removed from around the work. No backfilling shall be done in unsuitable weather or over ground that is frozen or too wet.

Backfill shall not be placed against structures until the concrete has cured at least 7 days. Backfill, in general, shall be placed in horizontal layers not in excess of 12 inches in thickness, except in the cases of embankment construction around structures and under roadway and piping locations, where backfill shall be placed in 6 inch layers, with each layer thoroughly compacted as specified hereinafter, prior to the addition of the succeeding layer.

Fill immediately adjacent to walls shall be hand tamped and special care shall be taken to prevent any wedging action or eccentric loading against the walls.

Fill material shall be suitable material taken from the excavation. All sticks, debris, organic matter, frozen material, stones or cobbles over 6 inches in maximum dimension, and other deleterious material shall be removed from the backfill material prior to its use.

10. COMPACTION:

a) General.

Compaction of earth fill and all pavement subgrades shall be performed to the percentages of maximum standard or modified dry densities and to the depths as shown on the drawing or as follows:

1. Subgrades Under Paved Areas, Sidewalks and Structures.

100 Percent Standard (ASTM Test D698) 24 inches

2. Unpaved Areas To Be Grassed Or Sodded.

Match existing undisturbed soil compaction.

b) Moisture Content.

All compaction shall be performed at material moisture contents within 3 percentage points, plus or minus of optimum. Compaction and proof rolling equipment shall be as outlined in Section 02500 or as may be required for the type of fill being compacted.

11. TESTING:

a) General.

The Contractor will select a qualified independent testing laboratory for the purpose

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of identifying soils, checking densities, and classifying soils materials during construction. Payment for the testing will be by Contractor with the cost included in other items of the work.

The Contractor shall include the cost of one compaction test per 500 cubic yards of fill material, 300 linear feet of curb, 200 linear feet of subgrade along pavement centerline and 1,500 square yards of base and one "proctor" test for each type of fill material to determine if the proper compaction has been attained.

b) Moisture-Density Tests.

Testing shall be in accordance with ASTM Methods D698 or such other test as approved by the Engineer. A test shall be performed on each type of material used in the work regardless of source. Tests will be accompanied by particle-size analyses of the soils tested (ASTM Methods D421 and D422). Changes in color, gradation, plasticity or source of fill material will require the performance of additional tests. Copies of all test results shall be furnished to the Owner=s representative.

c) Field Density Tests.

Tests shall be made in accordance with ASTM Method D1556 or such other test as may be approved by the Owner. If any compaction test reveals that fill or backfill is not compacted as specified, the Contractor shall scarify and re-compact as required to achieve the specified density. Additional compaction tests shall be made to verify proper compaction.

d) Submittals.

The soils technicians will submit formal reports of all compaction tests and retests to the Contractor and the Owner as soon as possible upon completion of the required tests.

This report information is to include but not be limited to the following:

1. Date of the test and date submitted.
2. Location of test.
3. Wet weight, moisture content and dry weight of field sample.
4. Description of soil.
5. Maximum dry density and moisture content of the lab sample which best matches the field sample in color, texture, grain size and maximum dry density.
6. Ratio of field dry density to maximum lab dry density expressed as a percentage.
7. Comments concerning the field density passing or failing the specified compaction.
8. Comments about re-compaction if required.

e) Compaction Results.

The soils technician is to advise the Owner=s representative and Contractor immediately of any compaction tests failing to meet the specified minimum requirements. No additional lift is to be placed on a lift with any portion failing.

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12. GRADING:

Upon completion of other construction operations, the entire site, within the limits shown on the Drawings, shall be brought to the finished grades shown. All surfaces shall be sloped to the grades indicated and which will provide proper drainage. All surfaces shall be raked smooth and shall be free of all vegetable matter, debris and stones larger than 2-1/2 inches. Allow for thickness of required topsoil.

END OF SECTION 02200

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SECTION 02 2210
EROSION AND SEDIMENT CONTROL

1. GENERAL:

a. RELATED LAND DISTURBING DOCUMENTS:

1. Land Disturbing Activity Permit (LDA) is required for each project over 1.1 acres and is part of the Work associated with the project. The Contractor is required to comply with the best management practices for the control of erosion and sediment from the work site.

2. NPDES Phase 2 General Permit Nos. GAR 100001, GAR 100002, GAR 100003 for the discharge of storm water associated with construction activity for projects one (1) acre and larger is required and is a part of the work associated with this project. Both the Owner and the Contractor are primary permittees (any entity that has submitted a Notice of Intent) of the Erosion, Sedimentation and Pollution Control Plan (ES&PCP). The Owner provides the ES&PCP to the Contractor. A copy of this permit will be provided to the Contractor and the Contractor shall comply with its provisions until the work is completed and accepted by the Owner.

The Contractor cannot start work until seven (7) days after the Owner has filed the Notice of Intent (NOI).

The ES&PCP and Comprehensive Monitoring Plan (CMP) will indicate when, where and how often the site inspection and water testing should be conducted. Inspections will be made by Effingham County.

3. NPDES Phase 2 Stormwater Discharge Permit Fees as required by Rules & Regulations for Water Quality Control Chapter 391-3-6, revised October 2003 is part of the permit requirement. These fees shall be paid prior to the commencement of any land disturbing activity.

b. DESCRIPTION OF WORK:

Under this section shall be included all measures both temporary and permanent to control erosion and sedimentation, and protect all surface waters and property both on and off site. This shall include all labor, materials and equipment necessary to meet the requirements of this Section. The Contractor shall not begin work until he is in full compliance with the LDA Permit that has been approved for the work associated with this project. Failure to install and maintain erosion control and sedimentation on the site shall

Stillwell-Clyo Road Fire Station

constitute a violation of this permit for each day on which such failure occurs.

c. EROSION AND SEDIMENTATION ACT - DEFINED:

It is the intent of this Specification that the Project and the Contractor comply with all applicable requirements of the State of Georgia Erosion and Sedimentation Control Act of 1975 as amended and any County or Municipal Soil Erosion Ordinance.

The Manual for Erosion and Sediment Control in Georgia further defines practices and requirements. All erosion and sedimentation control measures must be designed for a 25-year, 24-hour rain event. The Contractor is responsible for maintaining all sediment and erosion control measures on the project site during construction. The Contractor is responsible for any damage caused due to failure to implement these requirements. A Soil Erosion and Sedimentation Control Permit has been obtained by the Owner so that periodic inspections may be made by Effingham County. The Contractor is to cooperate with the person performing these inspections.

d. COORDINATION WITH CONTRACT DRAWINGS:

A Soil Erosion and Sedimentation Control Plan will be provided to the Contractor and is to be implemented as a part of the procedures necessary to implement requirements of the Act and Ordinance.

2. PRODUCTS:

Not applicable to this specification section.

3. EXECUTION:

a. IMPLEMENTATION:

Implementation of the requirements of the Act is based on the following principles:

1. The disturbed area and the duration of exposure to erosion elements should be minimized.
2. Stabilize disturbed areas immediately.
3. Retain or accumulate runoff.
4. Retain sediment.
5. Do not encroach upon watercourses.

4. SYMBOLS:

The Soil Erosion and Sedimentation Control Plan contains standard symbols for the different types of measures for implementing the Act. These symbols are defined for

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conditions, design criteria and construction specifications in Chapter 6 of the Manual and on the Drawings.

5. SPECIFIC REQUIREMENTS:

- a. All erosion and control measures must be installed prior to initiation of construction activity.
- b. A temporary construction egress pad shall be installed and maintained at any point where construction vehicles enter a paved road, street or parking area. The pad shall be used to prevent mud from leaving the construction area. The pad shall be constructed as shown in the Manual for Erosion and Sediment Control.
- c. All disturbed areas shall be grassed by sodding or seeding, fertilizing, mulching and watering to obtain a ground cover which prevents soil erosion.
- d. All measures installed for sediment control shall be checked at the beginning and end of each day when construction is occurring to ascertain that the measures are in place and functioning properly.
- e. Erosion control measures shall be inspected by the Contractor after each rainfall event and at least daily during prolonged periods of continuous rainfall. Contractor shall make repairs and adjustments as necessary to maintain the effectiveness of all sediment and erosion control measures.
- f. The contractor shall remove all silt fencing after permanent grassing is established and accepted by the Owner.

END OF SECTION 02210

Geotechnical Engineering Report

**Stillwell Road Fire Station
Effingham County, Georgia**

May 16, 2016
Terracon Project No. ES165084

Prepared for:
Effingham County Board of Commissioners
Springfield, Georgia

Prepared by:
Terracon Consultants, Inc.
Savannah, Georgia

Offices Nationwide
Employee-Owned

Established in 1965
terracon.com

Terracon

May 16, 2016



Effingham County Board of Commissioners
601 N. Laurel Street
Springfield, Georgia 31329

Attn: Mr. Wesley Sherrod
P: (912) 754 8064
E: wsherrod@effinghamcounty.com

Re: Geotechnical Engineering Report
Stillwell Road Fire Station
Effingham County, Georgia
Terracon Project No: ES165084

Dear Mr. Sherrod:

Terracon Consultants, Inc. (Terracon) has completed the Geotechnical Engineering Report for the above-referenced project. The services were performed in general accordance with our proposal No. PES165084 dated March 1, 2016. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations and pavements.

We appreciate the opportunity to be of service to you. Should you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

A handwritten signature in black ink that reads "Chris Wheeler".

Chris Wheeler, P.G.
Senior Staff Geologist

A handwritten signature in black ink that reads "Guoming Lin".

Guoming Lin, Ph.D., P.E.
Senior Principal

cc: 1 – Client (PDF)
1 – File



Terracon Consultants, Inc. 2201 Rowland Avenue Savannah, Georgia 31404
P (912) 629 4000 F (912) 629 4001 terracon.com/savannah

Geotechnical



Environmental



Construction Materials



Facilities

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APPENDIX A: FIELD EXPLORATION

Exhibit A-1	Site Location
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Exhibit A-3	Field Exploration Description
Exhibit A-4	CPT Sounding Cross Section
Exhibit A-5	CPT Sounding Logs
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APPENDIX B: SUPPORTING INFORMATION

Exhibit B-1	Seismic Design Parameters
Exhibit B-2	General Notes
Exhibit B-3	Unified Soil Classification System
Exhibit B-4	CPT-based Soil Classification

EXECUTIVE SUMMARY

This report presents the findings of the Geotechnical Engineering Report completed for the Stillwell Road Fire Station in Effingham County, Georgia. The investigation included a field exploration program and engineering evaluation of the subsurface conditions and foundation recommendations. The following geotechnical considerations were identified:

- n The subsurface conditions are relatively consistent across the area explored. In general, the upper 6 feet of materials encountered were loose to medium-dense sands with layers of organic material encountered in the hand auger borings. Below 6 feet there were medium-stiff clays to silty clays to 12 feet below the existing ground surface (BGS). Below 12 feet we encountered loose to medium-dense sands to silty sands to 22 feet BGS. Below 22 feet there were medium-stiff clays to silty clays to the termination of the sounding at 46 feet BGS. The groundwater table was approximately 2.5 feet BGS based on the CPT sounding. Groundwater was encountered at 2 to 2.5 feet in all of the hand auger borings
- n We performed settlement analyses using an assumed column load of 75 kips and slab load of 300 psf plus approximately 5 feet of grading fill soils and soil profiles obtained from the field exploration. Based on the settlement analyses, settlement of the building structure is estimated to be above 1 inch. Ground improvement measures are necessary to allow the use of shallow foundations for the building support.
- n Ground improvement consisting of a 5 foot soil surcharge program is recommended. The soil surcharge program duration of 100 days should be planned for in construction scheduling.
- n A net allowable bearing capacity of 2,000 pounds per square foot (psf) is recommended for shallow foundation design. The allowable bearing capacity may be increased by 1/3 for transient wind load and seismic load conditions. Terracon should be retained to confirm and test the subgrade during construction to provide more specific recommendations on subgrade repair based on the conditions at footing subgrade.
- n For seismic design purposes, the subject site shall be classified as Site Class E in accordance with the International Building Code (IBC) 2012, Section 1613.

This summary should be used in conjunction with the entire report for design purposes. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the findings and recommendations contained herein. The section titled **GENERAL COMMENTS** should be read for an understanding of the report's limitations.

GEOTECHNICAL ENGINEERING REPORT

Stillwell Road Fire Station Effingham County, Georgia

Terracon Project No. ES165084

May 16, 2016

1.0 INTRODUCTION

Terracon has completed the Geotechnical Engineering Investigation for the proposed Stillwell Road Fire Station in Effingham County, Georgia. The investigation included a field exploration program and engineering evaluation of the subsurface conditions and foundation recommendations. The field exploration program consisted of one (1) cone penetration test (CPT) sounding to a maximum depth of 46 feet below existing ground surface (BGS), and six (6) hand auger borings to a depth of 5 feet BGS. CPT sounding logs, and hand auger boring logs along with a site location map and exploration location plan are included in **Appendix A** of this report.

The purpose of this study is to provide subsurface information and geotechnical engineering recommendations relative to:

- n subsurface soil conditions
- n groundwater conditions
- n pavement recommendations
- n foundation design and construction
- n site preparation
- n seismic considerations

2.0 PROJECT INFORMATION

2.1 Project Description

Item	Description
Proposed Improvements	The proposed project will include the construction of a new unmanned volunteer fire station with associated drive aisles.
Finished floor elevation	F.F.E. 63.5
Maximum loads	Column Load: 75 kips (assumed for settlement analysis). Slab Loading: 300 psf plus 5 feet of structural fill soils (assumed for settlement analysis).
Maximum allowable settlement	Total settlement: 1 inch (assumed). Differential settlement: ½ inches over 40 feet or between columns (assumed).
Grading	It is anticipated that the site will involve approximately 5 feet of structural fill.

2.2 Site Location and Description

Item	Description
Location	The site is located south of the intersection of Stillwell Cylo Road and Benjamin-Gnann Road in Effingham County, Georgia. Latitude: 32.3848°, Longitude: -81.2448°
Existing improvements	Undeveloped.
Current ground cover and access conditions	Cleared land
Existing topography	Relatively level.

Should any of the above information or assumptions be inconsistent with the planned construction, Terracon should be informed so that modifications to this report can be made as necessary.

3.0 SUBSURFACE CONDITIONS

3.1 Typical Profile

Based on the results of the field exploration, the subsurface conditions at the project site are relatively consistent and can be generalized as follows:

Description	Approximate Depth to Bottom of Stratum (feet)	Material Encountered	SPT - N ₆₀
Stratum 1	6	Loose to medium-dense sands. Layer of organics near the existing ground surface.	5 to 25
Stratum 2	12	Medium stiff clay to silty clay.	6 to 8
Stratum 3	22	Loose to medium-dense sands to silty sands	5 to 18
Stratum 4	46, termination of sounding	Medium stiff clay to silty clay.	5 to 8

Details of the subsurface conditions encountered at each sounding location are presented on the individual CPT sounding logs in **Appendix A** of this report. Stratification boundaries on the logs represent the approximate depth of changes in soil types; the transition between materials may be gradual.

3.2 Groundwater

Groundwater was encountered in one of the CPT soundings and all six of the hand auger borings between 2 and 2.5 feet below the existing ground surface at the time of field exploration. It should be noted that groundwater levels tend to fluctuate with seasonal and climatic variations, as well as with construction activities. As such, the possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project. The groundwater table should be checked prior to construction to assess its effect on site work and other construction activities.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

The subsurface conditions at this site are considered relatively consistent and adaptable for the proposed development provided some additional ground improvement measures are implemented. The generalized soil profile is presented in **Section 3.1**.

Through our site visit and subsequent hand augers, we observed that fill materials were placed on-site prior to Terracon's field activities and have been placed on top of a layer of unsuitable organic materials approximately 12 to 18 inches thick throughout the entirety of the site. No topsoil, organic matter, stumps, or other unsuitable materials should be left in place. Terracon recommends that the previously placed fill material be removed, followed by undercutting of the layer of organic material. We highly recommend Terracon be retained to observe the undercutting process.

All footings should bear on suitable natural soil, or on properly compacted structural fills. Compacted fill below any footings should be placed directly on suitable natural soil. We recommend Terracon be retained to test the footing sub-grade during construction so that Terracon can provide additional recommendations to prepare the subgrade based on the conditions uncovered during the footing preparation.

The information regarding the structural loads is included in **Section 2.1** of this report. Settlement analyses were performed at each sounding location (C1) by using the soil parameters derived from the CPT soundings and assumed structural loads. Based on the results of our settlement analyses, total settlements were estimated to be greater than 1.0 inch at the sounding location. As such, additional ground improvement measures are necessary.

Structure settlements above 1 inch are typically unacceptable. We recommend ground improvement consisting of a 5 foot soil surcharge program. Details of the recommended surcharge program are provided below.

4.2 Preloading with Soil Surcharge

To improve the subsurface soils we recommend the entire building pad be preloaded with a soil surcharge. The building footprint should be constructed with structural fill to the proposed finished grade elevation and then further raised until the top of the soil surcharge is reached. The soil surcharge program should consist of a 5 foot tall surcharge over the finished subgrade elevation. The top of the surcharge should extend a minimum of 10 feet beyond the edge of the building footprint and the slope of the surcharge should be 2:1 (horizontal to vertical) to minimize erosion. Based on our experience of project sites in the area, we would recommend a minimal surcharge time of 100 days once the full surcharge height is reached. As a standard practice, the actual duration of surcharge should be determined based on the results of the settlement monitoring program. During site improvement, the determination of the surcharge time should also be evaluated in consideration of settlement curves as well as loads and allowable settlement criteria.

4.2.1 Settlement Monitoring Program

We recommend that a minimum of two (2) settlement plates be installed to monitor the settlement of the soil surcharge. The settlement plates should be placed soon after stripping and grubbing and before any grading fill is placed. Protection of the settlement plates from any movements during construction is imperative. Fill soils should be methodically placed and compacted in areas above and immediately surrounding the settlement plates. Fill soils should not be dumped in the immediate areas of the settlement plates. Settlement plate locations should be barricaded after completion of the fill and surcharge placement to prevent the plates from being disturbed or destroyed by construction equipment. Accurate surveying of the elevations of the settlement plates should begin immediately after their installation and continue once a week thereafter. A geotechnical engineer should interpret this data to determine when the foundation construction may begin.

4.3 Earthwork

As noted above, during our field exploration activities, structural fill was being placed and compacted. From our observations, the fill material was being placed over a layer of organic material. We recommend the removal of the recently placed structural fill and remove the organics. The depth of organics from the residual ground surface was approximately 24 inches on average with several locations indicating organics to 32 to 60 inches. Due to the varying

nature of the depth of organics, we highly recommend Terracon be retained to observe the organic undercutting.

The site work conditions will be largely dependent on the weather conditions and the contractor's means and methods in controlling surface drainage and protecting the sub-grade. Site preparation should include installation of a site drainage system, subgrade preparation, densification and proofrolling. The following paragraphs present our considerations and recommendations for the site and subgrade preparation.

4.3.1 Site Drainage

An effective drainage system should be installed prior to site preparation and grading activities to intercept surface water and to improve overall shallow drainage. The drainage system may consist of perimeter ditches supplemented with parallel ditches and swales. Pumping equipment should be prepared if the above ditch system cannot effectively drain water away from the site, especially during the rainy season. The site should be graded to shed water and avoid ponding over the subgrade.

4.3.2 Densification and Proofrolling

Prior to fill placement, the entire building and pavement area should be densified with a heavy-duty vibratory roller to achieve a uniform subgrade. The subgrade should be thoroughly proofrolled after the completion of densification. Proofrolling will help detect any isolated soft or loose areas that "pump", deflect or rut excessively, and also densify the near-surface soils for floor slab support.

A loaded tandem axle dump truck, capable of transferring a load in excess of 20 tons, should be utilized for this operation. Proofrolling should be performed under the Geotechnical Engineer's observation. Areas where pumping, excessive deflection or rutting is observed after successive passes of the proofrolling equipment should be undercut, backfilled and then properly compacted.

4.3.3 Fill Material Consideration

Structural fill should be placed over a stable or stabilized subgrade. The soils to be used as structural fill should be free of organics, roots, or other deleterious materials. It should be non-plastic granular material containing less than 25 percent fines passing the No. 200 sieve. If necessary, soils with more than 25 percent fines may be used as fill in less critical areas under close control of moisture and compaction. In general, the onsite soils are generally suitable for structural fill.

All structural fills should be placed in thin (8 to 10 inches loose) lifts and compacted to a minimum of 95% of the soil's Modified Proctor maximum dry density (ASTM D-1557). Fill brought to the site should be within 3 percent (wet or dry) of the optimum moisture content.

Some manipulation of the moisture content (such as wetting, drying) will be required during the filling operation to obtain the required degree of compaction. The manipulation of the moisture content is highly dependent on weather conditions and site drainage conditions. Therefore, the contractor should prepare both dry and wet fill materials to obtain the specified compaction during grading. A sufficient number of density tests should be performed to confirm the required compaction of the fill material.

4.4 Spread Footing Foundations

The proposed structures can be supported by a shallow, spread footing foundation system. The following sections present design recommendations and construction considerations for the shallow foundations for the proposed structures and related structural elements.

4.4.1 Spread Footing Design Recommendations

Description	Column	Wall
Net allowable bearing pressure¹	2,000 psf	2,000 psf
Minimum dimensions	24 inches	12 inches
Minimum embedment below finished grade	18 inches	12 inches
Approximate total settlement²	<1 inch	<1 inch
Estimated differential settlement	<1 inch between columns	<1/2 inch over 40 feet
Ultimate Coefficient of sliding friction³	0.32	

1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. It assumes any unsuitable fill or soft soils, if encountered, will be replaced with compacted structural fill.
2. The foundation settlement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the footings, the thickness of compacted fill, and the quality of the earthwork operations. Footings should be proportioned to reduce differential settlements. Proportioning on the basis of equal total settlement is recommended; however, proportioning to relative constant dead-load pressure will also reduce differential settlement between adjacent footings.
3. Sliding friction along the base of the footing will not develop where net uplift conditions exist.

The allowable foundation bearing pressures apply to dead loads plus design live load conditions. The design bearing pressure may be increased by one-third when considering total loads that include wind or seismic conditions. The weight of the foundation concrete below grade may be neglected in dead load computations.

Footings, foundations, and masonry walls should be reinforced as necessary to reduce the potential for distress caused by differential foundation movement. The use of joints at openings or other discontinuities in masonry walls is recommended.

Foundation excavations should be observed by the Geotechnical Engineer. If the soil conditions encountered differ significantly from those presented in this report, Terracon should be contacted to provide additional evaluation and supplemental recommendations.

4.4.2 Spread Footing Construction Considerations

The bottom of all foundation excavations should be free of water and loose soil and rock prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Extremely wet or dry material or any loose or disturbed material in the bottom of the footing excavations should be removed before foundation concrete is placed. Should the soils at bearing level become excessively dry, disturbed or saturated, the affected soil should be removed prior to placing concrete. Place a lean concrete mud-mat over the bearing soils if the excavations must remain open overnight or for an extended period of time.

Regarding construction of footings, we generally anticipate material suitable for the recommended design bearing pressure will be present at the bottom of the footings. However, there is a possibility that isolated zones of soft or loose native soils could be encountered below footing bearing level, even though field density tests are expected to be performed during fill placement operations. Therefore, it is important that the Geotechnical Engineer be retained to observe, test, and evaluate the bearing soil prior to placing reinforcing steel and concrete to determine if additional footing excavation or other subgrade repair is needed for the design loads.

