# Alton Maintenance Building Restroom Renovation Specifications
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**01019**

**CONTRACT REQUIREMENTS**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Schedule of values.
B. Application for payment.
C. Change procedures.
D. Alternatives.

1.2 RELATED SECTIONS

A. Section 01600 - Material and Equipment: Product substitutions.

1.3 SCHEDULE OF VALUES

A. Submit a printed schedule on Contractor's standard form. Electronic media printout will be considered.

B. Submit Schedule of Values in duplicate within 20 days after date of Owner-Contractor Agreement.

C. Revise schedule to list approved Change Orders, with each Application For Payment.

1.4 APPLICATIONS FOR PAYMENT

A. Submit four copies of each application on Contractor's electronic media driven form.
B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
C. Payment Period: 30 days.
D. Include an updated construction progress schedule.
E. Certified payroll records.

1.5 CHANGE PROCEDURES

A. The Architect/Engineer/Designer may issue a Notice of Change that includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required.

B. The Contractor may propose changes by submitting a request for change to the Architect/Engineer/Designer describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, the effect on the Contract Sum/Price and Contract Time, and a statement describing the effect on Work by the MoDOT District or other Contractors.

C. Stipulated Sum/Price Change Order: Based on Notice of Change and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by Architect/Engineer/Designer.

D. Construction Change Directive: Architect/Engineer/Designer may issue a directive instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute the change.

E. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract. Architect/Engineer/Designer will determine the change allowable in Contract Sum/Price and Contract Time as provided in the Contract Documents.

F. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

G. Execution of Change Orders: Architect/Engineer/Designer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

1.6 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specify requirements.

B. If, in the opinion of the Architect/Engineer/Designer, it is not practical to remove and replace the Work, the Architect/Engineer/Designer will direct an appropriate remedy or adjust payment.

1.7 ALTERNATIVES

A. Accepted Alternatives will be identified in Owner-Contractor Agreement.

**END OF SECTION**

**01039**

**COORDINATION AND MEETING REQUIREMENT**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coordination and project conditions.
B. Field engineering.
C. Preconstruction meeting.
D. Site mobilization meeting.
E. Progress meetings.
F. Preinstallation meetings.
G. Equipment electrical characteristics and components.
H. Examination.
I. Preparation.
J. Cutting and Patching.
K. Alteration project procedures.

1.2 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.

B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to and placing in service, such equipment.

C. Coordinate space requirements, supports, and installation of mechanical and electrical Work, which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas, except as otherwise indicated, conceal pipes, ducts and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

E. Coordinate completion and clean up of Work of separate sections in preparation for Substantial Completion.

F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.3 PRECONSTRUCTION MEETING

A. Architect/Engineer/Designer will schedule a meeting after Notice of Award.
B. Attendance Required: District engineer or representative, Architect/Engineer/Designer and Contractor.
C. Record minutes and distribute copies within 5 days after meeting to participants, with two copies to District Engineer, Architect/Engineer/Designer, participants and those affected by decisions made.

1.4 SITE MOBILIZATION MEETING

A. Architect/Engineer/Designer will schedule a meeting at the Project site prior to Contractor occupancy.

B. Architect/Engineer/Designer will record minutes and distributes copies within 5 days after meeting to participants, with two copies to Architect/Engineer/Designer, participants and those affected by decisions made.

1.5 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at when arranged by Architect/Engineer/Designer.

B. Architect/Engineer/Designer will make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.

C. Attendance Required: Job superintendent, major Subcontractors and suppliers, District engineer representative, Architect/Engineer/Designer, as appropriate to agenda topics for each meeting.

D. Agenda:
1. Review of Work progress.
2. Field observations, problems, and decisions.
3. Identification of problems, which impede planned progress.
4. Maintenance of progress schedule.
5. Corrective measures to regain projected schedules.
6. Coordination of projected progress.
7. Effect of proposed changes on progress schedule and coordination.

E. Record minutes and distributes copies within 5 days after meeting to participants and those affected by decisions made.

1.6 PREINSTALLATION MEETING

A. When required in individual specification sections, convene a pre-installation meeting at the site prior to commencing work of the section.
B. Notify Architect/Engineer/Designer seven days in advance of meeting date.
C. Prepare agenda and preside at meeting:
1. Review conditions of installation, preparation and installation procedures.
2. Review coordination with related work.
D. Record minutes and distributes copies within 5 days after meeting to participants and those affected by decisions made.

**PART 2 PRODUCTS**

Not used

**PART 3 EXECUTION**

3.1 CUTTING AND PATCHING

A. Employ skilled and experienced installer to perform cutting and patching.

B. Submit written request in advance of cutting or altering elements, which affect:
1. Structural integrity of element.
2. Integrity of weather-exposed or moisture-resistant elements.
3. Work of Owner or separate contractor.

C. Execute cutting, fitting, and patching to complete Work, and to:
   1. Uncover Work to install or correct ill-timed Work.
   2. Remove and replace defective and non-conforming Work.
   3. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

D. Cut masonry and concrete materials using masonry saw or core drill.

E. Fit Work tight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.

F. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

G. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

H. Identify hazardous substances or conditions exposed during the Work to the Architect/Engineer/Designer for decision or remedy.

3.2 ALTERATION PROJECT PROCEDURES

A. Materials: As specified in Product sections; match existing Products and work for patching and extending work.

B. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.

C. When finished surfaces are cut so that a smooth transition with new Work is not possible, terminate existing surface along a straight line at a natural line of division and submit recommendation to Architect/Engineer/Designer for review.

D. Patch or replace portions of existing surfaces that are damaged, lifted, discolored or showing other imperfections.

E. Finish surfaces as specified in individual Product sections.

**END OF SECTION**

**01300**

**SUBMITTAL REQUIREMENTS**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittal procedures.
B. Construction progress schedules.
C. Proposed Products list.
D. Product Data.
E. Shop Drawings.
F. Samples.
G. Design data.
H. Test reports.
I. Certificates.
J. Manufacturer's instructions.
K. Manufacturer's field reports.
L. Erection drawings.
M. Construction photographs.

1.2 RELATED SECTIONS

A. Section 01300 - Submittals
B. Section 01400 - Quality Control: Manufacturers' field services and reports.
C. Section 01700 - Contract Closeout: Contract warranties, bonds, manufacturers' certificates and closeout submittals.

1.3 REFERENCES

A. AGC Associated General Contractors of America publication "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry".

1.4 SUBMITTAL PROCEDURES

A. Submit five (5) hard copies of each submittal with Architect/Engineer/Designer accepted form.

B. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number and specification section number, as appropriate.

C. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work and coordination of information is in accordance with the requirements of the Work and Contract Documents.

D. Schedule submittals to expedite the Project, and deliver to Architect/Engineer/Designer at business address. Coordinate submission of related items.

E. For each submittal for review, allow 15 days excluding delivery time to and from the contractor.

F. Identify variations from Contract Documents and Product or system limitations, which may be detrimental to successful performance of the completed Work.

G. Submittals not requested will not be recognized or processed.

1.5 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial schedule in duplicate within 15 days after date established in Notice to Proceed.
B. Revise and resubmit as required.
C. Submit revised schedules with each Application for Payment, identifying changes since previous version.
D. Submit a horizontal bar chart with separate line for each major portion of Work or operation, identifying first workday of each week.

1.6 PROPOSED PRODUCTS LIST

A. Within 15 days after date of Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name and model number of each product.
B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation and reference standards.

1.7 PRODUCT DATA

A. Product Data for Review:
   1. Submitted to Architect/Engineer/Designer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
   2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.

B. Product Data for Information:
   1. Submitted for the Architect/Engineer/Designer’s knowledge as contract administrator or for the Owner.

C. Product Data for Project Closeout:
   1. Submitted for the Owner's benefit during and after project completion.

D. Submit the number of copies, which the Contractor requires, plus two copies that will be retained by the Architect/Engineer/Designer.

E. Mark each copy to identify applicable products, models, options and other data. Supplement manufacturers' standard data to provide information specific to this Project.

F. After review distribute in accordance with the Submittal Procedures article above and provide copies for record documents described in Section 01700 - CONTRACT CLOSEOUT.

1.8 SHOP DRAWINGS

A. Shop Drawings for Review:
   1. Submit five (5) hard copies to Architect/Engineer/Designer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
   2. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.

B. Shop Drawings for Information:
   1. Submitted for the Architect/Engineer/Designer’s knowledge as contract administrator or for the Owner.

C. Shop Drawings For Project Closeout:
   1. Submitted for the Owner's benefit during and after project completion.

D. Indicate special utility and electrical characteristics, utility connection requirements and location of utility outlets for service for functional equipment and appliances.