If unsuitable bearing soils are encountered in footing excavations, the excavations should be extended deeper to suitable soils and the footings could bear directly on those soils at the lower level or on lean concrete backfill placed in the excavations. As an alternative, the footings could also bear on properly compacted structural backfill extending down to the suitable soils. Over-excavation for compacted backfill placement below footings should extend laterally beyond all edges of the footings at least 8 inches per foot of overexcavation depth below footing base elevation. The over-excavation should then be backfilled up to the footing base elevation with well-graded granular material placed in lifts of 6 inches or less in loose thickness and compacted to at least 95 percent of the material's maximum dry density as determined by the

Modified Proctor test (ASTM D-1557). No. 57 stone is recommended in lieu of structural fill when the volume of excavation is relatively small, recompaction of the fill is difficult or the weather conditions or construction schedule becomes a controlling factor.

4.5 Floor Slabs

4.5.1 Floor Slab Design Recommendations

Item	Description
Floor slab support	Compacted structural fill / inspected and tested natural ground ¹ .
Modulus of subgrade reaction	120 pounds per square inch per in (psi / in) for point loading conditions.
Base course/capillary break²	4 inches of free draining granular material.
Vapor barrier	Project Specific ³ .
Structural considerations	Floor slabs should be structurally separated from columns and walls to allow relative movements ⁴ .

1. Because the existing ground may have been filled or disturbed previously, we recommend the subgrade be inspected and tested with proofrolling after the topsoil is stripped as outlined in **Section 4.2** of this report.
2. The floor slab design should include a base course comprised of free-draining, compacted, granular material, at least 4 inches thick. The granular subbase may be graded aggregate base (GAB) or sands containing less than 5 percent fines (material passing the #200 sieve). GAB subbase can also help improve workability of the subgrade especially during rain periods.
3. The use of a vapor retarder should be considered beneath concrete slabs on grade that will be covered with wood, tile, carpet or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and / or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.
4. Floor slabs should be structurally independent of any building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation. Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates that any differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks that occur beyond the length of the structural dowels. The structural engineer should account for this potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

4.5.2 Floor Slab Construction Considerations

Prior to construction of grade supported slabs, varying levels of remediation may be required to reestablish stable subgrades within slab areas due to construction traffic, rainfall, disturbance, desiccation, etc. As a minimum, the following measures are recommended:

- n Confirm that interior trench backfill placed beneath slabs is compacted in accordance with recommendations outlined in **Section 4.2** of this report.
- n All floor slab subgrade areas should be moisture conditioned and properly compacted to the recommendations in this report immediately prior to placement of the stone base and concrete.

4.6 Pavements

Based on the information in the site layout plan, we understand that the proposed development will include paved roads and parking lots. This section presents thickness recommendations for asphalt concrete and Portland cement concrete pavements and general considerations for pavement construction. Pavement thickness design is dependent upon:

- n the anticipated traffic conditions during the life of the pavement;
- n subgrade and paving material characteristics;
- n climatic conditions of the region.

Traffic patterns and anticipated loading conditions were not available. However, we anticipate that traffic loads will be produced primarily by fire engine traffic and automobile traffic. Two pavement section alternatives have been provided. The light duty section is for areas that receive only car traffic. The heavy duty section is for the main fire engine entrance drive. If heavier traffic loading is expected, this office should be provided with the information and allowed to review these pavement sections. A design life of 10 years was assumed to develop the total traffic used in thickness design.

A California Bearing Ratio (CBR) value of 8 has been estimated for the on-site granular soils and the proposed fill material. To help obtain this CBR value in the field, the upper 12 inches of pavement subgrades should be compacted to at least 95 percent of the modified Proctor density at moisture content within 3 percent of its optimum moisture.

Climatic conditions are considered in the design subgrade support value listed above and in the paving material characteristics. Recommended paving material characteristics, taken from the

Georgia Department of Transportation's (GDOT) 2001 edition of *Standard Specifications for Construction of Transportation Systems*, are included for the asphalt concrete sections.

4.6.1 Pavement Design Recommendations

Material ¹	Minimum Section Thickness (inches)	
	Light Duty Section ²	Heavy Duty ³
Asphalt Surface Course	2	0
Asphalt Intermediate Course	0	0
Concrete Pavement	0	8
Aggregate Base Course	7	4
Total Pavement Section	9	12

1. Asphalt concrete aggregates and base course materials should conform to the following GDOT material specifications.
 - § Section 815 for Graded Aggregate.
 - § Section 828 for Hot Mix Asphalt Concrete Mixture. Surface course may use 9.5 mm Superpave for smooth surface in the light-duty section or 12.5 mm Superpave for the heavy-duty section. 19 mm Superpave is recommended for the intermediate course.
2. Light duty section assumes only car traffic such as employee and customer parking.
3. Heavy-duty section traffic assumes fire engine traffic.

The concrete for the heavy duty pavement should be air entrained and have a minimum compressive strength of 4,000 psi after 28 days of lab curing per ASTM C-31. The above section represents the minimum design thickness and, as such, periodic maintenance should be anticipated. Prior to placement of the crushed stone the areas should be thoroughly proof rolled. For dumpster pads, the concrete pavement area should be large enough to support the container and the tipping axle of the refuse truck.

Long-term performance of pavements constructed on the site will be dependent upon maintaining stable moisture content of the subgrade soils, and providing for a planned program of preventative maintenance. The performance of all pavements can be enhanced by minimizing excess moisture that can reach the subgrade soils. At a minimum, the following recommendations should be considered:

- n Final grade adjacent to parking lots and drives should slope down from pavement edges at a minimum 1%.
- n The subgrade and the pavement surface should have a minimum ¼ inch per foot slope to promote proper surface drainage.
- n Install pavement subgrade drainage surrounding areas anticipated for frequent wetting, such as landscaped islands and along curbs and gutters.
- n Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.

4.6.2 Pavement Construction Considerations

Pavement subgrades prepared early in the project should be carefully evaluated as the time for pavement construction approaches. We recommend the pavement areas be rough graded and then thoroughly proof rolled with a loaded tandem-axle dump truck. Particular attention should be paid to high traffic areas that were rutted and disturbed and to areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by removing and replacing the materials with properly compacted fill. After proofrolling and repairing subgrade deficiencies, the entire subgrade should be scarified to a depth of 12 inches, and uniformly compacted to at least 95 percent of the materials' modified Proctor maximum dry density.

4.7 Seismic Considerations

Based on the findings in the field exploration and our knowledge of the local geological formation in the project area, the site can be classified as Site Class E in accordance with IBC 2012 and ASCE 7-10. The seismic design parameters obtained based on IBC 2012 and ASCE 7-10 are summarized in table below. The design response spectrum curve, as presented in the appendix, was developed based on the S_{DS} and S_{D1} values according to IBC 2012 and ASCE 7-10.

Summary of Seismic Design Parameters

Site Location (Lat. – Long.)	Site Classification	S_s	S_1	F_a	F_v	S_{DS}	S_{D1}
32.3848° -81.2448°	E	0.337g	0.127g	2.221g	3.419g	0.499g	0.289g

§ In general accordance with the 2012 International Building Code and ASCE 7-10.

§ The 2012 IBC and ASCE 7-10 require a site soil profile determination extending a depth of 100 feet for seismic site classification. The current scope does not include 100 foot soil profile determination. Explorations for this project extended to a maximum depth of 46 feet and this seismic site class definition was provided in consideration of the overall soil conditions as well as the general geology of the area.

5.0 GENERAL COMMENTS

Terracon should be consulted to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the project design and specifications. Terracon should also be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

The analyses and recommendations presented in this report are based upon the data obtained from the explorations performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between exploration locations, across the site, or may be caused due to the modifying effects of construction or weather. Bear in mind that the nature and extent of such variations may not become evident until construction has started or until construction activities have ceased. If variations do appear, Terracon should be notified immediately so that further evaluation and supplemental recommendations can be provided. The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, and bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or hazardous conditions. If the owner is concerned about the potential for such contamination or pollution, please advise so that additional studies may be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project and site discussed, and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either expressed or implied, are intended or made. Site safety, excavation support and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes, and then either verifies or modifies the conclusions of this report in writing.

APPENDIX A

FIELD EXPLORATION

Exhibit A-1	Site Location Map
Exhibit A-2	Exploration Location Plan
Exhibit A-3	Field Exploration Description
Exhibit A-4	CPT Cross Section
Exhibit A-5	CPT Logs
Exhibit A-6	Hand Auger Boring Logs



Image Courtesy of Google Earth™

Project Manager:	RCW	Project No.	ES165084
Drawn by:	RCW	Scale:	N.T.S.
Checked by:	GL	File Name:	
Approved by:	GL	Date:	5-4-16

Terracon
 Consulting Engineers & Scientists
 2201 Rowland Avenue Savannah, Georgia 31404
 Phone (912) 629 4000 Fax (912) 629 4001

SITE LOCATION MAP
Stillwell Road Fire Station Stillwell Cloy Road Stillwell, Effingham County, Georgia

Exhibit:
A-1



LEGEND	
	CPT Soundings
	Hand Auger Borings

Image Courtesy of Google Earth™

NOTES:
 ALL EXPLORATION LOCATIONS WERE LOCATED IN THE FIELD USING A GPS UNIT AND / OR SITE LANDMARKS. EXPLORATION LOCATIONS SHOULD BE CONSIDERED APPROXIMATE. DIAGRAM IS FOR GENERAL LOCATION ONLY; NOT INTENDED FOR CONSTRUCTION PURPOSES.

Project Manager:	RCW	Project No.	ES165084
Drawn by:	RCW	Scale:	N.T.S.
Checked by:	GL	File Name:	
Approved by:	GL	Date:	5-4-16

Terracon
 Consulting Engineers & Scientists

2201 Rowland Avenue Savannah, Georgia 31404
 Phone (912) 629 4000 Fax (912) 629 4001

EXPLORATION LOCATION PLAN

Stillwell Road Fire Station
 Stillwell Cloy Road
 Stillwell, Effingham County, Georgia

Exhibit:
A-2

Field Exploration Description

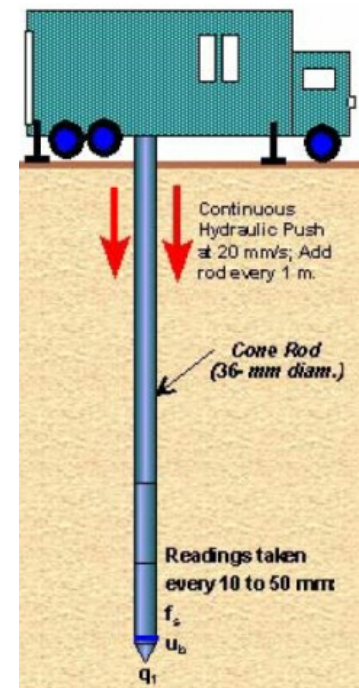
The locations of Cone Penetration Test (CPT) soundings and Hand Auger borings are determined by Terracon based on the proposed development and were located in the field using hand-held GPS units and in reference to existing features. These locations are shown in the Exploration Location Plan and should be considered approximate.

Cone Penetration Testing

The CPT hydraulically pushes an instrumented cone through the soil while nearly continuous readings are recorded to a portable computer. The cone is equipped with electronic load cells to measure tip resistance and sleeve resistance and a pressure transducer to measure the generated ambient pore pressure. The face of the cone has an apex angle of 60° and an area of 10 cm^2 . Digital data representing the tip resistance, friction resistance, pore water pressure, and probe inclination angle are recorded about every 2 centimeters while advancing through the ground at a rate between $1\frac{1}{2}$ and $2\frac{1}{2}$ centimeters per second. These measurements are correlated to various soil properties used for geotechnical design. No soil samples are gathered through this subsurface investigation technique.

CPT testing is conducted in general accordance with ASTM D5778 "Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils."

Upon completion, the data collected were analyzed and processed by the project engineer.

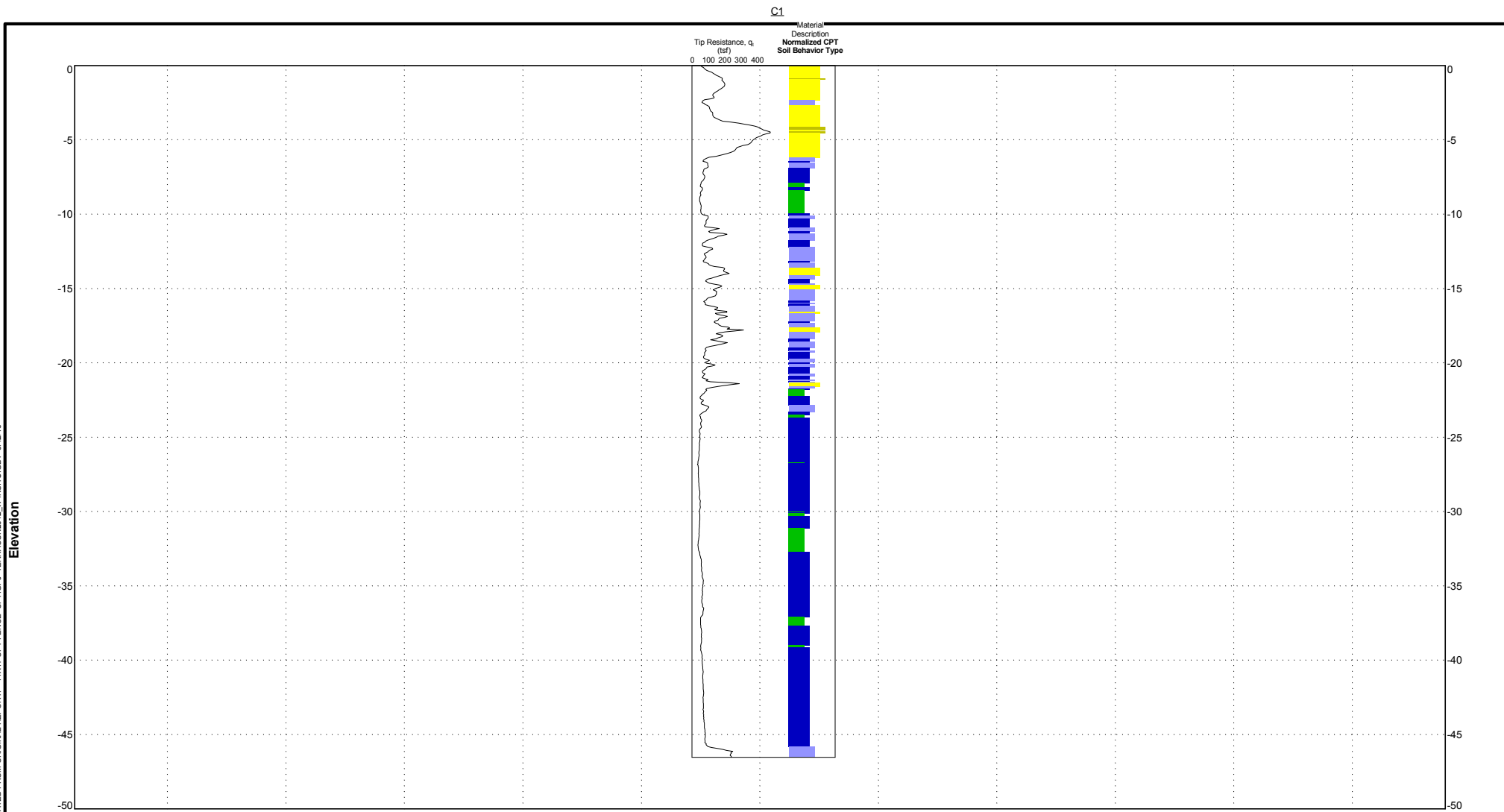


Source: FHWA NHI-06-088

Hand Auger Borings

Hand auger borings were conducted in general accordance with ASTM D 1452-80, Standard Practice for Soil Investigation and Sampling by Auger Borings. In this test, hand auger borings are drilled by rotating and advancing a bucket auger to the desired depths while periodically removing the auger from the hole to clear and examine the auger cuttings. The soils were classified in accordance with ASTM D2488.

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 11X17 CPT FENCE CPT.GPJ TERRACON2012.W\INSITU.GDT 5/12/16



Explanation

- C1 — Borehole Number
- Moisture Content — %w
- Sampling —
- AR — Borehole Termination Type
- BT — Borehole Termination Type
- LL PL — Liquid and Plastic Limits
- Borehole Lithology
- Water Level Reading at time of drilling.
- Water Level Reading after drilling.

NOTES:
 See Exhibit A-2 for orientation of soil profile.
 See General Notes in Appendix B-2 for symbols and soil classifications.
 Soils profile provided for illustration purposes only.
 Soils between borings may differ.
 AR - Auger Refusal
 BT - Boring Termination

Project Manager:	
Drawn by: RCW	
Approved by: GL	
Date: 5/12/2016	

Project No.: ES165084
Scale: N.T.S.
File Name: ES165084

Terracon
 2201 Rowland Ave
 Savannah, GA
 PH. 912-629-4000 FAX. 912-629-4001

SUBSURFACE PROFILE
STILLWELL ROAD FIRE STATION
EFFINGHAM COUNTY, GEORGIA

EXHIBIT A-4

CPT LOG NO. C1

PROJECT: Stillwell Road Fire Station

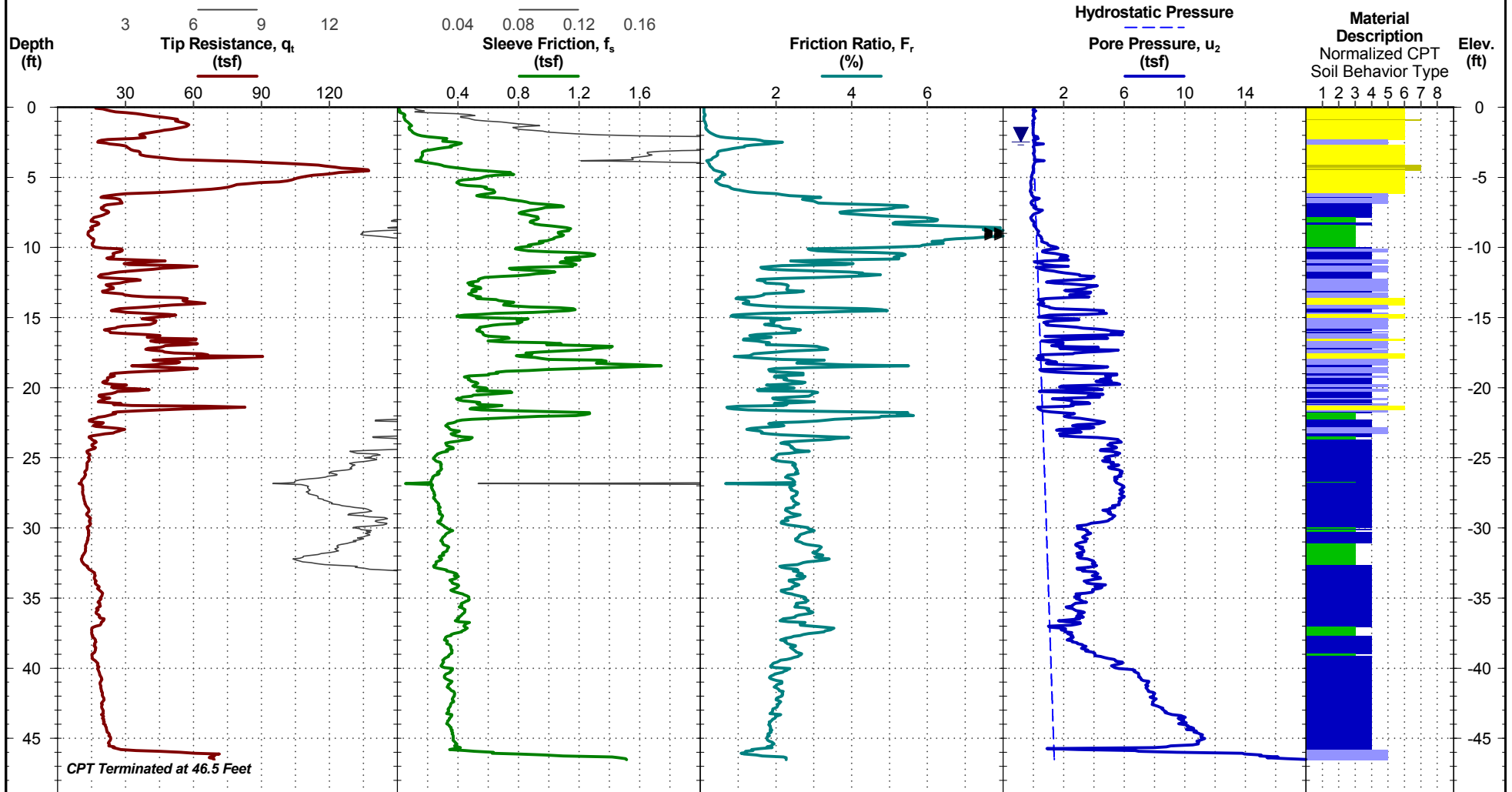
CLIENT: Effingham County Board of Commissioners

TEST LOCATION: See Exhibit A-2

SITE: Effingham County, Georgia

Latitude: 32.384826°

Longitude: -81.244801°



See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.

CPT sensor calibration reports available upon request.

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT_CPT.GPJ TERRACON2015.GDT 5/16/16

WATER LEVEL OBSERVATION

▼ 2.48 ft measured water depth
(used in normalizations and correlations;
see Appendix C)

Probe no. 4526 with net area ratio of 0.83
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 12/7/2015
Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in



CPT Started: 5/10/2016

Rig:

Project No.: ES165084

CPT Completed: 5/10/2016

Operator: JB

Exhibit: A-1

Hand Auger Boring Log

Project Name: Stillwell Road Fire Station
 Project No.: ES165084
 Project Location: Stillwell, Georgia



HA1		
Depth Below Grade (inch)	Material Description	USCS CLASSIFICATION
0 to 10	Orange/Red Clayey SAND (Fill Material)	SC
10 to 60	Black/Brown Silty SAND with Roots (Topsoil)	SM
Groundwater at 28 inches BGS		No Mottling Noted

HA2		
Depth Below Grade (inch)	Material Description	USCS CLASSIFICATION
0 to 18	Orange/Red Clayey SAND (Fill Material)	SC
18 to 24	Black/Brown Silty SAND with Roots (Topsoil)	SM
24 to 60	Light Gray SAND with Silt	SP-SM
Groundwater at 24 inches BGS		No Mottling Noted

HA3		
Depth Below Grade (inch)	Material Description	USCS CLASSIFICATION
0 to 12	Orange/Red Clayey SAND (Fill Material)	SC
12 to 18	Black/Brown Silty SAND with Roots (Topsoil)	SM
18 to 36	Light Gray SAND with Silt	SP-SM
36 to 60	Gray/Brown Silty SAND	SM
Groundwater at 28 inches BGS		No Mottling Noted

HA4		
Depth Below Grade (inch)	Material Description	USCS CLASSIFICATION
0 to 18	Orange/Red Clayey SAND (Fill Material)	SC
18 to 32	Black/Brown Silty SAND with Roots (Topsoil)	SM
32 to 60	Light Gray/Brown SAND with Silt	SP-SM
Groundwater at 28 inches BGS		No Mottling Noted

HA5		
Depth Below Grade (inch)	Material Description	USCS CLASSIFICATION
0 to 12	Orange/Red Clayey SAND (Fill Material)	SC
12 to 24	Black/Brown Silty SAND with Roots (Topsoil)	SM
24 to 36	Gray Silty SAND	SM
36 to 60	Light Gray/Brown SAND with Silt	SP-SM
Groundwater at 24 inches BGS		No Mottling Noted

HA6		
Depth Below Grade (inch)	Material Description	USCS CLASSIFICATION
0 to 12	Orange/Red Clayey SAND (Fill Material)	SC
12 to 24	Black/Brown Silty SAND with Roots (Topsoil)	SM
24 to 60	Light Gray SAND with Silt with Few Organics	SP-SM
Groundwater at 28 inches BGS		No Mottling Noted

APPENDIX B

SUPPORTING INFORMATION

- Exhibit B-1 Seismic Design Parameters
- Exhibit B-2 General Notes
- Exhibit B-3 Unified Soil Classification System
- Exhibit B-4 CPT-based Soil Classification

Seismic Design Parameters Based on IBC2012 Code and ASCE 7-10 Standard

Terracon Project Name: Stillwell Road Fire Station

Terracon Project Number: ES165084



Site Location: Effingham County, Georgia

Latitude : 32.3848

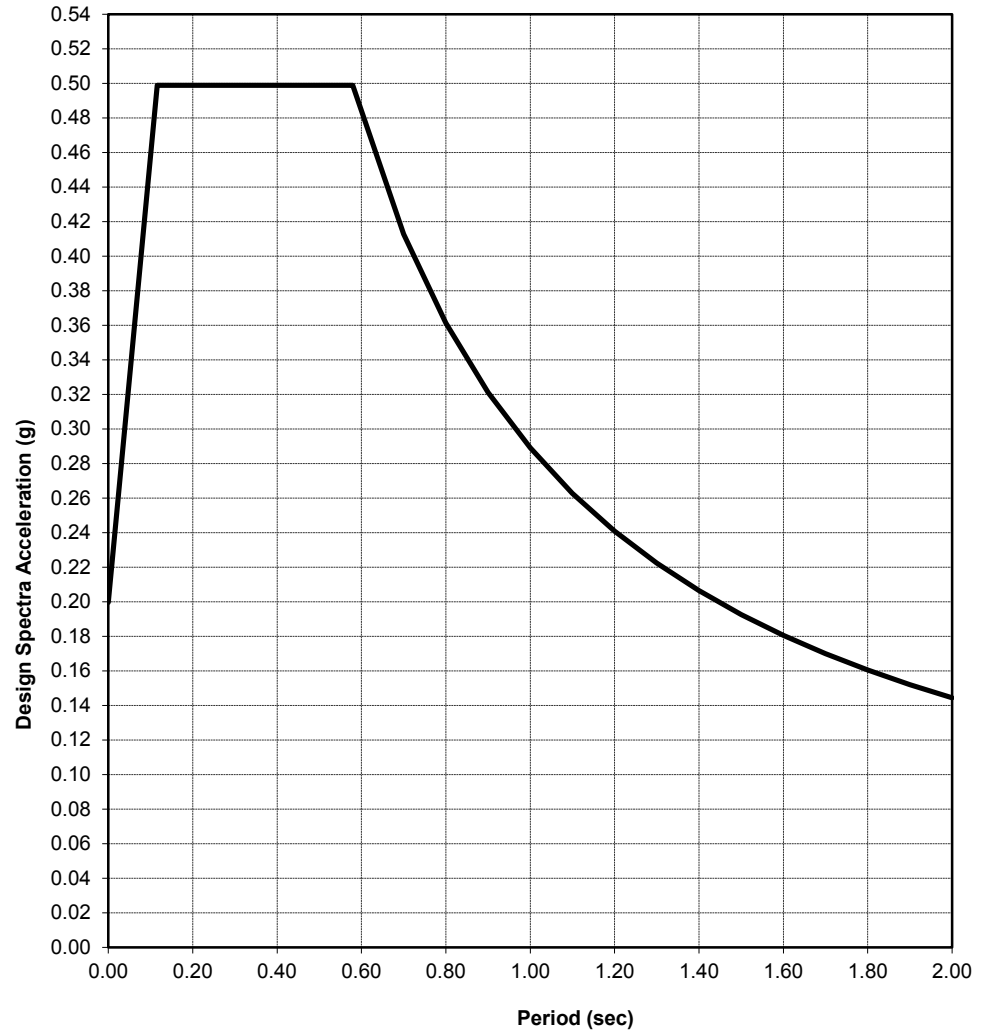
Longitude : -81.2448

Site Class: D

Design Response Spectrum for the Site Class












S_s 0.337	S_1 0.127
F_a 2.221	F_v 3.419
S_{MS} 0.749	S_{M1} 0.434
S_{DS} 0.499	S_{D1} 0.289

	<u>Period (sec)</u>	<u>Sa (g)</u>
	0.000	0.200
T_0	0.116	0.499
	0.200	0.499
T_S	0.579	0.499
T	0.700	0.413
	0.800	0.361
	0.900	0.321
	1.000	0.289
	1.100	0.263
	1.200	0.241
	1.300	0.222
	1.400	0.206
	1.500	0.193
	1.600	0.181
	1.700	0.170
	1.800	0.161
	1.900	0.152
	2.000	0.145



GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING			GROUNDWATER		Groundwater Initially Encountered	FIELD TESTS	(HP) Hand Penetrometer
	Auger	Split Spoon			Groundwater Level After a Specified Period of Time		(T) Torvane
					Static Groundwater Level After a Specified Period of Time		(b/f) Standard Penetration Test (blows per foot)
	Shelby Tube	Macro Core			No Groundwater Observed		(PID) Photo-Ionization Detector
				Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.			(OVA) Organic Vapor Analyzer
	No Recovery	Rock Core					
	Ring Sampler						

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS	RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
	Descriptive Term (Density)	Std. Penetration Resistance (blows per foot)	Descriptive Term (Consistency)	Undrained Shear Strength (kips per square foot)	Std. Penetration Resistance (blows per foot)
	Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
	Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
	Medium Dense	10 - 29	Medium-Stiff	0.50 to 1.00	5 - 7
	Dense	30 - 50	Stiff	1.00 to 2.00	8 - 14
	Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	above 4.00	> 30	

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Descriptive Term(s) of other constituents	Percent of Dry Weight
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests^A

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

^ABased on the material passing the 3-in. (75-mm) sieve

^BIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^CGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^DSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

$$^E C_u = D_{60}/D_{10} \quad C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^FIf soil contains $\geq 15\%$ sand, add "with sand" to group name.

^GIf fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^HIf fines are organic, add "with organic fines" to group name.

^IIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^JIf Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^KIf soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^LIf soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

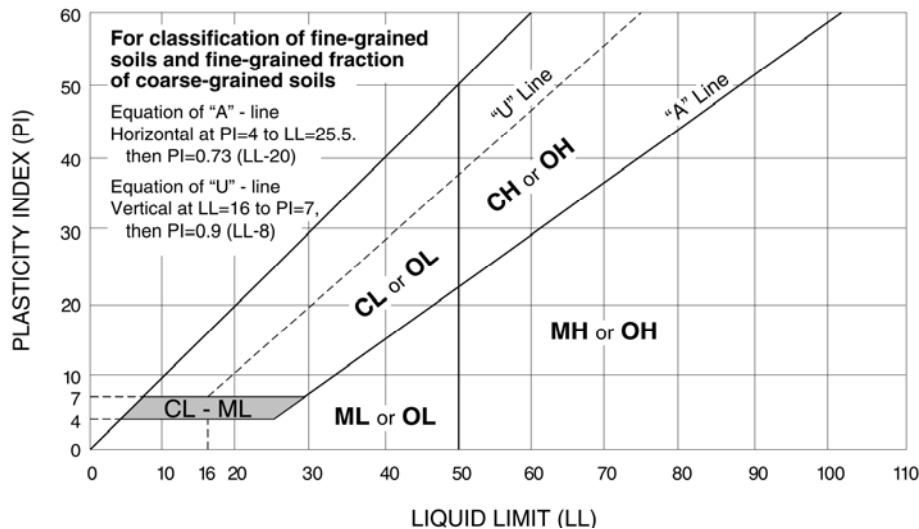
^MIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



Terracon

Exhibit B-3

CPT GENERAL NOTES

DESCRIPTION OF MEASUREMENTS AND CALIBRATIONS

To be reported per ASTM D5778:

Uncorrected Tip Resistance, q_c
Measured force acting on the cone divided by the cone's projected area

Corrected Tip Resistance, q_t
Cone resistance corrected for porewater and net area ratio effects
 $q_t = q_c + U2(1 - a)$

Where a is the net area ratio, a lab calibration of the cone typically between 0.70 and 0.85

Pore Pressure, U1/U2
U1 - sensor on the face of the cone
U2 - sensor on the shoulder (more common)

Sleeve Friction, f_s
Frictional force acting on the sleeve divided by its surface area

Normalized Friction Ratio, FR
The ratio as a percentage of f_s to q_t , accounting for overburden pressure

To be reported per ASTM D7400, if collected:

Shear Wave Velocity, V_s
Measured in a Seismic CPT and provides direct measure of soil stiffness

DESCRIPTION OF GEOTECHNICAL CORRELATIONS

Normalized Tip Resistance, Q_t
 $Q_t = (q_t - \sigma_{v0}) / \sigma'_{v0}$

Over Consolidation Ratio, OCR
OCR (1) = $0.25(Q_t)^{1.25}$
OCR (2) = $0.33(Q_t)$

Undrained Shear Strength, S_u
 $S_u = Q_t \times \sigma'_{v0} / N_{k1}$
 N_{k1} is a geographical factor (shown on S_u plot)

Sensitivity, St
 $St = (q_t - \sigma_{v0} / N_{k1}) \times (1 / fs)$

Effective Friction Angle, ϕ'
 $\phi' (1) = \tan^{-1}(0.373[\log(q_t / \sigma'_{v0}) + 0.29])$
 $\phi' (2) = 17.6 + 11[\log(Q_t)]$

Unit Weight
 $UW = (0.27[\log(FR)] + 0.36[\log(q_t / atm)] + 1.236) \times UW_{water}$
 σ_{v0} is taken as the incremental sum of the unit weights

SPT N_{60}
 $N_{60} = (q_t / atm) / 10^{(1.1268 - 0.2817k)}$

Soil Behavior Type Index, I_c
 $I_c = [(3.47 - \log(Q_t))^2 + (\log(FR) + 1.22)^2]^{0.5}$

Small Strain Modulus, G_0
 $G_0 = \rho V_s^2$

Elastic Modulus, E_s (assumes $q/q_{ultimate} \sim 0.3$, i.e. FS = 3)
 $E_s (1) = 2.6\psi G_0$
where $\psi = 0.56 - 0.33\log Q_{t, clean\ sand}$
 $E_s (2) = G_0$
 $E_s (3) = 0.015 \times 10^{(0.55I_c + 1.68)} (q_t - \sigma_{v0})$
 $E_s (4) = 2.5q_t$

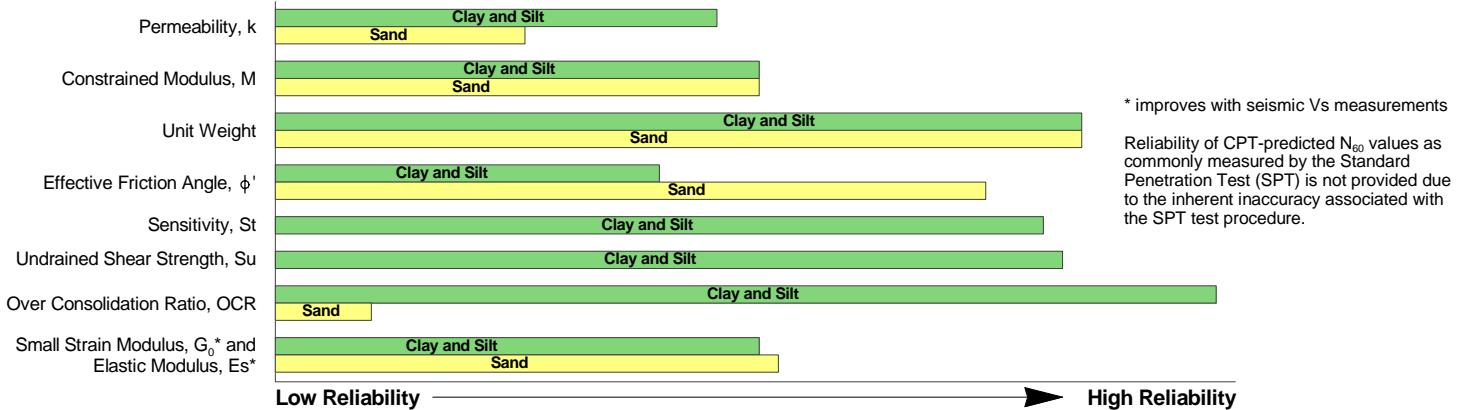
Constrained Modulus, M
 $M = \alpha_M (q_t - \sigma_{v0})$
For $I_c > 2.2$ (fine-grained soils)
 $\alpha_M = Q_t$ with maximum of 14
For $I_c < 2.2$ (coarse-grained soils)
 $\alpha_M = 0.0188 \times 10^{(0.55I_c + 1.68)}$

Hydraulic Conductivity, k
For $1.0 < I_c < 3.27$ $k = 10^{(0.952 - 3.04I_c)}$
For $3.27 < I_c < 4.0$ $k = 10^{(-4.52 - 1.37I_c)}$

REPORTED PARAMETERS

CPT logs as provided, at a minimum, report the data as required by ASTM D5778 and ASTM D7400 (if applicable). This minimum data include tip resistance, sleeve resistance, and porewater pressure. Other correlated parameters may also be provided. These other correlated parameters are interpretations of the measured data based upon published and reliable references, but they do not necessarily represent the actual values that would be derived from direct testing to determine the various parameters. The following chart illustrates estimates of reliability associated with correlated parameters based upon the literature referenced below.

RELATIVE RELIABILITY OF CPT CORRELATIONS



WATER LEVEL

The groundwater level at the CPT location is used to normalize the measurements for vertical overburden pressures and as a result influences the normalized soil behavior type classification and correlated soil parameters. The water level may either be "measured" or "estimated."

Measured - Depth to water directly measured in the field

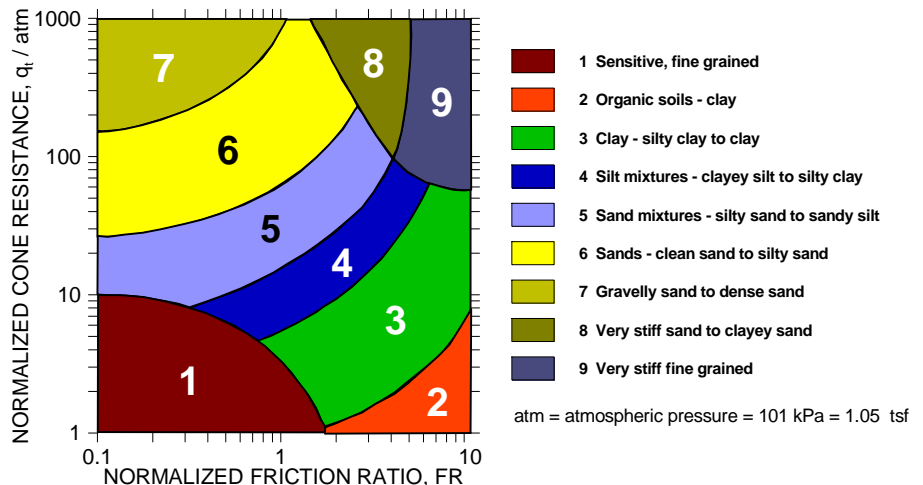
Estimated - Depth to water interpolated by the practitioner using pore pressure measurements in coarse grained soils and known site conditions

While groundwater levels displayed as "measured" more accurately represent site conditions at the time of testing than those "estimated," in either case the groundwater should be further defined prior to construction as groundwater level variations will occur over time.

CONE PENETRATION SOIL BEHAVIOR TYPE

The estimated stratigraphic profiles included in the CPT logs are based on relationships between corrected tip resistance (q_t), friction resistance (f_s), and porewater pressure (U2). The normalized friction ratio (FR) is used to classify the soil behavior type.

Typically, silts and clays have high FR values and generate large excess penetration porewater pressures; sands have lower FRs and do not generate excess penetration porewater pressures. Negative pore pressure measurements are indicative of fissured fine-grained material. The adjacent graph (Robertson et al.) presents the soil behavior type correlation used for the logs. This normalized SBT chart, generally considered the most reliable, does not use pore pressure to determine SBT due to its lack of repeatability in onshore CPTs.



REFERENCES

- Kulhawy, F.H., Mayne, P.W., (1997). "Manual on Estimating Soil Properties for Foundation Design," Electric Power Research Institute, Palo Alto, CA.
- Mayne, P.W., (2013). "Geotechnical Site Exploration in the Year 2013," Georgia Institute of Technology, Atlanta, GA.
- Robertson, P.K., Cabal, K.L. (2012). "Guide to Cone Penetration Testing for Geotechnical Engineering," Signal Hill, CA.
- Schmertmann, J.H., (1970). "Static Cone to Compute Static Settlement over Sand," *Journal of the Soil Mechanics and Foundations Division*, 96(SM3), 1011-1043.

**SECTION 03300
CAST-IN-PLACE CONCRETE**

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide all cast-in-place concrete, complete, in place, as indicated on the Drawings, specified herein and required for the complete installation.

1.02 SUMMARY

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

1.03 SUBMITTALS

- A. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others if requested by Engineer.
- B. Shop drawings for Concrete Reinforcement:
 - 1. Shop drawings shall be submitted by the Contractor to the Engineer and review action received prior to fabrication. When corrections are required, copies will be returned noting such. Drawings shall then be corrected and resubmitted until final review action is received. Coordination of shop drawing shall be such that corrections noted on one sheet that affects another drawing will be transmitted and made on all sheets and also resubmitted.
 - 2. Shop drawings shall also include:
 - a. Location of all proposed construction joints, keying and waterstops;
 - b. Location of all openings, depressions, construction and control joints, trenches, sleeves, inserts and items affecting the reinforcement and placing of concrete.
 - 3. The Contractor shall be responsible for checking quantities and dimensions in accordance with contract drawings. Where discrepancies in dimensions are noted, the Contractor shall notify the Engineer of such discrepancies and corrected dimensions will then be furnished by the Engineer. Corrected dimensions shall be reflected on shop drawings.
 - 4. Contract drawings receive precedence over shop drawings unless otherwise authorized in writing.
 - 5. Shop drawings furnished for reinforcing steel shall contain fabrication details as well as placement drawings which are to be used in conjunction with contract drawings.
 - 6. Detailing and fabrication of reinforcing shall conform to ACI 315 "Details and Detailing of Concrete Reinforcement", and ACI 315R "Manual of Engineering and Placing Drawings for Reinforced Concrete Structures".
- C. Submit 5 copies of laboratory test reports for concrete materials and mix design test. All concrete mix designs shall be prepared by a qualified testing laboratory.
- D. Material certificates in lieu of material laboratory test reports when permitted by Engineer. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from

admixture manufacturers that chloride content complies with specification requirements.

- E. Review Action: Submittals are reviewed for general conformance with the design concept only and are subject to all requirements of the contract documents. Contractor is responsible for dimensions, quantities and coordination with other trades. Reviews do not authorize any changes involving additional cost unless stated in separate letter or change order.

1.04 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
 - 1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
 - 2. ACI 311.4R, "Manual of Concrete Inspection."
 - 3. ACI 318, "Building Code Requirements for Reinforced Concrete."
 - 4. ACI 304R, "Guide for Measuring, Mixing, Transporting and Placing Concrete."
 - 5. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
- B. Concrete Testing Service:
 - 1. All testing services specified in this section of these specifications shall be performed by a recognized, independent laboratory approved by the Engineer.
 - 2. The Contractor shall furnish to the testing agency samples of all proposed material to be used which requires testing.
 - 3. Testing agency shall check and review proposed materials to be used for compliance with these specifications, perform all testing in accordance with referenced standards and provide all reports.
 - 4. Contractor shall furnish all project specifications, testing material, mill reports, design mixes and cylinders, and shall notify laboratory of concrete pouring schedules so as not to delay progress of the work.
 - 5. No material or mixes shall be used on project unless approved by the Engineer.
 - 6. Materials and installed work may require testing and retesting, as directed by the Engineer, at anytime during the progress of the work. Allow free access to material stockpiles and facilities at all times. Retesting of rejected material and installed work, shall be provided at the Contractor's expense.
- C. Tests for Concrete Materials:
 - 1. Portland cement shall be sampled and tested to determine the properties in accordance with ASTM C 150.
 - 2. Aggregates shall be sampled and tested in accordance with ASTM C 33 (normal weight).
- D. Supervision: All reinforced concrete construction shall be performed under the personal supervision of the contractor's superintendent. This superintendent shall keep a record of all concrete poured on the job. The record shall show in detail the area poured, the time and date of the pour and weather conditions which existed at the time of the pour. Upon completion of the work, this record shall be turned over to the Engineer.

PART 2 - PRODUCTS

2.01 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable

material. Provide lumber dressed on at least two edges and one side for tight fit.

- C. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 mg/l volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- D. Form Ties:
 - 1. Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.
 - 2. Provide ties that, when removed, will leave holes not larger than 1 inch in diameter in the concrete surface.

2.02 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Steel Wire: ASTM A 1064, plain, cold-drawn steel.
- C. Welded Wire Fabric: ASTM A 1064, welded steel wire fabric.
- D. Deformed-Steel Welded Wire Fabric: ASTM A 497.
- E. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI specifications.
 - 1. For slabs-on-grade, including thickened slab areas, use supports with sand plates or horizontal runners where base material will not support chair legs.
 - 2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).
 - 3. For foundations, support reinforcing in bottom at footings with whole concrete bricks at 4'-0" on center.

2.03 CONCRETE MATERIALS

- A. Portland Cement:
 - 1. Comply with ASTM C 150, Type I.
 - 2. Use one brand of cement throughout Project unless otherwise acceptable to Architect.
- B. Fly Ash: ASTM C 618, Type F.
- C. Normal-Weight Aggregates:
 - 1. Comply with ASTM C 33 Class 4M and as specified. Provide aggregates from a single source for exposed concrete.
 - 2. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
 - 3. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Architect.
 - 4. Do not use aggregates containing soluble salts, iron sulphide, pyrite, marcasite or ochre which can cause strains on exposed concrete surfaces.
 - 5. Dune sand, bank run sand and manufactured sand are not acceptable.
 - 6. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam or foreign matter, as follows:

- a. Crushed stone, processed from natural rock or stone.
- b. Washed gravel, either natural or crushed. Use of pit or bank run gravel is not permitted.
- c. Maximum Aggregate Size: Not larger than one-fifth of the narrowest dimension between sides of forms, one-third of the depths of slabs nor three-fourths of the minimum clear spacing between individual reinforcing bars or bundles of bars nor over 1" in max. size except for block fill where max. size shall not exceed ½".

These limitations may be waived if, in the judgement of the Engineer, workability and methods of consolidation are such that concrete can be placed without honeycomb or voids.

- D. Water: Potable.
- E. Admixtures, General: Provide concrete admixtures that contain not more than 0.1 percent chloride ions.
- F. Air-Entraining Admixture:
 - 1. Comply with ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- G. Water-Reducing Admixture:
 - 1. Comply with ASTM C 494, Type A.
- H. High-Range Water-Reducing Admixture:
 - 1. Comply with ASTM C 494, Type F or Type G.
- I. Water-Reducing, Accelerating Admixture:
 - 1. Comply with ASTM C 494, Type E.
- J. Water-Reducing, Retarding Admixture:
 - 1. Comply with ASTM C 494, Type D.
- K. Calcium Chloride: Calcium chloride will not be permitted in concrete.

2.04 RELATED MATERIALS

- A. Preformed Expansion Joint Fillers: Premolded fillers shall meet "Specifications for Premolded Expansion Joint Fillers for Concrete Paving and Structural Construction", ASTM D 1751.
- B. Reglets: Where sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.0217-inch-thick (26-gage) galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.
- C. Slab on Grade Floor Joint Forms:
 - 1. Interior spaces: 24 ga., pre-shaped keyed type galvanized steel joint forms and stakes. Galvanizing shall be hot-dipped conforming to ASTM A 653 Grade E Steel G90 coating class.
 - 2. Exterior spaces: Wood or metal removable tongue and groove joint forms.
- D. Chemical Hardener: Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 pounds of fluosilicates per gallon.
- E. Sand Fill: Clean, manufactured or natural sand.