E. Submit in the form of one reproducible transparency and one opaque reproduction.

1.9 SAMPLES

A. Samples for Review:
   1. Submitted to Architect/Engineer/Designer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
   2. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.

B. Samples for Information:
   1. Submitted for the Architect/Engineer/Designer’s knowledge as contract administrator or for the Owner.

C. Samples for Selection:
   1. Submitted to Architect/Engineer/Designer for aesthetic, color, or finish selection.
   2. Submit samples of finishes for Architect/Engineer/Designer selection.
   3. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.

1.10 DESIGN DATA

A. Submit for the Architect/Engineer/Designer’s knowledge as contract administrator or for the Owner.
B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.11 TEST REPORTS

A. Submit for the Architect/Engineer/Designer’s knowledge as contract administrator or for the Owner.
B. Submit test reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.12 CERTIFICATES

A. When specified in individual specification sections, submit certification by the manufacturer, installation/application subcontractor, or the Contractor to Architect/Engineer/Designer, in quantities specified for Product Data.
B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits and certifications as appropriate.
C. Certificates may be recent or previous test results on material or Product but must be acceptable to Architect/Engineer/Designer.

1.13 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery,

storage, assembly, installation, and start-up, adjusting and finishing, to Architect/Engineer/Designer for delivery to owner in quantities specified for Product Data.

B. Indicate special procedures, perimeter conditions requiring special attention and special environmental criteria required for application or installation.

C. Refer to Section 01400 - Quality Control, Manufacturers' Field Services article.

1.14 MANUFACTURER'S FIELD REPORTS

A. Submit reports for the Architect/Engineer/Designer's benefit as contract administrator or for the Owner.

B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.15 ERECTION DRAWINGS

A. Submit drawings for the Architect/Engineer/Designer’s benefit as contract administrator or for the Owner.

B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

C. Data indicating inappropriate or unacceptable Work may be subject to action by the Architect/Engineer/Designer or Owner.

**END OF SECTION**

**01400**

**QUALITY CONTROL REQUIREMENTS**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Quality assurance - control of installation.
B. Tolerances
C. References and standards.
D. Mock-up.
E. Inspecting and testing laboratory services.
F. Manufacturers' field services.

1.2 RELATED SECTIONS

A. Section 01300 - Submittals: Submission of manufacturers' instructions and certificates.
B. Section 01600 - Material and Equipment: Requirements for material and product quality.
C. Section 01650 - Starting of Systems.

1.3 QUALITY ASSURANCE - CONTROL OF INSTALLATION

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

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

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer/Designer before proceeding.

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

E. Perform Work by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

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

1.4 TOLERANCES

A. Monitor fabrication and installation tolerance control of Products to produce acceptable Work. Do not permit tolerances to accumulate.
B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer/Designer before proceeding.
C. Adjust Products to appropriate dimensions; position before securing Products in place.

1.5 REFERENCES AND STANDARDS

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

B. Conform to reference standard by date of issue current on date for receiving bids or date specified in the individual specification sections, except where a specific date is established by code.
C. Neither the contractual relationships, duties or responsibilities of the parties in Contract nor those of the Architect/Engineer/Designer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.6 TESTING SERVICES

A. Contractor to provide all testing services as called out in these specifications.
B. Testing and source quality control may occur on or off the project site. Perform off-site testing as required by the Architect/Engineer/Designer or the Owner.
C. Testing does not relieve Contractor to perform Work to contract requirements.
D. Re-testing required because of non-conformance to specified requirements shall be performed by the same MoDOT personnel on instructions by the Architect/Engineer/Designer.

1.7 INSPECTION SERVICES

A. Owner will employ MoDOT Personnel to perform inspection.
B. Inspecting may occur on or off the project site. Perform off-site inspecting as required by the Architect/Engineer/Designer or the Owner.
C. Inspecting does not relieve Contractor to perform Work to contract requirements.

1.8 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and the balancing of equipment as applicable and to initiate instructions when necessary.
B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
C. Refer to Section 01300 - SUBMITTALS, MANUFACTURERS' FIELD REPORTS article.

**PART 2 EXECUTION**

2.1 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

2.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.
B. Seal cracks or openings of substrate prior to applying next material or substance.
C. Apply manufacturer required or recommended substrate primer, sealer or conditioner prior to applying any new material or substance in contact or bond.

**END OF SECTION**

**01500**

**CONSTRUCTION FACILITIES AND TEMPORARY CONTROL REQUIREMENTS**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities: Electricity.
B. Temporary Controls: protection of the Work.
C. Construction Facilities: progress cleaning.