- F. Membrane-Forming Curing Compound: ASTM C 1315, 30% solids content minimum, Type 1, Class A.
- G. Vapor Barrier: Provide vapor barrier that is resistant to deterioration when tested according to ASTM E 1745, as follows:
 - 1. Membrane sheet not less than 10 mils thick, meeting ASTM E 1745, Class C.
- H. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- I. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
 - 1. Waterproof paper.
 - 2. Polyethylene film.
 - 3. Polyethylene-coated burlap.
- J. Liquid Membrane-Forming Curing Compound: Liquid-type membrane-forming curing compound complying with ASTM C 309, Type I, Class A.
- K. Epoxy Adhesive:
 - 1. ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.

2.05 PROPORTIONING AND DESIGNING MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use an independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.
 - 1. Limit use of fly ash to not exceed 25 percent of cement content by weight.
- B. Submit written reports to Engineer of each proposed mix for each class of concrete at least 15 days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed by Engineer.
- C. Design mixes to provide normal weight concrete with the following properties as indicated on drawings and schedules:
 - 1. Exterior Concrete, Exposure Category F:
 - a. Formed Concrete (Class F1): 4500 psi, 28-day compressive strength; 0.45 water/cement; air-entrained.
 - b. Slabs on Grade (Class F0): 3000 psi, 28-day compressive strength; non-air-entrained.
 - 2. Interior Concrete:
 - a. Formed Concrete: 4000 psi, 28-day compressive strength; 564 lbs. Cement per cubic yard minimum; non-air-entrained.
 - b. Slabs on Grade: 4000 psi, 28-day compressive strength; non-air-entrained.
 - c. Foundations: 3000 psi, 28-day compressive strength; non-air-entrained.
- D. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
 - 1. Ramps, slabs, and sloping surfaces: Not more than 4 inches.
 - 2. Reinforced foundation systems: Not less than 1 inch and not more than 4 inches.
 - 3. Concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2-to-3-inch slump concrete.
 - 4. Other concrete: Not more than 4 inches.

- E. 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 Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Engineer before using in Work. No water shall be added to concrete mix at job site unless approved by Engineer, except where indicated on delivery ticket that water has been withheld at batch plant and total amount of water does not exceed the total amount of mix water on the approved mix design.

2.06 ADMIXTURES

- A. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
- B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).
- C. Use high-range water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water-cement ratios below 0.50.
- D. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1-1/2 percent within the following limits:
 - 1. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure:
 - a. 4.5 percent (moderate exposure); 5.5 percent (severe exposure) for 1-1/2-inch maximum aggregate.
 - b. 4.5 percent (moderate exposure); 6.0 percent (severe exposure) for 1-inch maximum aggregate.
 - c. 5.0 percent (moderate exposure); 6.0 percent (severe exposure) for 3/4-inch maximum aggregate.
 - d. 5.5 percent (moderate exposure); 7.0 percent (severe exposure) for 1/2-inch maximum aggregate.
 - 2. Other concrete not exposed to freezing, thawing, or hydraulic pressure, or to receive a surface hardener. No air-entrainment. Maximum total air content shall not exceed 3 percent.
- E. Use admixtures for water reduction and set accelerating or retarding in strict compliance with manufacturer's directions.

2.07 CONCRETE MIXING

- A. Job-Site Mixing:
 - 1. Mix concrete materials in appropriate drum-type batch machine mixer. For mixers of 1 cu. yd. or smaller capacity, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released. For mixers of capacity larger than 1 cu. yd., increase minimum 1-1/2 minutes of mixing time by 15 seconds for each additional cu. yd.
 - 2. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.
- B. Ready-Mixed Concrete:
 - 1. Comply with requirements of ASTM C 94, and as specified.

2. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 GENERAL

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

3.02 FORMS

- A. General:
 1. Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits:
 2. Provide Class A tolerances for concrete surfaces exposed to view.
 3. Provide Class C tolerances for other concrete surfaces.
- B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.
- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like for easy removal.
- D. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- E. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.03 VAPOR BARRIER INSTALLATION

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

3.04 PLACING REINFORCEMENT

- A. General:

1. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.
 2. Avoiding cutting or puncturing vapor barrier during reinforcement placement and concreting operations. Repair damages before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Engineer.
- D. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

3.05 JOINTS

- A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Engineer.
- B. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.
- C. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.

3.06 INSTALLING EMBEDDED ITEMS AND ANCHORS

- A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.
- B. Edge Forms and Screed Strips for Slabs: Set edge forms, or bulkheads and intermediate screed strips for slabs to obtain the elevations and contours in the finished slab surface. Provide and secure units to support the type of screed strips by the use of strike-off templates or accepted compacting type screeds. Screed strips are to be constructed, supported and set to avoid displacement of reinforcing steel positions.

3.07 PREPARING FORM SURFACES

- A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.
- B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.
1. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.08 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. General: Comply with ACI 304R, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.
- C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.
- D. Placing Concrete in Forms:
 - 1. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 - 2. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309R.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.
- E. Placing Concrete Slabs:
 - 1. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.
 - 2. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
 - 3. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 - 4. Maintain reinforcing in proper position on chairs during concrete placement.
- F. Cold-Weather Placement: Comply with provisions of ACI 306R and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- G. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
 - 1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
- H. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305R and as specified.
 - 1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.

3.09 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.
- C. Smooth-Rubbed Finish: Provide smooth-rubbed finish on scheduled concrete surfaces that have received smooth-formed finish treatment not later than 1 day after form removal.
 1. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- D. Grout-Cleaned Finish:
 1. Provide grout-cleaned finish on scheduled concrete surfaces that have received smooth-formed finish treatment.
 2. Combine one part portland cement to one and one-half parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint. Blend standard portland cement and white portland cement in amounts determined by trial patches so that final color of dry grout will match adjacent surfaces.
 3. Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.

3.10 MONOLITHIC SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and where indicated.
 1. After placing slabs, finish surface to tolerances of F(F) 15 (floor flatness) and F(L) 13 (floor levelness) measured according to ASTM E 1155. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
- B. Float Finish:
 1. Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane

- or elastic roofing, or sand-bed terrazzo; and where indicated.
2. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances of F(F) 20 (floor flatness) and F(L) 15 (floor levelness) measured according to ASTM E 1155. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- C. Trowel Finish:
1. Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or another thin film-finish coating system.
 2. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of F(F) 38 (floor flatness) and F(L) 30 (floor levelness) and minimum local tolerances of F(F) 25 and F(L) 20 measured according to ASTM E 1155. Grind smooth any surface defects that would telegraph through applied floor covering system.
- D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.
- E. Nonslip Broom Finish:
1. Apply a nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 2. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- F. Nonslip Aggregate Finish:
1. Apply nonslip aggregate finish to concrete stair treads, platforms, ramps, sloped walks, and where indicated.
 2. After completing float finishing and before starting trowel finish, uniformly spread 25 lb of dampened nonslip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as specified.
 3. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose nonslip aggregate.
- G. Chemical Hardener Finish:
1. Apply chemical hardener finish to all exposed dry interior concrete floors exposed to view.
 2. Apply liquid chemical hardener after complete curing and drying of the concrete surface.
 3. Dilute the liquid hardener with water and apply three coats:
 - First Coat: 1/3 strength
 - Second Coat: 1/2 strength
 - Third Coat: 2/3 strength
 4. Evenly apply all coats and allow 24 hours drying time between coats.
 5. Apply proprietary chemical hardeners, in accordance with manufacturer's printed instruction.
 6. After final coat of chemical-hardener solution is applied and dried, remove surplus

hardener by scrubbing and mopping with water.

- H. F(L) and F(F) Exceptions:
 - 1. F(L) tolerances and testing specified herein shall not be applicable to formed elevated concrete slab surfaces.
 - 2. F(L) and F(F) tolerances and testing specified shall not be applicable to surfaces within two feet of any floor joints, pre-positioned embedments, or any types of full-depth penetrations in accordance with ASTM E-1155.

3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.

3.12 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- C. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified.
- D. Provide moisture curing by the following methods:
 - 1. Keep concrete surface continuously wet by covering with water.
 - 2. Use continuous water-fog spray.
 - 3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4-inch lap over adjacent absorptive covers.
- E. Provide moisture-retaining cover curing as follows:
 - 1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- F. Apply curing compound on exposed interior slabs and on exterior slabs, walks, and curbs as follows:
 - 1. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - 2. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
- G. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full

curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

- H. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.
 - 1. Final cure concrete surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.

3.13 REMOVING FORMS

- A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg. F (10 deg. C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.
- B. Form-facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

3.14 REUSING FORMS

- A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to Architect.

3.15 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Architect.
- B. Mix dry-pack mortar, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.
 - 1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
 - 2. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- C. Repairing Formed Surfaces:
 - 1. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.

2. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.
2. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
3. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
4. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Engineer.
5. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

- E. Repair isolated random cracks and single holes 1 inch or less in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Place dry-pack before bonding agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

- F. Perform structural repairs with prior approval of Engineer for method and procedure, using specified epoxy adhesive and mortar.

- G. Repair methods not specified above may be used, subject to acceptance of Engineer.

3.16 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. General: The Contractor will employ a testing agency to perform tests and to submit test reports.

- B. Sampling and testing for quality control during concrete placement may include the following, as directed by Engineer.

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - a. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - b. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
 - c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
 - d. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders

- for laboratory-cured test specimens except when field-cured test specimens are required.
- e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
- 2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
 - 3. When total quantity of a given class of concrete is less than 50 cu. yd., Engineer may waive strength testing if adequate evidence of satisfactory strength is provided.
 - 4. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 - 5. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
- C. Test results will be reported in writing to the Engineer within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
 - D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
 - E. Floor Tolerance Testing: Test slab in accordance with ASTM E1155 within 24 hours of the final troweling. Provide tolerance report including key plan showing location and results of testing to the Engineer.
 - F. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Engineer. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

END OF SECTION 03300

SECTION 05 4000
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Formed steel stud interior wall framing.
- B. Exterior wall sheathing.

1.2 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood blocking and miscellaneous framing.
- B. Section 07 2100 - Thermal Insulation: Insulation within framing members.
- C. Section 09 5100 - Acoustical Ceilings: Ceiling suspension system.

1.3 REFERENCE STANDARDS

- A. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- D. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2013.
- E. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; 2011c.
- F. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

1.5 SUBMITTALS

- A. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.
- B. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum three years of documented experience.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Metal Framing:
 - 1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
 - 2. Marino: www.marinoware.com.
 - 3. Substitutions: Pending Approval from Architect.
- B. Framing Connectors and Accessories:
 - 1. Same manufacturer as metal framing.

2.2 FRAMING SYSTEM

- A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.

2.3 FRAMING MATERIALS

- A. Studs and Track: ASTM C955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
 - 1. Gage: 18 gage, 3 5/8 and 6 inch
 - 2. Galvanized in accordance with ASTM A653/A653M, G90/Z275 coating.
 - 3. Provide components fabricated from ASTM A1008/A1008M, Designation SS steel.
- B. Framing Connectors: Factory-made, formed steel sheet.
 - 1. Material: ASTM A653/A653M SS Grade 33 and 40 (minimum), with G90/Z275 hot dipped galvanized coating for base metal thickness less than 10 gage, 0.1345 inch, and factory punched holes and slots.
 - 2. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI North American Specification for the Design of Cold Formed Steel Structural Members.
 - 3. Fixed Connections: Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.

2.4 WALL SHEATHING

- A. Wall Sheathing: See Section 09 2116.

2.5 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
- B. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.6 FASTENERS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.
- B. Anchorage Devices: Powder actuated.

PART 3 EXECUTION

3.1 INSTALLATION OF STUDS

- A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.

3.2 WALL SHEATHING

- A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using self-tapping screws.

END OF SECTION 05 4000

ROUGH CARPENTRY

SECTION 06 1000

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Rough opening framing for doors, windows, and roof openings.
- B. Sheathing.
- C. Concealed wood blocking, nailers, and supports.
- D. Miscellaneous wood nailers, furring, and grounds.

1.2 RELATED REQUIREMENTS

- A. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.

1.3 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- B. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; National Institute of Standards and Technology, U.S. Department of Commerce; 2010.
- C. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology, Department of Commerce; 2010.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Lumber fabricated from old growth timber is not permitted.

2.2 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.3 CONSTRUCTION PANELS

- A. Wall Sheathing: Any PS 2 type.
 - 1. Bond Classification: Exterior.
 - 2. Grade: Structural I Sheathing.
 - 3. Span Rating: 16.

4. Performance Category: 5/16 PERF CAT.
5. Edge Profile: Square edge.

2.4 ACCESSORIES

- A. Fasteners and Anchors:
 1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

3.2 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- D. Provide the following specific non-structural framing and blocking:
 1. Cabinets and shelf supports.
 2. Grab bars.
 3. Towel and bath accessories.
 4. Wall-mounted door stops.

3.3 INSTALLATION OF CONSTRUCTION PANELS

- A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
 1. Place water-resistive barrier horizontally over wall sheathing, weather lapping edges and ends.

3.4 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.5 CLEANING

- A. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- B. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION 06 1000

THERMAL INSULATION

SECTION 07 2100

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Batt insulation and vapor retarder in exterior wall, ceiling, and roof construction.

1.2 RELATED REQUIREMENTS

- A. Section 09 2116 - Gypsum Board Assemblies: Acoustic insulation inside walls and partitions.

1.3 REFERENCE STANDARDS

- A. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2013.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- C. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.

1.4 SUBMITTALS

- A. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

PART 2 PRODUCTS

2.1 APPLICATIONS

- A. Insulation in Metal Framed Walls: Batt insulation with no vapor retarder.
- B. Insulation in Wood Framed Walls: Batt insulation with integral vapor retarder.
- C. Insulation Above Lay-In Acoustical Ceilings: Batt insulation with no vapor retarder.

2.2 BATT INSULATION MATERIALS

- A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 - 1. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 - 2. Facing: Aluminum foil, flame spread 25 rated; one side.
 - 3. Manufacturers:
 - a. CertainTeed Corporation: www.certainteed.com.
 - b. Johns Manville Corporation: www.jm.com.
 - c. Owens Corning Corporation; EcoTouch PINK FIBERGLAS Insulation: www.ocbuildingspec.com.

2.3 ACCESSORIES

- A. Staples: Steel wire; electroplated or galvanized; type and size to suit application.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation and adhesive.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.2 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

- B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

3.3 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION 07 2100

JOINT SEALERS

SECTION 07 9005

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Sealants and joint backing.

1.2 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 08 8000 - Glazing: Glazing sealants and accessories.
- C. Section 09 2116 - Gypsum Board Assemblies.

1.3 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants; 2010.
- B. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

1.4 SUBMITTALS

- A. Product Data: Provide data indicating sealant chemical characteristics.
- B. Manufacturer's Installation Instructions: Indicate special procedures.

1.5 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.6 WARRANTY

- A. Correct defective work within a five year period after Date of Substantial Completion.
- B. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Gunnable and Pourable Sealants:
 - 1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - 2. Bostik Inc: www.bostik-us.com.
 - 3. Dow Corning Corporation: www.dowcorning.com.
 - 4. Tremco Global Sealants: www.tremcosealants.com.
 - 5. Sherwin-Williams Company: www.sherwin-williams.com.

2.2 SEALANTS

- A. Sealants and Primers - General: Provide products having volatile organic compound (VOC) content as specified in Section 01 6116.

2.3 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.1 PREPARATION

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- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

3.2 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Install bond breaker where joint backing is not used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Tool joints concave.

3.3 CLEANING

- A. Clean adjacent soiled surfaces.

3.4 PROTECTION

- A. Protect sealants until cured.

END OF SECTION 07 9005

SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Non-fire-rated steel doors and frames.
- B. Steel frames for wood doors.
- C. Thermally insulated steel doors.
- D. Steel glazing frames.

1.2 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware.
- B. Section 08 8000 - Glazing: Glass for doors and borrowed lites.
- C. Section 09 9000 - Painting and Coating: Field painting.

1.3 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.
- C. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames; 2007 (R2011).
- D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- G. ASTM C1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus; 2011.
- H. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; 2006.
- I. ICC A117.1 - Accessible and Usable Buildings and Facilities; International Code Council; 2009 (ANSI).
- J. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2007.

1.4 SUBMITTALS

- A. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Maintain at the project site a copy of all reference standards dealing with installation.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store in accordance with NAAMM HMMA 840.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

2.2 DOORS AND FRAMES

- A. Requirements for All Doors and Frames:
1. Accessibility: Comply with ICC A117.1 and ADA Standards.
 2. Door Texture: Smooth faces.
 3. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
 4. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
 5. Galvanizing for Units in Wet Areas: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness
 6. Finish: Factory primed, for field finishing.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.3 STEEL DOORS

- A. Exterior Doors:
1. Grade: ANSI/SDI A250.8 (SDI-100); Level 1 - Standard-Duty, Physical Performance Level C, Model 1 - Full Flush.
 2. Core: Kraftpaper honeycomb.
 3. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
 4. Insulating Value: U-value of 0.50, when tested in accordance with ASTM C1363.
 5. Weatherstripping: Separate, see Section 08 7100.
- B. Interior Doors, Non-Fire-Rated:
1. Grade: ANSI/SDI A250.8 (SDI-100); Level 1 - Standard-Duty, Physical Performance Level C, Model 1 - Full Flush.
 2. Core: Kraftpaper honeycomb.
 3. Thickness: 1-3/4 inch.

2.4 STEEL FRAMES

- A. General:
1. Comply with the requirements of grade specified for corresponding door.
 - a. ANSI/SDI A250.8 (SDI-100), Level 2 and 3 Door Frames: 14 gage, 0.067 inch, minimum thickness.
 - b. Frames for Sound-Rated Wood Doors: Comply with frame requirements in accordance with ANSI/SDI A250.8 (SDI-100), Level 1, 18 gage, 0.042 inch.
 2. Finish: Same as for door.
- B. Exterior Door Frames: Face welded, seamless with joints filled.
1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
 2. Weatherstripping: Separate, see Section 08 7100.
- C. Interior Door Frames, Non-Fire-Rated: Knockdown type.
1. Terminated Stops: Provide at all interior doors; closed end stop terminated 6 inches above floor at 45 degree angle.
- D. Frames for Interior Glazing or Borrowed Lights: Construction and face dimensions to match door frames, and as indicated on drawings.
- E. Transom Bars: Fixed, of profile same as jamb and head.

2.5 ACCESSORY MATERIALS

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- A. Louvers: Roll formed steel with overlapping frame; finish same as door components; factory-installed.
 - 1. Style: Standard straight slat blade.
 - 2. Fasteners: Concealed fasteners.
- B. Glazing: As specified in Section 08 8000, factory installed.
- C. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

2.6 FINISH MATERIALS

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.

3.2 PREPARATION

- A. Coat inside of other frames with bituminous coating to a thickness of 1/16 inch.

3.3 INSTALLATION

- A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
- B. Coordinate frame anchor placement with wall construction.
- C. Coordinate installation of hardware.
- D. Coordinate installation of glazing.

3.4 TOLERANCES

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

3.5 ADJUSTING

- A. Adjust for smooth and balanced door movement.

3.6 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION 08 1113

OVERHEAD COILING DOORS

SECTION 08 3323

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Overhead coiling doors and shutters, operating hardware, fire-rated, non-fire-rated, and exterior, manual and electric operation.
- B. Wiring from electric circuit disconnect to operator to control station.

1.2 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware: Cylinder cores and keys.
- B. Section 26 2717 - Equipment Wiring: Power to disconnect.

1.3 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2012.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.
- D. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated 600 2000 Volts; National Electrical Manufacturers Association; 2000 (R2008).
- E. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2011.
- F. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. Product Data: Provide general construction, electrical equipment, component connections and details, and__.
- B. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.

1.5 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Overhead Coiling Doors:
 - 1. Wayne-Dalton, a Division of Overhead Door Corporation;_____: www.wayne-dalton.com.
 - 2. Substitutions: Approved by Architect.

2.2 COILING DOORS

- A. Exterior Coiling Doors: Steel slat curtain.
 - 1. Capable of withstanding positive and negative wind loads of 20 psf, without undue deflection or damage to components.
 - 2. Finish: Factory painted, White color.
 - 3. Guides: Angles; galvanized steel.
 - 4. Hood Enclosure: Manufacturer's standard; primed steel.
 - 5. Electric operation.
 - 6. Mounting: Within framed opening.

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7. Exterior lock and latch handle.

2.3 MATERIALS

- A. Curtain Construction: Interlocking slats.
 1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
 2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
 3. Weatherstripping: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.
- B. Steel Slats: Minimum thickness, ____ gage, ____ inch; ASTM A653/A653M galvanized steel sheet.
- C. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.
- D. Steel Guides: ASTM A36/A36M steel angles, size as indicated, Black Powder Coated.
- E. Hood Enclosure: Internally reinforced to maintain rigidity and shape.
 1. Minimum thickness; ____ gage, ____ inch.
 2. Prime paint.
- F. Hardware:
 1. Latching: Inside mounted, adjustable keeper, spring activated latch bar with feature to keep in locked or retracted position.
 2. Latch Handle: Interior and exterior handle.
- G. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.
- H. View Window - Dual-Wall Poly Carbonate

2.4 ELECTRIC OPERATION

- A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by a testing agency acceptable to authorities having jurisdiction.
- B. Electric Operators:
 1. Motor Enclosure:
 - a. Exterior Doors: NEMA MG 1, Type 4; open drip proof.
 2. Motor Rating: 3/4 hp; continuous duty.
 3. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
 4. Controller Enclosure: NEMA 250, Type 1.
 5. Opening Speed: 12 inches per second.
 6. Brake: Adjustable friction clutch type, activated by motor controller.
 7. Manual override in case of power failure.
- C. Control Station: Standard three button (OPEN-STOP-CLOSE) momentary control for each operator.
 1. 24 volt circuit.
- D. Safety Edge: Located at bottom of curtain, full width, electro-mechanical sensitized type, wired to stop operator upon striking object, hollow neoprene covered.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that opening sizes, tolerances and conditions are acceptable.

3.2 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

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- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Coordinate installation of electrical service with Section 26 2717.
- F. Complete wiring from disconnect to unit components.

3.3 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation From Plumb: 1/16 inch.
- C. Maximum Variation From Level: 1/16 inch.
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.4 ADJUSTING

- A. Adjust operating assemblies for smooth and noiseless operation.

3.5 CLEANING

- A. Clean installed components.
- B. Remove labels and visible markings.

END OF SECTION 08 3323

DOOR HARDWARE

SECTION 08 7100

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Hardware for wood, hollow steel, and aluminum doors.
- B. Electrically operated and controlled hardware.
- C. Lock cylinders for doors for which hardware is specified in other sections.
- D. Thresholds.
- E. Weatherstripping, seals and door gaskets.

1.2 RELATED REQUIREMENTS

- A. Section 08 1113 - Hollow Metal Doors and Frames.
- B. Section 08 1416 - Flush Wood Doors.
- C. Section 08 3323 - Overhead Coiling Doors: Lockable coiling doors.
- D. Section 08 4313 - Aluminum-Framed Storefronts: Hardware for doors in storefront, including:
 - 1. Integral weatherstripping.
 - 2. Hinges.
 - 3. Closers.
 - 4. Push bars and pull handles.
 - 5. Thresholds.
- E. Section 08 7110 - Basis of Design Door Hardware - Hager.

1.3 REFERENCE STANDARDS

- A. BHMA A156.2 - American National Standard for Bored and Preamsembled Locks & Latches; Builders Hardware Manufacturers Association; 2011 (ANSI/BHMA A156.2).
- B. BHMA A156.3 - American National Standard for Exit Devices; Builders Hardware Manufacturers Association; 2008 (ANSI/BHMA A156.3).
- C. BHMA A156.4 - American National Standard for Door Controls - Closers; Builders Hardware Manufacturers Association, Inc.; 2008 (ANSI/BHMA A156.4).
- D. BHMA A156.6 - American National Standard for Architectural Door Trim; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.6).
- E. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders; Builders Hardware Manufacturers Association, Inc.; 2010 (ANSI/BHMA A156.8).
- F. BHMA A156.18 - American National Standard for Materials and Finishes; Builders Hardware Manufacturers Association, Inc.; 2012 (ANSI/BHMA A156.18).
- G. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems, Builders Hardware Manufacturers Association; 2012 (ANSI/BHMA A156.22).
- H. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products onto which door hardware will be installed.

1.5 SUBMITTALS

- A. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project.
- B. Hardware Schedule: Detailed listing of each item of hardware to be installed on each door. Use door numbering scheme as included in the Contract Documents. Identify electrically operated items and include power requirements.

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- C. Keying Schedule: Submit for approval of Owner.
- D. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- E. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

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

1.8 WARRANTY

- A. Provide five year warranty for door closers.

PART 2 PRODUCTS

2.1 MANUFACTURERS - BASIS OF DESIGN

- A. Hager Companies products as specified in Section 08 7110, for hinges, locks, closers, and other items specified: www.hagerco.com.
- B. As specified in this section for other products.
- C. Substitutions: Not permitted unless Approved by Architect

2.2 DOOR HARDWARE - GENERAL

- A. Provide all hardware specified or required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.
- B. Provide all items of a single type of the same model by the same manufacturer.
- C. Provide products that comply with the following:
 - 1. Applicable provisions of federal, state, and local codes.
 - 2. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.
- D. Function: Lock and latch function numbers and descriptions of manufactures series as listed in hardware schedule.
- E. Electrically Operated and/or Controlled Hardware: Provide all power supplies, power transfer hinges, relays, and interfaces required for proper operation; provide wiring between hardware and control components and to building power connection.
- F. Finishes: All door hardware the same finish unless otherwise indicated.
 - 1. Primary Finish: Satin chrome plated over nickel on brass or bronze, 626 (approx US26D).
 - 2. Secondary Finish: Satin chrome plated over nickel on brass or bronze, 626 (approx US26D).
 - a. Use secondary finish in kitchens, bathrooms, and other spaces containing chrome or stainless steel finished appliances, fittings, and equipment; provide primary finish on one side of door and secondary finish on other side if necessary.
 - 3. Finish Definitions: BHMA A156.18.
 - 4. Exceptions:
 - a. Where base metal is specified to be different, provide finish that is an appearance equivalent according to BHMA A156.18.
- G. Fasteners:
 - 1. Concrete and Masonry Substrates: Stainless steel machine screws and lead expansion shields.

2.3 HINGES

- A. Hinges: Provide hinges on every swinging door.

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1. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
 2. Provide ball-bearing hinges at all doors having closers.
 3. Provide hinges in the quantities indicated.
 4. Provide non-removable pins on exterior outswinging doors.
 5. Where electrified hardware is mounted in door leaf, provide power transfer hinges.
- B. Quantity of Hinges Per Door:
1. Doors From 60 inches High up to 90 inches High: Three hinges.
- C. Manufacturers - Hinges:
1. Assa Abloy McKinney: www.assaabloydss.com.
 2. Bommer Industries, Inc: www.bommer.com.
 3. C. R. Laurence Co., Inc: www.crl-arch.com.
 4. Hager Companies: www.hagerco.com.
 5. Stanley Black & Decker: www.stanleyblackanddecker.com.
 6. Substitutions: Not permitted unless approved by Architect

2.4 PUSH/PULLS

- A. Push/Pulls: Comply with BHMA A156.6.
1. Provide push and pull on doors not specified to have lockset, latchset, exit device, or auxiliary lock.
 2. On solid doors, provide matching push plate and pull plate on opposite faces.
 3. On glazed storefront doors, provide matching push/pull bars on both faces.
- B. Manufacturers - Push/Pulls:
1. Assa Abloy McKinney: www.assaabloydss.com.
 2. C. R. Laurence Co., Inc: www.crl-arch.com.
 3. Hager Companies: www.hagerco.com.
 4. Hiawatha, Inc: www.hiawathainc.com.
 5. Triangle Brass Manufacturing Co., Inc: www.trimcobbw.com.
 6. Substitutions: Not permitted unless approved by Architect

2.5 LOCKS AND LATCHES

- A. Locks: Provide a lock for every door, unless specifically indicated as not requiring locking.
1. Hardware Sets indicate locking functions required for each door.
 2. If no hardware set is indicated for a swinging door provide an office lockset.
 3. Trim: Provide lever handle or pull trim on outside of all locks unless specifically stated to have no outside trim.
 4. Lock Cylinders: Provide key access on outside of all locks unless specifically stated to have no locking or no outside trim.
- B. Lock Cylinders: Manufacturer's standard tumbler type, six-pin standard core.
1. Provide cams and/or tailpieces as required for locking devices required.
- C. Keying: Grand master keyed.
1. Include construction keying.
- D. Latches: Provide a latch for every door that is not required to lock, unless specifically indicated "push/pull" or "not required to latch".

2.6 CYLINDRICAL LOCKSETS

- A. Locking Functions: As defined in BHMA A156.2, and as follows.
1. Privacy: F76, emergency tool unlocks.
 2. Office: F81, key not required to lock, remains locked upon exit.
 3. Store Door: F91, locked by key from both sides, not an emergency exit (must be unlocked during occupied hours).
- B. Manufacturers - Cylindrical Locksets:
1. Assa Abloy Corbin Russwin, Sargent, or Yale: www.assaabloydss.com.
 2. Best Access Systems, division of Stanley Security Solutions: www.bestaccess.com.
 3. Hager Companies: www.hagerco.com.
 4. Schlage, an Allegion brand: www.allegion.com/us.

5. Substitutions: Not permitted unless approved by Architect

2.7 FLUSHBOLTS

- A. Flushbolts: Lever extension bolts in leading edge of door, one bolt into floor, one bolt into top of frame.
 1. Pairs of Swing Doors: At inactive leaves, provide flush bolts of type as required to comply with code.
 2. Floor Bolts: Provide dustproof strike except at metal thresholds.
- B. Manual Flushbolts: Provide lever extensions for top bolt at over-size doors.
- C. Manufacturers - Flushbolts:
 1. Assa Abloy McKinney: www.assaabloydss.com.
 2. Hager Companies: www.hagerco.com.
 3. Ives, an Allegion brand: www.allegion.com/us.
 4. Triangle Brass Manufacturing Co., Inc: www.trimcobbw.com.

2.8 EXIT DEVICES

- A. Locking Functions: Functions as defined in BHMA A156.3, and as follows:
 1. Entry/Exit, Free Swing: Key outside retracts latch, latch holdback (dogging) for free swing during occupied hours, not fire-rated; outside trim must be specified as lever or pull.

2.9 CLOSERS

- A. Closers: Complying with BHMA A156.4.
 1. Provide surface-mounted, door-mounted closers unless otherwise indicated.
 2. Provide a door closer on every exterior door.
 3. Provide a door closer on every fire- and smoke-rated door. Spring hinges are not an acceptable self-closing device unless specifically so indicated.
 4. On pairs of swinging doors, if an overlapping astragal is present, provide coordinator to ensure the leaves close in proper order.
 5. At outswinging exterior doors, mount closer in inside of door.
- B. Manufacturers - Closers:
 1. Assa Abloy Corbin Russwin, Norton, Rixson, Sargent, or Yale: www.assaabloydss.com.
 2. C. R. Laurence Co., Inc: www.crl-arch.com.
 3. DORMA Group North America: www.dorma-usa.com/usa.
 4. Hager Companies: www.hagerco.com.
 5. LCN, an Allegion brand: www.allegion.com/us.
 6. Substitutions: Not permitted unless approved by Architect

2.10 STOPS AND HOLDERS

- A. Stops: Complying with BHMA A156.8; provide a stop for every swinging door, unless otherwise indicated.
 1. Provide wall stops, unless otherwise indicated.
 2. If wall stops are not practical, due to configuration of room or furnishings, provide overhead stop.
 3. Stop is not required if positive stop feature is specified for door closer; positive stop feature of door closer is not an acceptable substitute for a stop unless specifically so stated.
- B. Wall Stops:
- C. Manufacturers - Wall and Floor Stops/holders:
 1. Assa Abloy McKinney: www.assaabloydss.com.
 2. C. R. Laurence Co., Inc: www.crl-arch.com.
 3. Hager Companies: www.hagerco.com.
 4. Hiawatha, Inc: www.hiawathainc.com.
 5. Triangle Brass Manufacturing Co., Inc: www.trimcobbw.com.

2.11 GASKETING AND THRESHOLDS

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- A. Gaskets: Complying with BHMA A156.22.
 - 1. On each exterior door, and doors between heated and non-heated spaces, provide weatherstripping gaskets, unless otherwise indicated; top, sides, and meeting stiles of pairs.
 - 2. On each exterior door, provide door bottom sweep, unless otherwise indicated.
- B. Thresholds:
 - 1. At each exterior door, provide a threshold unless otherwise indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that doors and frames are ready to receive work; labeled, fire-rated doors and frames are present and properly installed, and dimensions are as indicated on shop drawings.
- B. Verify that electric power is available to power operated devices and of the correct characteristics.

3.2 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Use templates provided by hardware item manufacturer.
- C. Mounting heights for hardware from finished floor to center line of hardware item: As listed in Schedule, unless otherwise noted:
- D. Set exterior door thresholds with full-width bead of elastomeric sealant on each point of contact with floor; anchor thresholds with stainless steel countersunk screws.

3.3 ADJUSTING

- A. Adjust hardware for smooth operation.
- B. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.4 CLEANING

- A. Clean adjacent surfaces soiled by hardware installation. Clean finished hardware per manufacturer's instructions after final adjustments has been made. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.5 PROTECTION

- A. Do not permit adjacent work to damage hardware or finish.

HARDWARE SETS

4.1 GENERAL

- A. These Hardware Sets indicate requirements for single doors of that type, with conditional requirements for pairs and other situations.
- B. Pairs of Swinging Doors: Provide one of each specified item on each leaf unless specifically stated otherwise. Treat pairs as two active leaves unless otherwise indicated.

4.2 SWING DOORS -- NOT REQUIRING KEY LOCKING

- A. HW-5: Privacy Lockset, Non-Fire-Rated:
 - 1. Lockset, Privacy.

4.3 SWING DOORS -- "STORE DOOR" LOCKING FUNCTION

- A. Doors with these sets must remain unlocked during business hours and do not qualify as emergency exits during fully occupied hours.
- B. HW-9: Push/Pull, Store Door Locking, To be Unlocked During Business Hours:
 - 1. Closer.
 - 2. Push/Pull.

4.4 SWING DOORS -- LOCKABLE, MAY BE LEFT UNLOCKED, KEY NOT REQUIRED TO LOCK

- A. HW-10: Office, Non-Fire-Rated:
 - 1. Lockset, Office.
 - 2. Pair: One leaf inactive, with manual flush bolts.

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- B. HW-13: Public Entrance, Exit Device, Lockable, Non-Fire-Rated:
 - 1. Closer.
 - 2. Exit Device, Rim, Entry/Exit, Free Swing, lever outside trim.
 - 3. Pair: Surface vertical rod type devices.

END OF SECTION 08 7100

GLAZING
SECTION 08 8000

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Glass.
- B. Plastic glazing film.
- C. Glazing compounds and accessories.

1.2 RELATED REQUIREMENTS

- A. Section 08 1113 - Hollow Metal Doors and Frames: Glazed doors and borrowed lites.
- B. Section 08 1416 - Flush Wood Doors: Glazed lites in doors.
- C. Section 08 4313 - Aluminum-Framed Storefronts: Glazing furnished by storefront manufacturer.
- D. Section 08 5113 - Aluminum Windows: Glazing furnished by window manufacturer.

1.3 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- C. ASTM C1036 - Standard Specification for Flat Glass; 2011e1.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- E. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- F. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2012a.
- G. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- H. GANA (GM) - GANA Glazing Manual; Glass Association of North America; 2009.
- I. GANA (SM) - GANA Sealant Manual; Glass Association of North America; 2008.

1.4 SUBMITTALS

- A. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- B. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual and GANA Sealant Manual for glazing installation methods.

1.6 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.7 WARRANTY

- A. Sealed Insulating Glass Units: Provide a five (5) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.
- B. Laminated Glass: Provide a five (5) year warranty to include coverage for delamination, including replacement of failed units.

PART 2 PRODUCTS

2.1 INSULATING GLASS UNITS

- A. Type IG-1 - Sealed Insulating Glass Units: Vision glass, double glazed.
 - 1. Application: All exterior glazing unless otherwise indicated.
 - 2. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - b. Coating: Low-E (passive type), on #2 surface.
 - 3. Inboard Lite: Annealed float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - 4. Total Thickness: 1 inch.
 - 5. Glazing Method: Gasket glazing.

2.2 EXTERIOR GLAZING ASSEMBLIES

- A. Performance Criteria: Select type and thickness of glass to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of glass.
 - 1. Use the procedure specified in ASTM E1300 to determine glass type and thickness.
 - 2. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
 - 3. Glass thicknesses listed are minimum.

2.3 GLASS MATERIALS

- A. Float Glass Manufacturers:
 - 1. AGC Glass Company North America, Inc: www.us.agc.com.
 - 2. Pilkington North America Inc: www.pilkington.com/na.
 - 3. PPG Industries, Inc: www.ppgideasapes.com.
 - 4. Substitutions: Refer to Section 01 6000 - Product Requirements.
- B. Float Glass: All glazing is to be float glass unless otherwise indicated.
 - 1. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
 - 2. Heat-Strengthened and Fully Tempered Types: ASTM C1048.
 - 3. Tinted Types: Color and performance characteristics as indicated.
 - 4. Thicknesses: As indicated; for exterior glazing comply with specified requirements for wind load design regardless of specified thickness.

2.4 SEALED INSULATING GLASS UNITS

- A. Manufacturers:
 - 1. Any of the manufacturers specified for float glass.
 - 2. Fabricator certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.
 - 3. Substitutions: Not permitted unless approved by Architect
- B. Sealed Insulating Glass Units: Types as indicated.
 - 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 - 2. Edge Spacers: Aluminum, bent and soldered corners.
 - 3. Edge Seal: Glass to elastomer with supplementary silicone sealant.
 - 4. Purge interpane space with dry hermetic air.

2.5 PLASTIC FILMS

- A. Manufacturers:
 - 1. Flexvue Films: www.flexvuefilms.com.
 - 2. 3M Window Film: www.3m.com/US/arch_construct/scpd/windowfilm.
 - 3. Substitutions: Not permitted.

2.6 GLAZING COMPOUNDS

- A. Manufacturers:
 - 1. Bostik Inc: www.bostik-us.com.
 - 2. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - 3. Substitutions: Not permitted.
- B. Silicone Sealant, Type____: Single component; neutral curing; capable of water immersion

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without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; _____color.

2.7 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
- C. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; _____color.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerance.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.2 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.
- D. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.
- E. Install sealants in accordance with manufacturer's instructions.

3.3 INSTALLATION - EXTERIOR/INTERIOR DRY METHOD (GASKET GLAZING)

- A. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- B. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- C. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.4 INSTALLATION - INTERIOR WET/DRY METHOD (TAPE AND SEALANT)

- A. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.
- D. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line.
- E. Trim protruding tape edge.

3.5 CLEANING

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after Work is complete.
- C. Clean glass and adjacent surfaces.

3.6 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION 08 8000

GYPSUM BOARD ASSEMBLIES

SECTION 09 2116

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal channel ceiling framing.
- C. Acoustic insulation.
- D. Gypsum sheathing.
- E. Gypsum wallboard.
- F. Joint treatment and accessories.
- G. Water-resistive barrier over exterior wall sheathing.

1.2 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Building framing and sheathing.
- B. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.
- C. Section 09 2216 - Non-Structural Metal Framing.

1.3 REFERENCE STANDARDS

- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2012.
- B. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
- C. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2011.
- D. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- E. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2011.
- F. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- G. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- H. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
- I. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2013.

1.4 SUBMITTALS

- A. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Copies of Documents at Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

PART 2 PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.2 METAL FRAMING MATERIALS

- A. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size

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and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.

1. Studs: "C" shaped with flat or formed webs with knurled faces.
2. Runners: U shaped, sized to match studs.
3. Ceiling Channels: C shaped.

B. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

2.3 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:

1. American Gypsum;____: www.americangypsum.com.
2. CertainTeed Corporation;____: www.certainteed.com.
3. Georgia-Pacific Gypsum;____: www.gpgypsum.com.
4. National Gypsum Company;____: www.nationalgypsum.com.
5. USG Corporation;____: www.usg.com.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.

1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
2. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 1/2 inch.

2.4 ACCESSORIES

A. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.

B. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.

1. Types: As detailed or required for finished appearance.

C. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.

1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
2. Ready-mixed vinyl-based joint compound.

D. Screws for Attachment to Steel Members Less Than 0.033 inch In Thickness, to Wood Members, and to Gypsum Board: ASTM C1002; self-piercing tapping type; cadmium plated for exterior locations.

E. Screws for Attachment to Steel Members From 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws for application of gypsum board to loadbearing steel studs.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.2 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.

1. Level ceiling system to a tolerance of 1/1200.

C. Studs: Space studs at 24 inches on center.

1. Extend partition framing Per Wall Types on Drawings.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

E. Blocking: Install wood blocking for support of:

1. Framed openings.
2. Wall mounted cabinets.
3. Plumbing fixtures.
4. Toilet accessories.

5. Wall mounted door hardware.

3.3 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.4 BOARD INSTALLATION

- A. Comply with ASTM C 840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- C. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.

3.5 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
- B. Corner Beads: Install at external corners, using longest practical lengths.

3.6 JOINT TREATMENT

- A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
- B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 1. Feather coats of joint compound so that camber is maximum 1/32 inch.

3.7 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION 09 2116

PAINTING AND COATING

SECTION 09 9000

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints, stains, varnishes, and other coatings.
- C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
- D. Do Not Paint or Finish the Following Items:
 - 1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Floors, unless specifically so indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.

1.2 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

1.3 SUBMITTALS

- A. Product Data: Provide complete list of all products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
- B. Samples: Submit 2 paper "draw down" samples, 3x3 inches in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.
- C. Manufacturer's Instructions: Indicate special surface preparation procedures.
- D. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and coated surfaces, and color samples of each color and finish used.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Paint and Coatings: 1 gallon of each color; store where directed.
 - 2. Label each container with color in addition to the manufacturer's label.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.5 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature

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ranges required by the paint product manufacturer.

- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.
- B. Provide all paint and coating products from the same manufacturer to the greatest extent possible.
- C. Paints:
 - 1. Behr Process Corporation: www.behr.com.
 - 2. Duron, Inc: www.duron.com.
 - 3. Glidden Professional, a product of PPG Architectural Coatings: www.gliddenprofessional.com.
 - 4. Benjamin Moore & Co: www.benjaminmoore.com.
 - 5. Sherwin-Williams Company: www.sherwin-williams.com.
- D. Substitutions: Not permitted.

2.2 PAINTS AND COATINGS - GENERAL

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
 - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Supply each coating material in quantity required to complete entire project's work from a single production run.
 - 3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
 - 1. Concrete: Interior Institutional Low Odor/VOC Primer Sealer; MPI #149.
- C. Volatile Organic Compound (VOC) Content:
 - 1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- D. Colors: TBD

2.3 PAINT SYSTEMS - INTERIOR

- A. All Interior Surfaces Indicated to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete, concrete masonry, brick, wood, plaster, uncoated steel, shop primed steel, galvanized steel, and aluminum.
 - 1. Two top coats and one coat primer.
 - 2. Top Coat(s): High Performance Architectural Interior Latex; MPI #138-141.
 - 3. Satin: MPI gloss level 4; use this sheen for items subject to frequent touching by occupants, including door frames and railings.
 - 4. Primer(s): As recommended by manufacturer of top coats.
- B. Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals:
 - 1. Two top coats and one coat primer.

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2. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
- C. Medium Duty Vertical/Overhead: Including concrete masonry.
 1. Two top coats and one coat primer.
 2. Top Coat(s): High Performance Architectural Interior Latex; MPI #138-141.
 3. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
 4. Primer(s): As recommended by manufacturer of top coats.
- D. Transparent Finish on Concrete Floors, Unless Otherwise Indicated:
 1. Sealer Product(s):
 - a. Behr Premium Low-Lustre Sealer [No. 986].

2.4 ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin application of coatings until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 1. Gypsum Wallboard: 12 percent.
 2. Plaster and Stucco: 12 percent.
 3. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 4. Concrete Floors and Traffic Surfaces: 8 percent.

3.2 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to coating application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- G. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
- H. Plaster Surfaces to be Painted: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- I. Concrete Floors and Traffic Surfaces to be Painted: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- J. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

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- K. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-SP 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).
- L. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand or power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
- M. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
- N. Interior Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

3.3 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance.
- D. Sand wood and metal surfaces lightly between coats to achieve required finish.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

END OF SECTION 09 9000

SECTION 10 2800
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Accessories for toilet rooms and utility rooms.
- B. Grab bars.

1.2 RELATED REQUIREMENTS

1.3 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2014e1.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2010.
- D. ASTM C1036 - Standard Specification for Flat Glass; 2011e1.
- E. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.5 SUBMITTALS

- A. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- B. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Toilet Accessories:
 - 1. American Specialties, Inc: www.americanspecialties.com.
 - 2. Bradley Corporation: www.bradleycorp.com.
 - 3. Bobrick.
 - 4. Substitutions: Approved by Architect.

2.2 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
- B. Keys: Provide 2 keys for each accessory to Owner; master key lockable accessories.
- C. Stainless Steel Sheet: ASTM A666, Type 304.
- D. Stainless Steel Tubing: ASTM A269/A269M, Type 304 or 316.
- E. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.
- F. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

2.3 FINISHES

- A. Stainless Steel: No. 4 Brushed finish, unless otherwise noted.

2.4 TOILET ROOM ACCESSORIES

- A. Toilet Paper Dispenser: Double roll, surface mounted bracket type, stainless steel, spindleless type for tension spring delivery designed to prevent theft of tissue roll.

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- B. Paper Towel Dispenser: roll paper type.
 - 1. Cover: Stainless steel.
 - 2. Paper Discharge: Auto-cut dispense.
 - 3. Capacity: 8 inch diameter roll.
 - 4. Mounting: Surface mounted.
- C. Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
 - 1. Size: 24x36.
 - 2. Frame: 0.05 inch angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; No.4 finish.
 - 3. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
- D. Grab Bars: Stainless steel, nonslip grasping surface finish.
 - 1. Standard Duty Grab Bars:
 - a. Push/Pull Point Load: 250 pound-force, minimum.
 - b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
 - c. Length and Configuration: As indicated on drawings.

2.5 UTILITY ROOM ACCESSORIES

- A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
 - 1. Hooks: 2, 0.06 inch stainless steel rag hooks at shelf front.
 - 2. Mop/broom holders: 3 spring-loaded rubber cam holders at shelf front.
 - 3. Length: Manufacturer's standard length for number of holders/hooks.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. Verify that field measurements are as indicated on drawings.

3.2 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.3 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
 - 1. Grab Bars: As indicated on the drawings.

3.4 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION 10 2800

SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fire extinguishers.
- B. Accessories.

1.2 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

1.3 REFERENCE STANDARDS

- A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.
- B. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.4 SUBMITTALS

- A. Product Data: Provide extinguisher operational features.
- B. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.5 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Fire Extinguishers:
 - 1. Ansul, a Tyco Business; Cleanguard: www.ansul.com.
 - 2. Nystrom, Inc: www.nystrom.com.
 - 3. Pyro-Chem, a Tyco Business: www.pyrochem.com.
 - 4. Strike First Corporation of America; Water Fire Extinguisher: www.strikefirstusa.com.

2.2 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide extinguishers labeled by UL for the purpose specified and indicated.
- B. Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage.
 - 1. Class: A:B:C.
 - 2. Size: 5 pound.

2.3 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure rigidly in place.