1.2 TEMPORARY ELECTRICITY

A. Cost: By Contractor; pay for temporary power service furnished by MoDOT.

1.3 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

1.4 FENCING

A. Construction: Use plastic mesh safety fencing or better.
B. Provide 48" high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.5 EXTERIOR ENCLOSURES

A. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.6 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification sections.
B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.
C. Provide protective coverings at walls, projections, jambs, sills and soffits of openings.
D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage or movement of heavy objects, by protecting with durable sheet materials.
E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
F. Prohibit traffic from landscaped areas.

1.7 SECURITY

A. Provide security and facilities to protect Work and existing facilities and Owner's operations from unauthorized entry, vandalism or theft.
B. Coordinate with Owner's security program.

1.8 ACCESS ROADS

A. Provide and maintain access to fire hydrants, free of obstructions.
B. Provide means of removing mud from vehicle wheels before entering streets.

C. Designated existing on-site roads may be used for construction traffic.

1.9 PROGRESS CLEANING AND WASTE REMOVAL

A. Maintain areas free of waste materials, debris and rubbish. Maintain site in a clean and orderly condition.
B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces and other closed or remote spaces, prior to enclosing the space.
C. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.
D. Collect and remove waste materials, debris and rubbish from site periodically and dispose off-site.
E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.95 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities and materials prior to Final Application for Payment inspection.
B. Clean and repair damage caused by installation or use of temporary work.
C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

**PART 2 PRODUCTS**

Not Used.

**PART 3 EXECUTION**

Not Used.

**END OF SECTION**

**01600**

**MATERIAL AND EQUIPMENT REQUIREMENT**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products.
B. Transportation and handling.
C. Storage and protection.
D. Product options.
E. Substitutions.

1.2 RELATED SECTIONS

A. Instructions to Bidders: Product options and substitution procedures.
B. Section 01400 - Quality Control: Product quality monitoring.

1.3 PRODUCTS

A. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
B. Provide interchangeable components of the same manufacture for components being replaced.

1.4 TRANSPORTATION AND HANDLING

A. Transport and handle Products in accordance with manufacturer's instructions.
B. Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct and products are undamaged.
C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement or damage.

1.5 STORAGE AND PROTECTION

A. Store and protect Products in accordance with manufacturers' instructions.

B. Store with seals and labels intact and legible.

C. Store sensitive Products in weather tight, climate controlled, enclosures in an environment favorable to Product.

D. For exterior storage of fabricated Products, place on sloped supports above ground.

E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.

F. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.

G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement or damage.

I. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

1.6 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description is acceptable.
B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.
C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named in accordance with the following article.

1.7 SUBSTITUTIONS

A. Architect/Engineer/Designer will consider requests for Substitutions only within 15 days after date established in Notice to Proceed.

B. Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

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

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedure:
1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
2. Submit shop drawings, product data and certified test results attesting to the proposed Product equivalence. Burden of proof is on proposer.
3. The Architect/Engineer/Designer will notify Contractor in writing of decision to accept or reject request.

**PART 2 PRODUCTS**

Not Used.

**PART 3 EXECUTION**

Not Used.

**END OF SECTION**

**01650**

**STARTING OF SYSTEMS REQUIREMENT**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Starting systems.
B. Demonstration and instructions.
C. Testing, adjusting and balancing.

1.2 RELATED SECTIONS

A. Section 01400 - Quality Control: Manufacturers field reports.
B. Section 01700 - Contract Closeout: System operation and maintenance data and extra materials.

1.3 STARTING SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect/Engineer/Designer seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, and control sequence and for conditions that may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable manufacturer's representative or Contractors' personnel in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check and approve equipment or system installation prior to start-up and to supervise placing equipment or system in operation.

H. Submit a written report in accordance with Section 01300 that equipment or system has been properly installed and is functioning correctly.

1.4 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of Final Completion.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.

D. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance and shutdown of each item of equipment at agreed time, at equipment location.

E. Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instruction.

F. The amount of time required for instruction on each item of equipment and system that's specified in individual sections.

**PART 2 PRODUCTS**

Not Used.

**PART 3 EXECUTION**

Not Used.

**END OF SECTION**

**01700**

**CONTRACT CLOSEOUT REQUIREMENT**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Closeout procedures.
B. Final cleaning.
C. Adjusting.
D. Project record documents.
E. Operation and maintenance data.
F. Spare parts and maintenance Products.
G. Warranties.