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- C. Place extinguishers in cabinets and on wall brackets.
- D. Extinguishers to be located in field by Architect

END OF SECTION 10 4400

SECTION 13 3419
METAL BUILDING SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Manufacturer-engineered, shop-fabricated structural steel building frame.
- B. Insulated Metal wall and roof panels including soffits.
- C. Exterior doors, windows, skylights, overhead doors, and louvers.

1.2 RELATED REQUIREMENTS

- A. Section 08 1113 - Hollow Metal Doors and Frames.
- B. Section 08 3323 - Overhead Coiling Doors
- C. Section 08 4313 - Aluminum - Framed Storefronts
- D. Section 08 8000 - Glazing.

1.3 REFERENCE STANDARDS

- A. AISC 360 - Specification for Structural Steel Buildings; American Institute of Steel Construction, Inc.; 2010.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2012.
- D. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.
- E. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2013.
- F. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- G. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2007.
- H. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality; 2005 (Reapproved 2009).
- I. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2013a.
- J. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- K. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014.
- L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- M. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2012.
- N. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010 w/Errata.
- O. IAS AC472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal

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Building Systems; 2012.

- P. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.4 DESIGN REQUIREMENTS

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.6 SUBMITTALS

- A. Product Data: Provide data on profiles, component dimensions, fasteners.
- B. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections; wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage, installation ; framing anchor bolt settings, sizes, and locations from datum, foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.
- C. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.
- D. Manufacturer Qualification Statement: Provide documentation showing metal building manufacturer is accredited under IAS AC472.
 - 1. Include statement that manufacturer designs and fabricates metal building system as integrated components and assemblies, including but not limited to primary structural members, secondary members, joints, roof, and wall cladding components specifically designed to support and transfer loads and properly assembled components form a complete or partial building shell.
- E. Project Record Documents: Record actual locations of concealed components and utilities.

1.7 QUALITY ASSURANCE

- A. Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of this Work.
 - 1. Design Engineer Qualifications: Licensed in the State in which the Project is located.
 - 2. Conform to applicable code for submission of design calculations as required for acquiring permits.
 - 3. Cooperate with regulatory agency or authority and provide data as requested.
- B. Perform welding in accordance with AWS D1.1/D1.1M.
- C. Manufacturer Qualifications: Company specializing in the manufacture of products similar to those required for this project.
 - 1. Not less than 3 years of documented experience
 - 2. Accredited by IAS in accordance with IAS AC472.
- D. Erector Qualifications: Company specializing in performing the work of this section with minimum 5 years experience.

1.8 WARRANTY

- A. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Metal Buildings:
 - 1. Butler Manufacturing Company: www.butlermfg.com.
 - 2. Ceco Building Systems: www.cecobuildings.com.
 - 3. Chief Buildings: www.chiefbuildings.com.
 - 4. Kirby Building Systems: www.kirbybuildingsystems.com.
 - 5. Metallic Building Company: www.metallic.com.

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6. Nucor Building Systems: www.nucorbuildingsystems.com.
7. VP Buildings: www.vp.com.
8. Substitutions: Not permitted unless approved by Architect

2.2 METAL BUILDING

- A. Single span rigid frame.
- B. Primary Framing: Rigid frame of rafter beams and columns, canopy beams, and wind bracing.
- C. Secondary Framing: Purlins, and other items detailed.
- D. Wall System: Preformed metal panels of vertical profile, with sub-girt framing/anchorage assembly, and accessory components.
- E. Roof System: Preformed metal panels oriented parallel to slope, with sub-girt framing/anchorage assembly, insulation, and liner panels, and accessory components.
- F. Roof Slope: 1 inches in 12 inches.
- G. Canopy systems - Front Door - See Drawings

2.3 MATERIALS - FRAMING

- A. Structural Steel Members: ASTM A572/A572M, Grade 50.
- B. Structural Tubing: ASTM A500/A500M, Grade B cold-formed.
- C. Plate or Bar Stock: ASTM A529/A529M, Grade 50.
- D. Anchor Bolts: ASTM A307, galvanized to ASTM A153/A153M.
- E. Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, galvanized to ASTM A153/A153M, Class C.
- F. Welding Materials: Type required for materials being welded.
- G. Primer: SSPC-Paint 20, zinc rich.
- H. Grout: ASTM C1107/C1107M, Non-shrink type, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents, capable of developing minimum compressive strength of 2400 psi in two days and 7000 psi in 28 days.

2.4 MATERIALS - WALLS AND ROOF

- A. Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, SS Grade 33/230, with G90/Z275 coating.
- B. Insulation: Roll glass fiber type, faced with reinforced white vinyl, ASTM E84, flame spread index of 25 or less where exposed, friction fit, 8 inches thick.
- C. Joint Seal Gaskets: Manufacturer's standard type.
- D. Fasteners: Manufacturer's standard type, galvanized to comply with requirements of ASTM A153/A153M, finish to match adjacent surfaces when exterior exposed.
- E. Sealant: Manufacturer's standard type.
- F. Metal Mesh: Galvanized steel wire, woven.
- G. Trim, Closure Pieces, Caps, Flashings, Gutters, Downspouts, Rain Water Diverter, Fascias, and Infills: Same material, thickness and finish as exterior sheets; brake formed to required profiles.
- H. Add Alternate #1 - Premanufactured Stucco Textured Metal Panels - See drawings for location and details.

2.5 ACCESSORY COMPONENTS

- A. Doors and Frames: Manufacturer's standard.
- B. Doors and Frames: Specified in Section 08 1113.
- C. Storefront System - See Specifications and Drawings

2.6 DESIGN CRITERIA

- A. Design members to withstand dead load, applicable snow load, and design loads due to pressure and suction of wind calculated in accordance with applicable code.
- B. Exterior wall and roof system shall withstand imposed loads with maximum allowable deflection of 1/90 of span.
- C. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.

2.7 FABRICATION - FRAMING

- A. Fabricate members in accordance with AISC 360 for plate, bar, tube, or rolled structural shapes.
- B. Anchor Bolts: Formed with bent shank, assembled with template for casting into concrete.

2.8 FABRICATION - WALL AND ROOF PANELS

- A. Expansion Joints: Same material and finish as adjacent material where exposed, 1/2" inch thick, manufacturer's standard brake formed type, of profile to suit system.
- B. Flashings, Closure Pieces, Fascia: Same material and finish as adjacent material, profile to suit system.
- C. Fasteners: To maintain load requirements and weather tight installation, same finish as cladding, non-corrosive type.

2.9 FABRICATION - GUTTERS AND DOWNSPOUTS

- A. Fabricate of same material and finish as roofing metal.

2.10 FINISHES

- A. Framing Members: Clean, prepare, and shop prime. Do not prime surfaces to be field welded.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position

3.2 ERECTION - FRAMING

- A. Erect framing in accordance with AISC 360.
- B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.
- C. Set column base plates with non-shrink grout to achieve full plate bearing.
- D. Do not field cut or alter structural members without approval.
- E. After erection, prime welds, abrasions, and surfaces not shop primed.

3.3 ERECTION - WALL AND ROOF PANELS

- A. Install in accordance with manufacturer's instructions.
- B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.
- C. Fasten cladding system to structural supports, aligned level and plumb.
- D. Locate end laps over supports. End laps minimum 2 inches. Place side laps over bearing.
- E. Provide expansion joints where indicated.
- F. Use concealed fasteners.

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G. Install sealant and gaskets, providing weather tight installation.

3.4 ERECTION - GUTTERS AND DOWNSPOUTS

A. Rigidly support and secure components. Join lengths with formed seams sealed watertight.

Flash and seal gutters to downspouts.

B. Slope gutters minimum 1/8" inch/ft.

C. Install splash pans under each downspout.

3.5 INSTALLATION - ACCESSORY COMPONENTS IN WALL SYSTEM

A. Install door frames, doors, overhead doors, and windows and glass in accordance with manufacturer's instructions.

3.6 TOLERANCES

A. Framing Members: 1/4 inch from level; 1/8 inch from plumb.

B. Siding and Roofing: 1/8 inch from true position.

END OF SECTION 13 3419

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SECTION 22 0500 GENERAL PROVISIONS

1 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 GENERAL REQUIREMENTS

- A. General conditions, supplementary, and Special Conditions of the Contract govern work under this Section.
- B. Contractors performing work shall be totally responsible for work and shall coordinate, connect and conform to all sections or divisions of the Specifications and all drawings as required to provide complete systems.
- C. Applicable provisions of this section apply to and are hereby made part of the other sections of this Division.
- D. The Drawings and Specifications shall be understood to cover, according to their intent and meaning, complete operating systems as shown on the drawings and specified under appropriate sections of the specifications. The Drawings and Specifications are to be taken together. Work specified and not shown or work shown and not specified shall be performed and furnished as though mentioned in both specifications and drawings.
- E. Minor items and accessories or devices reasonably inferable as necessary to the complete and proper operation of any system shall be provided for such system.
- F. Verification of Existing Conditions: No allowance shall be made for failure to investigate site before building.
- G. Coordinate all utility construction and service installation with respective utility.
- H. The Contractor shall remove and/or relocate existing equipment and devices as required to provide clearance for new construction and to render systems operational.

1.3 CODES AND STANDARDS

- A. International Fire Protection Code, 2012 Edition with Georgia Amendments.
- B. International Fuel Gas Code, 2012 Edition with Georgia Amendments.
- C. International Building Code, 2012 Edition with Georgia Amendments.
- D. International Plumbing Code, 2012 Edition with Georgia Amendments.
- E. International Mechanical Code, 2012 Edition with Georgia Amendments.
- F. National Electric Code- 2014 Edition.
- G. NFPA 90A - Installation of Air Conditioning and Ventilating Systems with Georgia Amendments.
- H. NFPA 101 - Life Safety Code- 2012 Edition with Georgia Amendments.

1.4 SPECIAL REQUIREMENTS

- A. LAYOUT OF WORK: Drawings are Diagrammatic. Correlate final equipment locations with governing Architectural and Structural drawings and existing conditions. Lay out work before installation so that all trades may install equipment in spaces available. Provide coordination as required for installation in a neat and workmanlike manner. Verify working clearances and install per code.
- B. COORDINATION: Provide all required coordination and supervision where work connects to or is affected by work of the sections of the Specification and comply with all requirements affecting the Division. Work required under other Divisions, Specifications, or Drawings to be performed by this Division shall be coordinated with the Division.
- C. SUPERVISION OF WORK: Provide a field superintendent who has had previous successful experience on projects of comparable size and complexity. Superintendent shall be present at all times that work is being performed.
- D. INSPECTIONS: All work must pass routine and final inspections by local and state agencies.

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- E. Suitably protect all materials and equipment and items furnished under this Contract during construction. Restore all damaged surfaces and items to "like new" condition before a request for final acceptance.
- F. SCHEDULING: Contractor scheduling is to be coordinated with the Owner and Architect.
- G. CLEANLINESS CONTROL AND CLEAN-UP: Provide dust partitions, vacuum systems or exhaust fan to control dust and debris during construction operations. Procedures shall prevent dust and debris from entering finished areas. The Contractor shall also be responsible for removal of trash on a daily basis and shall maintain the construction area free of stored materials. If the Contractor is negligent in this regard, the area will be cleared in accordance with the terms of the General Conditions.
- H. CUTTING AND PATCHING: Locate all openings required for work required under this Section. Cut openings with minimum over-cut, place sleeves or other closure system as required and patch all areas about the cut zone to match existing finishes. Openings in concrete shall be blocked out before placement of concrete. Core boring or saw cutting only on approval of Architect.

1.5 SUBSTITUTIONS: Comply with pertinent provisions of the Instructions to Bidders.

1.6 SUBMITTALS

- A. Comply with pertinent provisions of the General Conditions.
- B. Product Data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, Submit:
 - 1. Materials list of items proposed to be provided under this section.
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements (NOTE: Generic or class data covering more than one piece of equipment or options shall be marked to show application for this specific project.
 - 3. Manufacturer's recommended installation procedures which, when approved, will become the basis for accepting or rejecting actual installation procedures used on the Work.
 - 4. Format: Compile information by subcontractor trades and an index to contents. Organize the material in an orderly manner and mark sheets with the appropriate specification reference number followed by the submittal for that portion of the specification.
 - 5. INCOMPLETE SUBMITTALS SHALL BE RETURNED, UNREVIEWED, TO CONTRACTOR FOR COMPLETION AND RESUBMISSION.
 - 6. Coordinate items submitted under this Section with other trades for ratings and characteristics to insure proper operation, e.g., panelboard circuit breaker voltage, poles and amp rating vs. equipment electrical requirements.
 - 7. Furnish via email one copy of product data submittals to architect and to engineer showing items intended to be used on this project.
- C. Submittal Requirements:

ITEM	PRODUCT DATA	SHOP DRAWINGS	WIRING DIAGRAMS	OPERATION & SPARE PARTS MAINT MANUALS	TEST REPORTS	WARRANTY CERTIFICATES
PIPE & FITTINGS	X					X
VALVES	X			X		X
SUPPORTS & ANCHORS	X	X		X		
IDENTIFICATION	X					
VIBRATION ISOLATION	X	X		X		X
PIPE INSULATION	X					X

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DUCT INSULATION	X			X		X
PLUMBING FIXTURES & EQUIPMENT	X			X		X
POWER VENTILATORS	X	X				X
DUCTWORK & ACCESSORIES	X	X				
AIR INLETS & OUTLETS	X					X
CONTROLS	X	X	X	X		X
TEST & BALANCES	X					X
FILTERS	X					
HIGH INTENSITY HEATERS	X	X				X
WATER PIPING DISINFECTION						
LOUVERS	X	X				X
A/C HEAT PUMP SYSTEM UNITS	X		X	X		X

D. CONTRACTOR REVIEW: Review brochure before submitting to architect. Information on each item shall be technically complete to permit an evaluation and compliance and shall bear the contractor's approval stamp, initial of checker and date checked. Requests for payment or substitutions will not be considered until brochure has been reviewed by the contractor and submitted for checking.

E. Completion Data: At substantial completion provide:

1. Three sets of manufacturer's printed operating Instructions, maintenance procedures and spare parts recommendations for items requiring maintenance manuals.
2. Three sets of all product submittal data shall be included in maintenance manuals.

F. CONTRACTOR REVIEW: Review brochure before submitting to Architect. Information on each item shall be technically complete to permit an evaluation and compliance and shall bear the Contractor's approval stamp, initial of checker and date checked. Requests for payment or substitutions will not be considered until brochure has been reviewed by the Contractor and submitted for checking.

1.7 Record As-built Drawings: In accordance with the contract.

2

PART 2 GUARANTEE

2.1 Furnish one year written guarantee to Owner from date of substantial completion on material and workmanship.

2.2 Furnish extended guarantee certificate on all items where greater than one year guarantee is required.

END OF SECTION

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SECTION 22 0700 PLUMBING INSULATION

- 1
- 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 WORK INCLUDED**
- A. Piping insulation
- B. Jackets and accessories
- 1.3 RELATED WORK**
- A. Painting: Painting insulation jacket.
- 1.4 REFERENCES**
- A. ANSI/ASTM C547 - Mineral Fiber Preformed Pipe Insulation.
- B. ASTM/E84 - Surface Burning Characteristics of Building Materials.
- 1.5 QUALITY ASSURANCE**
- A. Applicator: Company specializing in piping insulation application with three years minimum experience.
- B. Materials: Flame spread smoke developed rating of 25/50 in accordance with ASTM E84.
- 1.6 SUBMITTALS**
- A. Submit product data under provision of Section 22 0500.
- B. Include product description, list of materials and thickness for each service, and locations.
- C. Submit manufacturer's installation instructions under provision of Section 22 0500
- 2
- PART 2 PRODUCTS**
- 2.1 ACCEPTABLE MANUFACTURERS**
- A. Armstrong
- B. Owens Corning
- C. Knauf
- D. Certain-Teed
- E. Pittsburgh-Corning
- F. Imeco
- G. Johns-Manville
- H. Substitutions: Under provision of Section 22 0500.
- 2.2 INSULATION**
- A. Type A: Glass fiber insulation; ANSI/ASTM C547; C547; "k" value of 0.17 at 75°F at 24°C at noncombustible.
- B. Type G: Closed cell cellular foam; flexible, plastic; "k" value of 0.24 at 75°F fire rated.
- 2.3 JACKETS**
- A. Interior Applications:
- Vapor Barrier Jackets: Kraft reinforced foil vapor barrier with self-sealing adhesive joints.
 - PVC Jackets: One piece, pre-molded type.
 - Fiberglass Jackets: Per 2.04, E.

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- 4. Aluminum Jackets: ASTM B209; 0.020" thick; smooth finish.
- B. Exterior Applications: Aluminum Jackets: ASTM B209; 0.020" thick; smooth finish.

2.4 ACCESSORIES

- A. Insulation Bands: 3/4" wide; stainless steel 0.007" thick aluminum.
- B. Metal Jacket Bands: 3/8" wide; 0.015" thick aluminum. 0.010" thick stainless steel.
- C. Insulating Cement: ANSI/ASTM C195; hydraulic setting mineral wool.
- D. Finishing Cement: ASTM C449.
- E. Fibrous Glass Cloth: Untreated, 9 oz./sq yd weight (10x10 mesh).
- F. Adhesives: Compatible with insulation.

3 PART 3 EXECUTION

3.1 PREPARATION

- A. Install materials after piping has been tested and approved.

3.2 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Continue insulation with vapor barrier through penetrations.
- C. In exposed piping, locate insulation and cover seams in least visible locations.
- D. On insulated piping with vapor barrier, insulate fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
- E. Insulation through rated (1 hour or 2 hour) partitions or floors shall be non-combustible and shall not derate the value of the penetration.
- F. Provide an insert, not less than 6" long, of same thickness and contour as adjoining insulation, between support shield and piping, but under the finish jacket, on piping 2" in diameter or larger, to prevent insulation from sagging at support points.
- G. Neatly finish insulation at supports, protrusions, and interruptions.
- H. Finish:
 - 1. Domestic cold and hot water, indoor: Standard jackets, with or without vapor barrier. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass cloth and adhesive. PVC jackets may be used.
 - 2. Refrigerant cold vapor lines and A/C condensates:
 - a. Concealed: insulation as manufactured
 - b. Exposed: interior and exterior paint two coats as approved by insulation manufacturer and per painting specification.

3.3 INSULATION APPLICATION (TYPE A)

- A. Apply insulation to pipe and fittings with all joints tightly fitted. Secure with jacket lap strip and aluminum bands. Cover fittings with preformed PVC or aluminum cover.
- B. Hot water valves, unions and pumps do not require insulation.

3.4 INSULATION APPLICATION (TYPE G)

- A. Slip insulation on in tubular form where possible.
- B. Longitudinal joint shall be a factory applied pressure sensitive glue or hot glue, field applied.
- C. Butt joints shall use a hot glue application.

3.5 SCHEDULE

INSULATION PIPING AND THICKNESS	SYSTEM	TYPE	PIPE SIZE	VAPOR BARRIER

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3/8" or 1/2"	A/C Condensate Lines	G	All	Yes
3/4"	Domestic Hot Water	A or G	All	No
1/2"	Domestic Cold Water	A or G	All	Yes
3/4"	Refrigerant Vapor Lines	G	All	Yes

END OF SECTION

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SECTION 22 1116 DOMESTIC WATER PIPING

1 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 WORK INCLUDED

- A. Pipe and Pipe Fittings
- B. Valves
- C. Hot and Cold Domestic Water System

1.3 RELATED WORK

- A. Excavation
- B. Backfilling
- C. Trenching
- D. Painting
- E. Supports and Anchors
- F. Vibration Isolation
- G. Piping Insulation

1.4 REFERENCES

- A. ANSI/ASME B16.3 - Malleable Iron Threaded Fittings Class 150 NS 300.
- B. ANSI/ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.
- C. ANSI/ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
- D. ANSI/ASME Sect. 9- Welding and Brazing Qualifications.
- E. ANSI/ASTM B32 - Solder Metal.
- F. ANSI/ASTM - D2466 - Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40.
- G. ASME - Boiler and Pressure Vessel Code.
- H. ASTM A53 - Pipe, Steel, Black and Hot-dipped Zinc Coated, Welded and Seamless.
- I. ASTM A74 - Cast Iron Soil Pipe and Fittings.
- J. ASTM A 120 - Pipe, Steel, Black and Hot-dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Use.
- K. ASTM A232 - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- L. ASTM B88 - Seamless Copper Water Tube.
- M. ASTM B306 - Copper Drainage Tube (DWV).
- N. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe Fittings.
- O. ASTM D1785 - Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- P. ASTM D2241 - Poly Vinyl Chloride (PVC) Plastic Pipe (SDR-PR).
- Q. ASTM D2855 - Making Solvent - Cemented joints with Poly Vinyl Chloride) PVC Pipe Fittings.
- R. ASTM D3033 - Type PSP Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings
- S. ASTM D3034 - Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings.
- T. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

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- U. AWS C601 -Standard Methods for the Examination of Water and Waste Water.
- V. AWWA C601 - Standard Methods for the Examination of Water and Waste Water.
- W. CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.
- X. REFERENCES:
 - 1. ANSI B16.18 (1984; R 1994) Cast Copper Alloy Solder Joint Pressure Fittings
 - 2. ANSI B16.22 (1995) Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
 - 3. ICC/ANSI 1002 (2008) PMG Listing Criteria for Press Connection Fittings for Potable Water Tube and Radiant Heating Systems
 - 4. IAPMO PS117 (2005) Press Type or Plain End Rubber Gasketed with Nail Connection Copper and Copper Alloy Fittings for Installation on Copper Tubing
 - 5. NSF/ANSI 61 Health Effects
 - 6. NSF/ANSI 61-pw Potable water systems
 - 7. NSF/ANSI 61-G Annex G Lead Free designation

1.5 QUALITY ASSURANCE

- A. Valves: Manufacturer's name and pressure rating marked on valve body.
- B. Welding Materials and Procedures: Conform to ASME Code and applicable state labor regulations.
- C. Welders Certification: In accordance with ANSI/ASME Section 9.

1.6 SUBMITTALS

- A. Submit product data under provisions of Section 22 0500.
- B. Include data on pipe materials, pipe fittings, valves and accessories.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Section 22 0500.
- B. Store and protect products under provisions of Section 22 0500.
- C. Deliver and store materials in shipping containers with labeling in place.

2 PART 2 PRODUCTS

2.1 SANITARY WASTE AND VENT

- A. 2" and Larger
 - 1. Cast iron pipe: ASTM A74, service weight. Fittings: Cast iron. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.
- B. 1-1/2" and Smaller
 - 1. Copper Pipe: ASTM B306, DWV. Fittings: ANSI/ASME B16.3, cast bronze, or ANSI/ASTM B32, solder, Grade 50B.
 - 2. PVC Schedule 40 with solvent welded joints.
- C. PVC
 - 1. Manufactured from PVC compound with a cell class of 12454 per ASTM D 1784 and conform with National Sanitation Foundation (NSF) standards 14 and 61. Pipe shall be iron pipe size (IPS) conforming to ASTM D 1785. Socket fittings shall conform to ASTM D 2467; threaded fittings shall conform to ASTM D 2464 or D 2467. Flanges shall be 150# type per ANSI/ASME B 16.5. Solvent cements shall conform to ASTM D 2564, primer shall conform to ASTM F 656.
- D. Pipe thru rated walls and in plenums above ceilings shall be cast iron or copper.

2.2 CLEANOUTS

- A. Exterior Ground Surface Areas: Brass plug, cast iron body, nicely top and cover, scoriae cover, vandal resistant assembly, Jose 58400 Series with vandal resistant screw.

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- B. Interior Floor Areas: Brass plug, cast iron body, nicely top and cover, scoriae cover, vandal resistant screw. In carpeted areas provide carpet marker and vandal resistant screw. Jose Series 58400. .
- C. Interior Wall Areas: Round stainless with vandal resistant hardware. Jose 58990 Series.
- D. Provide two (2) special tools designed for removal of vandal resistant hardware. Deliver to Owner at project completion.