1.2 RELATED SECTIONS

A. Section 01500 - Construction Facilities and Temporary Controls: Progress cleaning.
B. Section 01650 - Starting of Systems: System start-up, testing, adjusting and balancing.

1.3 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer/Designer's review.
B. Provide submittals to Owner that is required by governing or other authorities.
C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments and sum remaining due.
D. Owner will occupy portions of the building as specified in Section 01010.
E. Projects shall not be accepted by MoDOT until the vendor has completed all punch list items. The vendor will then have 30 days to submit all required paperwork necessary to close the project. Failure to submit the required paperwork within 30 days could result in the debarment or suspension of the contractor from future projects

1.4 FINAL CLEANING

A. Execute final cleaning prior to final project assessment. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

B. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

C. Clean or replace filters of operating equipment used during construction and/or adjustment.

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

E. Clean site; sweep paved areas, rake clean landscaped surfaces.

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

1.5 ADJUSTING

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

1.6 PROJECT RECORD DOCUMENTS

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

B. Record information concurrent with construction progress.

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

D. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish main floor datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   4. Field changes of dimension and detail.
   5. Details not on original Contract drawings.

E. Submit documents to Architect/Engineer/Designer'swith claim for final Application for Payment.

1.7 OPERATION AND MAINTENANCE DATA

A. Submit data bound in 8-1/2 x 11 inch (A4) text pages, three D side ring binders with durable plastic covers.
B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project and subject matter of binder when multiple binders are required.
C. Internally subdivide the binder contents with permanent page dividers, logically organized; with tab titling clearly printed under reinforced laminated plastic tabs.
D. Submit 1 draft copy of completed volumes 15 days prior to final inspection. This copy will be reviewed and returned with Architect/Engineer/Designer comments. Revise content of all document sets as required prior to final submission.
E. Submit two sets of revised final volumes, within 10 days after final inspection.

1.8 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra Products in quantities specified individual specification sections.
B. Deliver to Project site; obtain receipt prior to final payment.
C. Examine system components at a frequency consistent with reliable operation. Clean, adjust and lubricate as required.
D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
E. Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Owner.

1.9 WARRANTIES

A. Execute and assemble transferable warranty documents from Subcontractors, suppliers and manufacturers.
B. Submit prior to final Application for Payment.
C. For items of Work delayed beyond date of Final Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of the warranty period.

**PART 2 PRODUCTS**

Not Used.

**PART 3 EXECUTION**

Not Used.

**END OF SECTION**

**02050**

**DEMOLITION**

## PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. The work to be done under these Specifications shall include all labor, materials, equipment and services necessary to complete all demolition of designated areas; removal of slab-on-grade where shown on plans, removal of wood stud walls, disconnecting utilities to demolished areas and removing utility lines as noted on Partial Site Plan.

## PART 2 PRODUCTS

This Section not used.

## PART 3 EXECUTION

3.1 PROTECTION OF EXISTING FACILITIES

A. The contractor shall, as soon as he receives a Notice to Proceed with work, enter the premises and do any and all things necessary to protect the premises from damage by unauthorized persons. The contractor shall protect all existing equipment, pavements, tracks, poles, pipes, utilities, etc., which are not affected by demolition work. The contractor shall provide all shoring, bracing, tarps, temporary partitions, barricades, and/or other safety devices deemed necessary for protection.

3.2 OWNERSHIP OF PROPERTY

A. No right, title property or interest of any kind whatsoever in or to the land or premises upon which such buildings or structures stand, is created, assigned, conveyed, granted, or transferred to the contractor, or any other person or persons, except only the right on entry to remove such buildings and structures in strict accordance with the Contract.
B. Only such property may be salvaged by contractor as is owned by MoDOT, and in the event of any doubt respecting the ownership of any particular property, the contractor shall request from MoDOT a written statement respecting its ownership.
C. All salvage becomes the property of the contractor, or as noted, but storage of such materials and equipment of the project area will not be permitted except for the duration of the demolition contract.
D. Personal property of third persons or of occupants of building on the site shall not become the property of the contractor.