2.3 WATER PIPING AND FITTINGS

- A. Copper Tubing: ASTM B88, Type L, hard drawn. Fittings: ANSI/ASME B16.23, cast brass, or ANSI/ASME B16.29, wrought copper. Joints: Lead free ANSI/ASTM B32, Solder, Grade 95TA, Silva rite 100 or ProPress Fittings. ProPress Fittings: Bronze or copper shall conform to the material requirements of ASME B16.18 or ASME B16.22, and conform to IAPMO PS117, ICC/ANSI 1002, and NSF/ANSI61-G, if used in a potable water system. ProPress fittings 1/2 - inch thru 4-inch for use with ASTM B88 copper tube type K, L, or M and 1/2 - inch up to include 1-1/4-inch annealed copper tube. ProPress fillings shall have an EPDM sealing element and Smart Connect (SC) feature. 2- 1/2 -inch thru 4-inch shall have a 420 stainless steel grip ring, PBT separator ring, EPDM sealing element and Smart Connect (SC) feature. Sealing elements shall be verified for the intended use.

2.4 FLANGES, UNIONS AND COUPLINGS

- A. Pipe Size 2" and under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.
- B. Pipe Size Over 2": 150 psig forged steel slip-on flange for ferrous piping; bronze flanges for copper piping; fiber reinforced neoprene gaskets; 1/16" thick preformed.
- C. Dielectric Connections: Union with galvanized steel threaded end, copper solder end, water impervious isolation barrier.

2.5 ACCEPTABLE MANUFACTURERS- VALVES

- A. Crane
- B. Walworth
- C. R.P. &C.
- D. Stockham
- E. Substitutions: Under Section 15010.

2.6 GATE VALVES

- A. Up to 2-1/2": Bronze, 1251b. SWP, non-shock, screwed bonnet non-rising stem, solid wedge, meeting Federal Specification WW-V-51d, Class A, Type 1.

2.7 GLOBE VALVES

- A. Up to 2-1/2": Bronze, 1251b. SWP, non-shock, screwed bonnet non-rising stem, solid wedge, meeting Federal Specification WW-V-51d, Class A, Type 1.

2.8 BALL VALVES

- A. 2" and under: Crane 930-TF 500 lb. bronze body. UL listed.

2.9 SWING CHECK VALVES

- A. 125 lb. SWP, bronze disc screwed bonnet meeting Federal Specification WW-V-51d, Class A, Type IV.

3 PART 3 EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

- A. Provide non-conducting dielectric connections wherever joining dissimilar metals.

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- B. Route piping in orderly manner and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Provide clearance for installation of insulation and access to valves and fillings.
- G. Provide access where valves and fillings are not exposed.
- H. Slope water piping and arrange to drain at low points.
- I. Establish elevations of buried piping outside the building to ensure not less than 1.5 ft. of cover.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- K. Prepare pipe, fillings, supports and accessories not pre-finished, ready for finish painting.
- L. Establish invert elevations, slopes for drainage to 1/4" per foot for under 4" pipe, 1/8" per foot for 4" and larger pipe. Maintain gradients.
- M. Excavate in accordance with Section 31 5000.
- N. Backfill in accordance with Section 31 5000.
- O. Install bell and spigot pipe with bell end upstream.
- P. Install valves with stems upright or horizontal, not inverted.
- Q. Do not use PVC piping in return air plenums.
- R. EXECUTION:
 - 1. ProPress bronze, or copper fittings: Pipe ends shall be cut on a right angle (square) to the pipe. Pipe ends shall be reamed and chamfered, all grease, oil or dirt shall be removed from the pipe end with a clean rag. Visually examine the fitting sealing element to insure there is no damage, and it is properly seated into the fitting. Insert pipe fully into the fitting. Make a mark with a felt tip pen on the pipe at the face of the fitting. Always examine the tube to insure it is fully inserted into the fitting prior to pressing the joint. ProPress fillings 1/2 - inch thru 4-inch shall be joined using Ridgid ProPress Tools. 2-1/2-inch thru 4- inch ProPress copper fillings shall utilize Ridgid ProPress XLC Rings, and 2-1/2-inch thru 4- inch bronze ProPress fillings shall utilize Ridgid ProPress XL Rings. ProPress fillings shall be installed according to the most current edition of the Viega installation guidelines. Sealing elements shall be verified for the intended use. Installers shall attend a Viega ProPress installation training class.

3.3 APPLICATION

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.
- D. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Install globe valves for throttling, bypass, or manual flow control services.
- F. Use PVC only pipe system for waste line distribution

3.4 SERVICE CONNECTIONS

- A. Drains: Coordinate with site drawings and field conditions before commencing work. Check invert elevations required for connections, confirm inverts and ensure that these can be properly connected with slope for drainage.
- B. Water: Coordinate with site/civil drawings.

3.5 TESTING

- A. Sanitary Sewer and Vent System: Test at 10' water column to leak free condition.
- B. Domestic Water System: Hydrostatic test at 150 psig to leak free condition.

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- C. After ProPress fittings have been installed a "step test" shall be followed. Utilizing air, water, or dry nitrogen, pressurize the system not to exceed 85 psi. Walk the system and check for leaks. If you do not locate any leaks proceed to pressurize the system to the recommended pressures, not to exceed 600 psi. Should you locate a leaking joint that has not been pressed, relieve the pressure from the system, insure the tube is fully inserted into the fitting and proceed to press the fitting. Should you locate a fitting that is leaking that has been previously pressed, you can press the fitting a second time. Resume testing procedure, after the necessary repairs have been made.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Ensure PH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda ash) or acid (hydrochloric).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15% of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- H. Take samples no sooner than 4 hours after flushing, from 10% of outlets and from water entry, and analyze in accordance with AWWA C601.
- I. Submit test report for review and approval.

END OF SECTION

SECTION 26 0500

COMMON WORKS RESULTS FOR ELECTRICAL

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.
- B. Electrical Commissioning Requirements.

1.2 GENERAL REQUIREMENTS

- A. General Conditions and Supplementary Conditions of the Contract govern work under this Section.
- B. Contractors performing work shall be totally responsible for work and shall coordinate, connect and conform to all sections or divisions of the Specifications and all drawings as required to provide complete systems.
- C. Applicable provisions of the Section apply to and are hereby made part of the other Sections of these Specifications.
- D. The Drawings and Specifications shall be understood to cover, according to their intent and meaning, complete operating systems as shown on the drawings and specified under appropriate section of the specifications. The Drawings and Specifications are to be taken together. Work specified and not shown or work shown and not specified shall be performed or furnished as though mentioned in both Specifications and Drawings.
- E. Minor items and accessories or devices reasonably inferable as necessary to the complete and proper operation of any system shall be provided for such systems.
- F. Verification of Existing Conditions: No allowance shall be made for failure to investigate site before bidding.
- G. Coordinate all utility connections and service installation with respective utilities.
- H. Motor starters and controllers furnished as integral part of equipment are specified and furnished under applicable Equipment section and are not work of this section.
- I. Motor starters and controllers not furnished as integral part of equipment specified in applicable Mechanical sections, are to be provided as part of Electrical.
- J. Refer to Mechanical sections for control system wiring: Conduit and wire installation is part of this section.

1.3 CODES AND STANDARDS

- A. International Fuel Gas Code, 2012 Edition with Georgia Amendments.
- B. International Fire Code, 2012 Edition with Georgia Amendments.
- C. International Building Code, 2012 Edition with Georgia Amendments.
- D. International Plumbing Code, 2012 Edition with Georgia Amendments.
- E. International Mechanical Code, 2012 Edition with Georgia Amendments.
- F. National Electric Code, 2014 Edition.
- G. NFPA 72E- Automatic Fire Detectors.
- H. NFPA 90A- Installation of Air Conditioning & Ventilating Systems.
- I. NFPA 101 -Life Safety Code- 2012 Edition
- J. Fire Alarm Code- NFPA 72

1.4 REGULATORY REQUIREMENTS

- A. Layout of Work: Drawings are diagrammatic. Correlate final equipment locations with governing Architectural and Structural drawings and existing conditions. Lay outwork before installation so that all trades may install equipment in spaces available. Provide coordination as required for installation in a neat workmanlike manner.

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- B. Coordination: Provide all required coordination and supervision where work connects to or is affected by work of others, and comply with all requirements affecting this Division. Work required under other Divisions, specifications or Drawings to be performed by this Division shall be coordinated with this Division.
- C. Supervision of Work: Provide a field superintendent who has had previous successful experience on projects of comparable size and complexity. Superintendent shall be present at all times that work is being performed.
- D. Inspections: All work must pass routine and final inspections by the local building inspection authority.
- E. Suitably protect all materials and equipment and items furnished under this Contract during construction. Restore all damaged surfaces and items to "like new" condition before a request for final acceptance.
- F. Cleanliness Control and Cleanup: Provide temporary partitions vacuum systems or exhaust fans to control dust and debris during construction operations. Procedures shall prevent dust and debris from entering finished areas occupied by the Owner or tenants. The Contractor shall also be responsible to removal of trash on a daily basis and shall maintain the construction area free of stored materials. If the Contractor is negligent in this regard, the area will be cleared in accordance with the terms of the General Conditions.
- G. Cutting and Patching: Locate all openings required for work required under this Section. Cut openings with minimum over-cut, place sleeves or other closure system as required and patch all areas about the cut zone to match existing finishes. Openings in concrete shall be blocked out before placement of concrete. Core boring or saw cutting of concrete only on approval of the Architect.

1.5 SUBSTITUTIONS

- A. Comply with pertinent provisions of the Instructions to Bidders.

1.6 SUBMITTALS

- A. Comply with pertinent provisions of the General Conditions.
- B. Product Data: Within 30 calendar days after the Contractor has received the Owners Notice to Proceed, Submit:
 - 1. Materials list of items proposed to be provided under this section.
 - 2. Manufacturers specifications and other data needed to prove compliance with the specified requirements (NOTE: Generic or class data covering more than one piece of equipment or options shall be marked to show application for this specific project.
 - 3. Manufacturers recommended installation procedures which, when approved, will become the basis for accepting or rejecting actual installation procedures used on the Work.
 - 4. Format: Compile information by subcontractor trades and an index to contents. Organize the material in an orderly manner and mark sheets with the appropriate specification reference number followed by the submittal for that portion of the specification.
 - 5. INCOMPLETE SUBMITTALS SHALL BE RETURNED, UNREVIEWED, TO CONTRACTOR FOR COMPLETION AND RESUBMISSION.
 - 6. Coordinate items submitted under this Section with other trades for ratings and characteristics to insure proper operation, e.g., panelboard circuit breaker voltage, poles and amp rating vs. equipment electrical requirements.
 - 7. Furnish via email one copy of product data submittals to architect and to engineer showing items intended to be used on this project.

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C. Submittal Requirements:

ITEMS	PRODUCT DATA	SHOP DRAWINGS	WIRING DIAGRAMS	MAINTENANCE MANUALS	TEST REPORTS	WARRANTY
CONDUIT	X					X
WIRE	X					X
BOXES	X					X
WIRING DEVICES	X		X			X
CABINETS& ENCLOSURES	X					X
SUPPORTING DEVICES	X					X
IDENTIFICATION	X					X
DISCONNECT SWITCHES	X					X
GROUNDING DEVICES	X					X
PANELBOARDS	X	X	X	X		X
LIGHTING FIXTURES	X		X	X		X
SURGE PROTECTION	X	X	X	X		X
FIREALARM SYSTEM	X	X	X	X	X	X

D. CONTRACTOR REVIEW: Review brochure before submitting to architect. Information on each item shall be technically complete to permit an evaluation and compliance and shall bear the contractor's approval stamp, initial of checker and date checked. Requests for payment or substitutions will not be considered until brochure has been reviewed by the contractor and submitted for checking.

E. Completion Data: At substantial completion provide:

1. Three sets of manufacture(s) printed operating Instructions, maintenance procedures and spare parts recommendations for items requiring maintenance manuals.
2. Three sets of all product submittal data shall be included in maintenance manuals.

F. CONTRACTOR REVIEW: Review brochure before submitting to Architect. Information on each item shall be technically complete to permit an evaluation and compliance and shall bear the Contractor's approval stamp, initial of checker and date checked. Requests for payment or substitutions will not be considered until brochure has been reviewed by the Contractor and submitted for checking.

1.7 AS-BUILT DRAWINGS

A. In accordance with the contract.

PART 2 PRODUCTS

2.1 GUARANTEE/WARRANTY

A. Furnish one year written guarantee to Owner from date of substantial completion on material and workmanship.

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- B. Furnish extended guarantee certificate on all items where greater than one year guarantee is required.

END OF SECTION

SECTION 26 0519

CONDUCTORS AND CABLE

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 WORK INCLUDED

- A. Building power wire
- B. Wiring connections and terminations

1.3 REFERENCES

- A. NEMA WC 5 - Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- B. National Electric Code- 2014 with Georgia Amendments.
- C. Federal Specification A-A-59544
- D. UL 1569

1.4 SUBMITTALS

- A. Submit shop drawings and product data under the provisions of Section 260500.
- B. Submit manufacturer s instructions.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Southwire
- B. Aetna Insulated Wire
- C. Cerro Wire
- D. Substitutions under provisions of general contract

2.2 MATERIALS

- A. Thermoplastic-Insulated Building Wire: NEMA WC 5.
- B. Feeders and Branch Circuits Larger than #10 AWG: Copper stranded conductor, 600 volt insulation, THW or THHN/THWN.
- C. Feeders and Branch Circuits #10 AWG and Smaller: Copper conductor, 600 volt insulation, THW or THHN/THWN, solid conductor.
- D. Control Circuits: Copper, stranded conductor 600 volt insulation, THW or THWN.
- E. Telephone/Data: 4 pair 22 gage, Category 6.
- F. Type MC Cable: Lightweight galvanized steel interlocked armor enclosing type THHN/THWN insulated solid copper wire conductor. Insulation voltage rated for 240V AC.

PART 3 GENERAL WIRING METHODS

- A. Use no wire smaller than 12AWG for power and lighting circuits, and no wire smaller than 14AWG for control wiring.
- B. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 75'.

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- C. Place an equal number of conductors for each phase of a circuit in same raceway or cable.
- D. Splice only in junction or outlet boxes.
- E. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- F. Make conductor lengths equal for parallel circuits.

3.2 WIRING INSTALLATION IN RACEWAYS

- A. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricant for pulling No. 4 AWG and larger wires.
- B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
- C. Completely and thoroughly swab raceway system before installing conductors.

3.3 WIRING CONNECTIONS AND TERMINATIONS

- A. Splice only in accessible junction boxes.
- B. Use solderless pressure connectors with insulating covers for copper wire splices and taps, 8 AW for 10 AWG and smaller, use insulated spring wire connectors with plastic caps.
- C. Use split bolt connectors for copper wire splices and taps, 6 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150% of the insulation value of conductor.
- D. Thoroughly clean wires before installing lugs and connectors.
- E. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.
- F. Terminate spare conductors with electrical tape.

3.4 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 26 0500.
- B. Inspect wire and cable for physical damage and proper connection.
- C. Torque test conductor connections and terminations to manufacturers recommended values.
- D. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.
- E. Perform continuity test on all instrumentation signal and control circuit conductors.

3.5 WIRE AND CABLE INSTALLATION SCHEDULE

- A. All wire shall be installed in raceways.
- B. Install per description in NEC-2014.

3.6 COLOR CODING WIRE

- A. Color code wire as follows:

208 VAC, 3-Phase System	A Phase	Black
	B Phase	Red
	C Phase	Blue
	Neutral	White
All Equipment Ground Conductors		Green

END OF SECTION

SECTION 26 0526

GROUNDING AND BONDING

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 WORK INCLUDED

- A. Power System Grounding
- B. Communication System Grounding
- C. Electrical Equipment and Raceway Grounding and Bonding
- D. Building Grounding

1.3 SYSTEM DESCRIPTION

- A. Ground electrical service system neutral at service entrance equipment to metallic water service piping, to supplementary grounding electrodes, building steel structure and to flow slab reinforcing steel.
- B. Provide communications system grounding conductor at new telephone terminal boards and connect to nearest panelboard ground bus.
- C. Bond system neutrals, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.

1.4 SUBMITTALS

- A. Submit shop drawings under provisions of Section 26 0500.
- B. Indicate location of system grounding electrode connections, and routing of grounding electrode conductor.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Conductors: Copper, conforming to Section 26 0519.
- B. Ground clamps: copper or bronze.
- C. Ground rods: 2/3" diameter by 10' long galvanized steel.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Provide a separate, insulated equipment grounding conductor in all feeder and branch circuits. Terminate each end on a grounding lug, bus or bushing.
- B. Connect electrical service grounding electrode conductor to metal water pipe using a suitable ground clamp.
- C. Connect a supplementary grounding electrode to electrical service ground in main service equipment area.
- D. Use minimum 6 AWG copper conductor and as noted for communications service grounding conductor. Leave 5' slack conductor at terminal board.

END OF SECTION

SECTION 26-0529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

1 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 WORK INCLUDED

- A. Conduit and equipment supports.
- B. Fastening hardware.

1.3 RELATED WORK

- A. Cast-in-place concrete

1.4 QUALITY ASSURANCE

- A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

2 PART 2 PRODUCTS

2.1 MATERIALS

- A. Support Channel: Galvanized or painted steel
- B. Hardware: Corrosion resistant.
- C. Clevis Hangers. For supporting rigid metal conduit, galvanized steel, with 1/2" diam. Hole for round steel rod.
- D. Riser Clamps: For supporting rigid metal conduit, galvanized steel, with 2 bolts and nuts, and 4" ears.
- E. C-Clamps: Black malleable iron, 1/2" rod size.
- F. 1-Beam Clamps: Black steel 1-1/4" X 3/16" stock, 3" cross bolt, flange width 2".
- G. One hole Conduit Straps: For supporting 3/4" rigid metal conduit, galvanized steel
- H. Two hole Conduit Straps: For supporting 3/4" rigid metal conduit, galvanized steel, 3/4" strap width and 2-1/8" between center of screw holes.
- I. Hexagon Nuts: For 1/2" rod size, galvanized steel.
- J. Round Steel Rod: Black steel, 3/8" diameter minimum
- K. Offset Conduit Clamps: for supporting rigid metal conduit: black steel

3 PART 3 EXECUTION

3.1 INSTALLATION

- A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors, preset inserts and spring steel clips.
- B. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls, self-drilling anchors or expansion anchor on concrete surfaces, sheet metal screws in sheet metal studs, and wood screws in wood construction.
- C. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.

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- D. Do not drill structural members without approval.
- E. Do not use powder actuated anchors.
- F. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lockwashers under all nuts.
- G. In we locations install free standing electrical equipment on concrete pads.
- H. Install surface mounted cabinets and panelboards with minimum of four anchors. Provide 3/4" plywood or steel channel supports to stand cabinet off wall.
- I. Provide extra studs as required to mount flush mounted cabinets and panelboards in studwalls.
- J. Use hangers suitable for connection to channels provided and shown in the Architectural details.
- K. Repair fire protective coating materials damaged during construction in accordance with procedures described in the U.L. Design specified on the Architectural drawings.

END OF SECTION

SECTION 26 0533

BOXES

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 WORK INCLUDED

- A. Wall and ceiling outlet boxes.
- B. Pull and junction boxes.

1.3 RELATED WORK

- A. Cabinets and Enclosures

1.4 REFERENCES

- A. ANSI/NEMA OS-1 and OS-2: Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts maximum).

PART 2 PRODUCTS

2.1 OUTLET BOXES

- A. Sheet metal outlet boxes: ANSIIINEMA OS 1: one piece galvanized steel, with 1/2" male fixture studs where required.
- B. Cast Boxes: Cast fer alloy, deep type, gasketed cover, threaded hubs.
- C. Cast non-metallic with gasketed cover.

2.2 PULL AND JUNCTION BOXES

- A. Sheet metal Boxes: ANSI/NEMA OS 1; Galvanized steel.
- B. Sheet metal boxes larger than 12" in any dimension: NEMA-250 Type 1 steel with screw cover.
- C. Cast metal boxes for outdoor and wet location installations: NEMA 250; Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as raintight. Galvanized cast iron box and cover with ground flange, neoprene gasket, and stainless steel cover screws.
- D. Cast metal boxes for underground installations: NEMA 250; Type 4, outside flanged, recessed cover box for flush mounting, UL listed as raintight. Galvanized cast iron box and plain cover with neoprene gasket and stainless steel cover screws.
- E. Fiberglass handholes for underground installations: Diemolded with pre-cut 6 x 6 inch cable entrance at center bottom of each side; fiberglass weatherproof cover with non-skid finish.
- F. Underground enclosures shall be Composolite as manufactured by Quazite Corporation or approved equal. Enclosures and covers shall be concrete gray color and rated for no less than 5,000 lbs over a 10"x10" area and be designed and tested to temperatures of -50°F. Material compressive strength should be no less than 11,000 psi. Covers shall have a minimum coefficient of friction of 0.5 and shall have logo "ELECTRIC" on top surface. Boxes shall be stackable for extra depth.

PART 3 EXECUTION

3.1 COORDINATION OF BOX LOCATIONS

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- A. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.
- B. Electrical box locations shown on Contract Drawings are approximate unless dimensioned.
- C. Locate and install boxes to allow access. Where installation is inaccessible, coordinate locations and sizes of required access doors with architectural details and other trades.

3.2 BOX INSTALLATION

- A. Do not install boxes back-to-back in walls. Provide minimum 8" separation, except provide minimum 24" separation in acoustic-rated walls.
- B. Locate boxes in masonry walls to require cutting of masonry unit at bottom of one cell. Coordinate masonry cutting to achieve neat openings for boxes.
- C. Provide knockout closures for unused openings.
- D. Support boxes independently of conduit except for cast box that is connected to two rigid metal conduits, both supported within 12" of box.
- E. Use multiple-gang boxes where multiple devices are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.
- F. Concealed Outlets: At all concealed outlets for electric lights, switches, wall receptacles, telephones, etc., standard one piece galvanized steel outlet boxes shall be provided where required. Boxes and covers shall not be less than 1/16" thick and in every instance of such form dimensions as to be adapted to its specific use and location, kind of fixtures to be used, number, size, and arrangement of conduit connecting thereto. Outlet boxes shall be provided with 3/8" fixture studs where required.
- G. Wiring Device Boxes: For switches, receptacles, thermostats, telephones, etc., installed in concrete block, gypsum or plaster walls shall be square cornered, 2-1/8" deep and set with device ring, flush with the finished wall. Boxes shall be steel 4" or 4-11/16" square cornered with tile ring device adapter.
- H. Ceiling Outlets: Ceiling Outlets shall be 4" octagon, 4" or 4-11/16" square boxes with covers as required for space for conductors and for conduit arrangement. Where lighting fixtures are hung from the outlet box, 3/8" fixture studs shall be provided. Ceiling outlet boxes shall be supported with Caddy No. 512 clips as a minimum support. See details for special support requirements. Boxes supporting chandeliers shall have structural support designed for the specific fixture load.
- I. Install boxes in walls without damaging wall insulation.
- J. Caulk around boxes in exterior and rated walls.
- K. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes, and within special casework. Review placement with architectural details.

<u>Device:</u>	<u>Standard Mounting:</u>
Switch Outlet	48" Center Line
Convenience Receptacle	16" to bottom and as noted
Wall Bracket Lights	As directed
Data/telephone Outlet	16" to bottom and as noted
Fire Alarm Chimes/Horns/Speakers, Strobe Lights	Wall 6" below ceiling (max. 96" AFF) (ADA: min. 80")
TV	16" and as noted
Above Break Area Counter	Coordinate with backsplash
AIC Controller	48" to Bottom of Box

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- L. Position outlets to locate luminaires as shown on reflected ceiling plans.
 - M. In inaccessible ceiling areas, position outlets and junction boxes to be accessible through luminaire ceiling opening.
 - N. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.
 - O. Align wall-mounted outlet boxes for switches, thermostats and similar devices.
 - P. Provide cast outlet boxes in exterior locations exposed to the weather and wet locations.
- 3.3 PULL AND JUNCTION BOX INSTALLATION
- A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.
 - B. Support pull and junction boxes independent of conduit.
 - C. Coordinate locations with work of other Sections/Divisions of the specifications to insure working access to open face of box.

END OF SECTION

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SECTION 26 0535

RACEWAYS

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 WORK INCLUDED

- A. Rigid metal conduit and fittings.
- B. Intermediate metal conduit and fittings.
- C. Electrical metallic tubing and fittings.
- D. Flexible metal conduit and fittings.
- E. Liquid-tight flexible metal conduit and fittings.
- F. Non-metallic conduit and fittings.

1.3 RELATED WORK

- A. Cutting and Patching.
- B. Trenching: Excavation and backfill for conduit and utilities on site.
- C. Cast in-place Concrete: Protective envelope for underground conduit installations.
- D. Sheet Metal Flashing and Trim.

1.4 REFERENCES

- A. ANSI C80.1 -Rigid Steel Conduit, Zinc-Coated.
- B. ANSI C80.3 - Electrical Metallic Tubing, Zinc-Coated.
- C. ANSI/NEMA FB 1-Fittings and Supports for Conduit and Cable Assemblies
- D. FS WW-C-563- Electrical Metallic Tubing.
- E. FS WW-C-566- Specification for Flexible Metal Conduit.
- F. FS WW-C-581 -Specification for Galvanized Rigid Conduit.
- G. NEMA TC 2- Electrical Plastic Tubing (EPT) and Conduit and Tubing.
- H. NEMA TC 3- PVC Fittings for Use with Rigid PVC Conduit and Tubing.

PART 2 PRODUCTS

2.1 INTERMEDIATE METAL CONDUIT (IMC) AND FITTINGS

- A. Conduit: Galvanized Steel.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; Use fittings and conduit bodies specified above for rigid steel conduit.

2.2 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS

- A. EMT: ANSI C80.3 or FS WW-C-563 galvanized tubing.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; Steel compression and set screw type.

2.3 FLEXIBLE METAL CONDUIT FITTINGS

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- A. Conduit: FA WW-C-566; Steel.
 - B. Fittings and Conduit Bodies: ANSI/NEMA FB 1.
- 2.4 LIQUIDTIGHT FLEXIBLE CONDUIT AND FITTINGS
- A. Conduit: Flexible metal conduit with PVC jacket.
 - B. Fittings and Conduit Bodies: ANSI/NEMA FB 1.
- 2.5 PLASTIC CONDUIT AND FITTINGS
- A. Conduit: NEMA TC 2; Schedule 40 PVC.
 - B. Fittings and Conduit Bodies: NEMA TC 3.
- 2.6 RIGID METAL CONDUIT AND FITTING
- A. Rigid steel conduit: ANSI C80.1, FS WW-C-581
 - B. Fittings and conduit bodies: ANSI/NEMA FI3; threaded type, material to match conduit.
- 2.7 CONDUIT SUPPORTS
- A. Conduit Clamps, Straps and Supports: Steel or malleable iron.
- PART 3 EXECUTION**
- 3.1 CONDUIT SIZING, ARRANGEMENT AND SUPPORT
- A. Size conduit for conductor type installed or for type THW conductors. Flexible metal sheathed cable (Type MC with ground) may be used for all concealed branch circuits rated at 20 or 30 Amps.
 - B. Arrange conduit to maintain headroom and present a neat appearance.
 - C. Route exposed conduit and conduit parallel and perpendicular to walls and adjacent piping.
 - D. Maintain minimum 6" clearance between conduit and piping. Maintain 12" clearance between conduit and heat sources such as flues, hot pipes, and heating appliances.
 - E. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.
 - F. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25% additional conduit.
 - G. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.
 - H. Support conduit at a maximum of 7' on center.
- 3.2 CONDUIT INSTALLATION
- A. Cut conduit square using a saw or pipe cutter; de-burr and ream cut ends.
 - B. Bring conduit to the shoulder of fittings and couplings and fasten securely.
 - C. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations.
 - D. Install no more than the equivalent of three 90 degree bends between boxes.
 - E. Use conduit bodies to make sharp changes in direction, as around beams.
 - F. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 1-1/2" size.
 - G. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.

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- H. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.
- I. Provide No. 12 AWG insulated conductor or suitable pull string in empty conduit, except sleeves and nipples.
- J. Install expansion joints where conduit crosses building expansion joints.
- K. Where conduit penetrates fire-rated walls and floors, provide mechanical fire-stop fittings with UL listed fire rating equal to wall or floor rating. See details on Architectural Drawings.
- L. Route conduit through roof openings for piping and ductwork where possible; otherwise, route through roof jack with seal fittings.
- M. Maximum Size Conduit routed within Slabs above Grade: 3/4". Conduits crossing each other may not be larger than 1/2".
- N. Use rigid steel factory elbows for bends in plastic conduit larger than 1".
- O. Wipe plastic conduit clean and dry before joining. Apply full even coat of cement to entire area that will be inserted into fitting.

3.3 CONDUIT INSTALLATION SCHEDULE

- A. Raceways may be routed below floor within the building unless noted to be above slab.
- B. EMT, rigid or IMC, shall be installed for all interior locations as follows:
 - 1. Concealed in walls and above ceilings.
 - 2. Exposed in electrical rooms and mechanical rooms and above floor shop bays.
- C. Exposed Outdoor Locations: Intermediate metal conduit or electrical metallic tubing.
- D. Wet Interior Locations: Intermediate metal conduit, rigid steel or electrical metallic tubing.
- E. Flexible Metal Conduits:
 - 1. Non-jacketed for concealed and exposed dry locations.
 - 2. Provide liquid-tight flexible conduit for connection of motors and other electrical equipment where subject to movement and vibration, and also where connections are subject to one or more of the following conditions:
 - a. Exterior locations
 - b. Moist or humid atmosphere where condensate can be expected to accumulate
 - c. Corrosive atmosphere
 - d. Water spray
 - e. Dripping oil, grease or water
- G. Installations in or under concrete slab on grade, or Underground over 5 feet from building: •schedule 40 plastic conduit. Elbow up thru slab shall be rigid steel.
- H. In or under concrete slab on grade within building. Rigid steel, IMC with plastic coating or •schedule 40 PVC.

3.4 CONDUIT FITTING SCHEDULE

- A. Rigid or Intermediate Metal Conduit: Threaded.
- B. Electrical Metallic Tubing:
 - 1. Wet or Damp or in Concrete: Steel compression.
 - 2. Dry: Steel compression or steel set screw.
- C. Flexible: Compression type.
- D. Plastic Conduit: Solvent type.

3.5 CABLE TRAY

- A. Install in accordance with manufacturer's instructions.
- B. Coordinate routing with placement of other trades ducts, equipment and devices.

STILLWELL-CLYO ROAD FIRE STATION

SECTION 26 2416

PANELBOARDS

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 WORK INCLUDED

- A. Lighting and appliance branch circuit panelboards

1.3 RELATED WORK

- A. Contactors
- B. Supporting Devices

1.4 REFERENCES

- A. FS W-C-375 - Circuit Breakers, Molded Case, Branch Circuit and Service.
- B. FS W-P-115 - Power Distribution Panel.
- C. NEMA PB 1 - Panelboards.
- D. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 volts or less.
- E. NEMA PB 1.2 - Application Guide for Ground Fault Protective Devices for Equipment.
- F. NEMA AB 1 - Molded case circuit breakers.

1.5 SUBMITTALS

- A. Submit shop drawings for equipment and component devices under provisions of Section 26 0500.
- B. Include outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

1.6 SPARE PARTS

- A. Keys: Furnish 4 for each panel to Owner.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS- PANELBOARDS

- A. Siemens ITE
- B. General Electric
- C. Square-D
- D. Cutler-Hammer
- E. Substitutions: Under provisions of Section 26 0500.

2.2 BRANCH CIRCUIT PANELBOARD

- A. Lighting and Appliance Branch Circuit panelboards: NEMA PB 1; circuit breaker type.
- B. Enclosure: NEMA PB; Type 1.
- C. Cabinet Size: 5" deep; 20" wide.

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- D. Provide flush/surface mounted cabinet front with concealed trim clamps, concealed hinge and flush lock all keyed alike. Finish in manufacturers standard gray enamel.
- E. Provide panelboards with tinned copper or aluminum bus, ratings as scheduled on Drawings. Provide copper ground bus in all panelboards.
- F. Minimum Integrated Short Circuit Rating: 22,000 amps.
 - 1. 10,000 amperes RMS symmetrical for 120/208 volt panelboards. See Drawings for specific requirements.
- G. Molded Case Circuit Breakers:
 - 120/208V panelboards: NEMA AB 1; bolt-in type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled on Drawings. Branch circuit breakers: bolt-on type.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install panelboards plumb in conformance with NEMA PB 1.
- B. Height: 6' above finished floor to highest breaker (6'6" maximum to top of panel).
- C. Provide filler plates for unused spaces in panelboards.
- D. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

3.2 FIELD QUALITY CONTROL

- A. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 20%, rearrange circuits in the panelboard to balance the phase loads within 20%. Take care to maintain proper phasing for multi-wire branch circuits.
- B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

3.3 PANELBOARD SCHEDULE -SEE DRAWINGS

END OF SECTION

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SECTION 26 2726

PART 1 GENERAL

WIRING DEVICES

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 WORK INCLUDED

- A. Switches
- B. Receptacles
 - 1. Standard
 - 2. Ground Fault
- C. Device plates and box covers

1.3 REFERENCES

- A. FS W-C-596- Electrical Power, Connector, Plug, Receptacle and Cable Outlet.
- B. FSW-S-896- Switch, Toggle.
- C. NEMA WD 1- General Purpose Wiring Devices.
- D. NEMA WD 5- Specific Purpose Wiring Devices.

1.4 SUBMITTALS

- A. Submit product data under provisions of Section 26 0500.
- B. Provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS- WALL SWITCHES AND RECEPTACLES.

- A. General Electric
- B. Bryant
- C. Leviton
- D. Hubbell
- E. Sierra
- F. Arrow Hart
- G. Eagle
- H. Substitutions: Under provision of Section 26 0500

2.2 WALL SWITCHES (SPECIFICATION GRADE)

- A. Wall switches for lighting circuits and motor loads under 1/2 HP: NEMA WD- 1; AC general use snap switch with toggle handle, rated 20 amperes and 120- 277 volts AC.
- B. Pilot Light Type: Lighted handle
- C. Locator Type: Lighted handle
- D. Switch Color: Ivory

2.3 RECEPTACLES (SPECIFICATION GRADE)

- A. Convenience Receptacle Configuration: NEMA WD-1. General use: NEMA Type 20R, unless noted.
- B. Locking Blade Receptacles: NEMA WD 5.
- C. Specific use receptacle Configuration: NEMA WD 1 or WD 5; Type as indicated on Drawings, black or brown plastic face.
- D. GFCI Receptacles: Duplex convenience receptacle with integral ground fault current interrupter.
- E. Receptacle Color: Ivory

2.4 ACCEPTABLE MANUFACTURERS- WALL PLATES

- A. General Electric
- B. Bryant
- C. Leviton
- D. Hubbell
- E. Sierra
- F. TayMac
- G. Substitutions: Under Section 26 0500.

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2.5 WALL PLATES

- A. Finished Areas: Smooth finish stainless steel.
- B. Weatherproof Receptacles, Cover Plate: Gasketed ultraviolet-stabilized polycarbonate with hinged gasketed device cover that does not diminish integrity of weatherproofing when receptacle is in use. Minimum two stainless steel screw attachment.
- C. Unfinished Areas: Galvanized Steel.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install wall switches OFF position down. (3-way will vary.)
- B. Install convenience receptacles 16" to bottom of box above finish floor, and as directed/noted. Grounding pole on top.
- C. Install specific-use receptacles at heights shown on Contract Documents.
- D. Install wall plates on switch, receptacle, and blank outlets in finished areas, after painting is complete. DO NOT install wall plates if wall opening/cutout extends beyond the edge of the device plate at any point. Coordinate/repair wall finish to provide proper opening size.
- E. Install galvanized steel plates on outlet boxes and junction boxes in shop mechanical and equipment rooms.
- F. Install devices and wall plates flush and level.

3.2 TESTING

- A. Test each outlet for proper wiring sequence (line, neutral, ground).
- B. Verify each device is firmly supported from the device tabs and screws, not from the device plate.

END OF SECTION

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SECTION 26 2816

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Disconnect switches
- B. Fuses
- C. Enclosures

1.3 REFERENCES

- A. ANSI/UL 198C - High-Intensity Capacity Fuses; Current Limiting Types.
- B. ANSI/UL 198E - Class R Fuses.
- C. FS W-F-870 - Fuseholders (for Plug and Enclosed Cartridge Fuses).
- D. FS W-S 865 - Switch, Box (enclosed), Surface-mounted.
- E. NEMA KS 1- Enclosed Switches.

1.4 SUBMITTALS

- A. Submit product under provisions of Section 26 0500.
- B. Include outline drawings with dimensions, and equipment ratings for voltage, capacity, horsepower, and short circuit, interrupting capacity.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS- DISCONNECT SWITCHES

- A. Square-D
- B. General Electric
- C. Siemens ITE
- D. Cutler-Hammer
- E. Substitutions: Under provisions of Section 26 0500.

2.2 DISCONNECT SWITCHES 240 VOLT RATED

- A. Fusible Switch Assemblies: NEMA KS 1; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse clips: Designed to accommodate Class Rand J fuses. Heavy duty rated.
- B. Non-fusible Switch Assemblies: NEMA KS 1; Type HD; FS W-S-865; quick make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front switch in ON position. Handle lockable in OFF position. Heavy duty rated.
- C. Enclosures: Dry locations; NEMA 1; wet/damp locations: NEMA 3R.

2.3 ACCEPTABLE MANUFACTURERS- FUSES

- A. Gould
- B. Buss
- C. Littlefuse
- D. Substitutions: Under provisions of Section 26 0500.

2.4 FUSES

- A. Fuses 600 Amperes and Less: ANSI/UL 198C, Class J, Dual element.

- B. Interrupting Rating: 100,000 RMS amperes.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install disconnect switches where indicated on Drawings.
- B. Install fuses in fusible disconnect switches.
- C. Provide 3 spare fuses of each size used on the Project.

END OF SECTION

SECTION 26 4300

SURGE PROTECTIVE DEVICES

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 DESCRIPTION

- A This section describes the materials and installation requirements for surge protection device (SPD) for the protection of all AC electrical circuits from the effects of lightning induced currents, sub-station switching transients and internally generated transients resulting from inductive and/or capacitive load switching.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. General Electrical Requirements.
- B. Raceways, Boxes and Fittings
- C. Wire and Cable
- D. Grounding

1.4 SUBMITTALS

- A Submit shop drawings, product data and manufacturer's installation instructions.
- B. The surge protective device shall also include:
 - 1. Dimensional drawing of each suppressor type including mounting arrangements.
 - 2. Manufacture(s) certified test data for each protective type indicating:
 - a. Compliance with this section.
 - b. Category C3 test results.
 - c. UL 1449 clamping documentation.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A Advanced Protection Technologies
- B. Lea Dynatech
- C. MCG
- D. Sentrex
- E. Current Technology
- F. Substitutions: Under section 26 0500
- G. Siemens Energy and Energy & Automation, Inc.

2.2 SUPPRESSORS FOR BRANCH CIRCUIT PANELBOARD

- A Suppressors shall be UL listed in accordance with UL 1449, Standard for Safely, Surge Protective Devices.
- B. For 3-phase, 4-wire delta configurations, suppressors shall provide suppression elements between all phases and each phase conductor and the system neutral, and between each phase and ground. An additional suppression element is required between the system neutral and the electrical grounding conductor providing a total of (10) suppression elements.
- C. SPD manufacturer shall provide certified test data confirming a fail short failure mode.
- D. Visible indication of proper SPD connection and operation shall be provided.
- E. SPD shall be close-nippled to the panel being protected. The mounting position of the suppressor shall permit a straight and short lead length connection between the SPD and the point of connection to the panelboard. Other SPD connections will not be acceptable.
- F. SPD shall meet or exceed the following criteria:
 - 1. Maximum single impulse current rating: 80,000 amperes (8 x 20 μ s – wave form).

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NOTE: If the suppressor utilizes fuses, the maximum single impulse current cannot exceed the rating of the fuse.

2. Pulse life rating: 5,000 amperes (8 x 20 μ s - wave form): 50 occurrences.
 3. Pulse life rating: 1,000 amperes (8 x 20 μ s - wave form): 100 occurrences.
 4. Maximum clamping voltage will be listed 500V for a 3KA, 8x20 μ s current waveform.
- G. SPD shall have turn-on and turn-off times of less than 1 nanosecond.
- H. SPD shall be of solid-state componentry and shall operate bi-directionally.

PART 3 EXECUTION

3.1 BRANCH CIRCUIT PANELBOARDS

- A. Install one secondary SPD at each branch panel.
- B. SPD shall be connected on the load side of the branch panel main, using #10 copper conductors.
- C. Conductors between SPD and point of attachment to the panelboard shall be kept as short and straight as possible.
- D. SPD shall be installed with separate grounding and grounded conductors. The grounding and grounded conductor shall have no contact at this point.

3.3 WARRANTY

- A. The SPD will have a warranty guarantee for a period of five years, incorporating a one time free replacement if the suppressor is destroyed by lightning within the warranty period.

END OF SECTION

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SECTION 26 5100

LIGHTING FIXTURES

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 WORK INCLUDED

- A. Interior luminaires and accessories
- B. Exterior luminaires and accessories
- C. Lamps
- D. Ballasts

1.3 RELATED WORK

- A. Trenching: Excavation and backfill
- B. Ceilings
- C. Painting

1.4 REFERENCES

- A. ANSI C82.1 - Specification for Fluorescent Lamp Ballasts.
- B. FS W-F-414 - Fixture, Lighting (Fluorescent, Alternating Current, Pendant Mounting).
- D. UL924 - Emergency Lighting and Power Equipment.

1.5 SUBMITTALS

- A. Submit products data under provisions of Section 26 0500.
- B. Include outline drawings, lamp and ballast data, support points, weights and accessory information for each luminaire type.
- C. Submit manufacturer's installation instructions under provisions of Section 26 0500.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Section 26 0500.
- B. Store and protect products under provisions of Section 26 0500.

PART 2 PRODUCTS

2.1 INTERIOR LUMINAIRES AND ACCESSORIES

- A. Fluorescent luminaires: FS-WF-414. Surface and recessed with lenses as scheduled.
 - 1. Recessed Fixtures: Provide hinged frame with latches and trim to install in the ceiling system as installed.

2.2 EXTERIOR LUMINAIRES AND ACCESSORIES

- A. Enclosures: Complete with gaskets to form weatherproof assembly.
- B. Provide low temperature drivers with reliable starting to 10°F.

2.3 ACCEPTABLE MANUFACTURERS - LAMPS

- A. Osram
- B. General Electric
- C. Sylvania
- D. Phillips
- E. Substitutions: Under provisions of Section 26 0500.

2.4 LAMPS

- A. Fluorescent Lamps: (3500°K design for all fluorescent lamps)
 - 1. 4' long T8 SP35, nominal 2900 lumens.

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- B. LED 3500° K

2.5 ACCEPTABLE MANUFACTURERS - FLUORESCENT BALLASTS

- A. Advance
- B. General Electric
- C. Universal
- D. Magnetek
- E. Substitutions: Under provisions of Section 26 0500.

2.6 FLUORESCENT BALLASTS

- A. Fluorescent Ballasts: ANSI C82.1; High power factor type. Class p, CBM Certified, sound rating "A".
- B. Electronic type, UL listed. Meets FCC regulations, Part 15J "E" rated.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install lamps in luminaires and lampholders.
- B. Support surface-mounted luminaires from ceiling grid T structure; provide auxiliary support laid across top of ceiling T's, fasten using bolts, screws, rivets or approved ceiling framing member clips.
- C. Install recessed luminaires in non-accessible ceiling to permit removal from below. Use plaster frames. Install grid clips in dry ceiling systems.
- D. Support recessed fixtures in T-grid ceilings with a minimum of two wires at diagonal corners of the fixture. Wires to extend from fixture to structure above.

3.2 RELAMPING

- A. Relamp luminaires which have failed lamps at completion of Work.

3.3 ADJUSTING AND CLEANING

- A. Align luminaires and clean lenses and diffusers at completion of Work. Clean paint splatters, dirt, and debris from installed luminaires.
- B. Replace all damaged fixtures and lenses.

3.4 LUMINAIRE SCHEDULE - SEE DRAWINGS.

END OF SECTION

SECTION 26 5200

EMERGENCY LIGHTING EQUIPMENT

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Emergency lighting units.
- B. Emergency exit signs.

1.2 REFERENCES

- A. FS W-L-305- Light Set, General Illumination (Emergency or Auxiliary).
- B. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.
- C. NEMA WD1 -General Purpose Wiring Devices.

1.3 REGULATORY REQUIREMENTS

- A. Conform to NFPA 101 for installation requirements.

1.4 SUBMITTALS

- A. Submit product data under provisions of Section 26 0500.
- B. Provide product data for emergency lighting units and exit signs.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS- SELF-CONTAINED EMERGENCY POWER EXIT SIGNS

- A. Sure-Lites
- B. Lithonia
- C. Dual-Lite
- D. Substitutions: under provisions of Section 26 0500.

2.2 INCANDESCENT EMERGENCY LIGHTING UNITS

- A. Emergency Lighting Unit: FS W-L-305; Type I, Class I, self contained unit with rechargeable storage batteries, charger and lamps.
- B. Battery: 6-volt, nickel-cadmium or lead calcium type, with 1.5 hours capacity to supply the connected lamp load.
- C. Charger: Dual-rate charger, capable of maintaining the battery in a full-charge state during normal conditions and capable of recharging discharged battery to fully charged within 12 hours.
- D. Lamps: 8 watt minimum, quartz-halogen.
- E. Indicators: Provide lamps to indicate AC ON and CHARGING.
- F. Provide test switch to transfer unit from normal supply to battery supply.
- G. Electrical Connection: Knock-out for conduit connection.

2.3 ACCEPTABLE MANUFACTURERS- SELF-CONTAINED EMERGENCY POWER EXIT SIGNS

- A. Lithonia
- B. Sure-Lites
- C. Dual-lite
- D. Substitutions - Under Section 26 0500

2.4 SELF-CONTAINED EMERGENCY POWER EXIT SIGNS

- A. Exit Signs: White face stencil, 6" high green letters, directional arrows as indicated, universal mounting type with integral emergency battery backup and charger.

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- B. Type: Exit signs with integral battery-operated emergency power supply, including power failure relay, test switch, AC ON pilot light, battery, and fully-automatic two-rate charger.
- C. Battery: Sealed lead acid or lead calcium cell, requiring no maintenance or replacement for 10 years under normal conditions.
- D. Light emitting diode (LED) lamping.

2.5 ACCEPTABLE MANUFACTURERS- EMERGENCY FLUORESCENT LAMP POWER SUPPLY

- A. Iota
- B. Bodine
- C. Substitutions: Under Section 26 0500.

2.6 EMERGENCY FLUORESCENT LAMP POWER SUPPLY

- A. Unit: Self-contained with automatic transfer to battery supply on power failure, including test switch, AC ON pilot light, battery, and full-automatic two-rate charger, and power supply capable of operating one 4' fluorescent lamp with output of 1100 lumens.
- B. Battery: Sealed lead acid or lead calcium cell, requiring no maintenance or replacement for 10 years under normal conditions.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install units plumb and level.
- B. Aim directional lampheads as directed.
- C. Install battery inverter units on fixtures as specified.

END OF SECTION