3.3 DEMOLITION REQUIREMENTS

The work under this contract shall consist of the following:

A. Demolition and removal items shown in the Construction Documents.
B. Provide, erect, and maintain temporary barriers and security devices.
C. Protect existing landscaping and/or paving that are not to be demolished.
D. Disconnect cap and identify designated utilities. See Partial Site Plan for specific instructions.
    1. Maintain and preserve utilities traversing premises as long as same are required.
E. Remove and dispose of all concrete slab on grade.
F. All open areas shall be filled. Where excavations or open areas are not backfilled within 24 hours, the contractor will be required to encircle the open area by a standard snow fence, or equal.
G. Perform all other incidental work necessary to fully complete the contract.

H. Backfill open pits and holes caused as a result of demolition. Use backfill as described in section 02220.

I. All rubbish, non-reusable fill, debris, equipment, etc., resulting from demolition work shall be removed from the premises during and-or upon completion of work, leaving the site area acceptable to the satisfaction of the owner.

J. The contractor shall furnish the disposal site for all demolition materials.

K. The contractor shall take whatever steps necessary to control dust during demolition and removal.

**END OF SECTION**

**02220**

**EXCAVATING, BACKFILLING AND COMPACTING**

## PART 1 GENERAL

1.1 SUMMARY

A Excavate, backfill, compact, and grade the site to the elevations shown on the Drawings, as specified herein, and as needed to meet the requirements of the construction shown in the Contract Documents.

B. Related work:

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

1.2 QUALITY ASSURANCE

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

B. Use equipment adequate in size, capacity and numbers to accomplish the work of this Section in a timely manner.

C. In addition to complying with requirements of governmental agencies having jurisdiction, comply with the directions of the MoDOT Inspector.

1.3 DELIVERY, STORAGE AND HANDLING

A. Comply with pertinent provisions of Section 01620.

## PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. Fill and backfill materials:

1. Provide soil materials free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension, and with not more than 15% of the rocks or lumps larger than 2-3/8" in their greatest dimension.
2. Fill material is subject to the approval of the MoDOT Inspector, and are those materials removed from excavations or imported from off-site borrow areas; predominantly granular, non-expansive soils free from roots and other deleterious matter.
3. Do not permit rocks having a dimension greater than 1" in the upper 12" of fill or embankment.
4. Cohesionless material used for structural backfill. Provide sand free from organic material and other foreign matter, and as approved by the MoDOT Inspector.
5. Where granular base is called for under building slabs, provide aggregate complying with requirements of Section 03300 of these Specifications.

2.2 TOPSOIL

A. Where and if shown on the Drawings or otherwise required, provide topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic matter normal to the region, capable of sustaining healthy plant life, and reasonably free from subsoil, roots, heavy or stiff clay, stones larger than 2" in greatest dimension, noxious weeds, sticks, brush, litter and other deleterious matter.

B. Obtain topsoil/backfill from sources within the project limits as approved by Owner, or provide imported topsoil obtained from sources outside the project limits or from both sources.

2.3 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

**PART 3 EXECUTION**

3.1 SURFACE CONDITIONS

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

3.2 FINISH ELEVATIONS AND LINES

A. Comply with pertinent provisions of Section 01050.

3.3 PROCEDURES

A. Utilities:
1. Unless shown to be removed, protect active utility lines shown on the Drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.
2. If active utility lines are encountered and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Architect and secure his instructions.
5. Do not proceed with permanent relocation of utilities until written instructions are received from the Architect.

B. Protection of persons and property:
1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
3. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, washout and other hazards created by operations under this Section.

C. Dewatering:
1. Remove all water, including rainwater encountered during trench and sub-structure work to an approved location by pumps, drains and other approved methods.
2. Keep excavations and site construction area free from water.

D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors and to other work being performed on or near the site.

E. Maintain access to adjacent areas at all times.

3.4 EXCAVATING

A. Perform excavating of every type of material encountered within the limits of the Work to the lines, grades and elevations indicated and specified herein.

B. Satisfactory excavated materials:
   1. Transport to and place in, fill or embankment areas within the limits of the Work.

C. Unsatisfactory excavated materials:
   1. Excavate to a distance below grade as directed by the MoDOT Inspector and replace with satisfactory materials.
   2. Include excavation of unsatisfactory materials and replacement by satisfactory materials, as parts of the work of this Section.

D. Surplus materials:
   1. Dispose of unsatisfactory excavated material, and surplus satisfactory excavated material, away from the site at disposal areas arranged and paid for by the Contractor.

E. Excavation of rock:
   1. Where rocks, boulders, granite, or similar material is encountered, and where such material cannot be removed or excavated by conventional earth moving or ripping equipment, take required steps to proceed with the general grading operations of the Work, and remove or excavate such material by means which will neither cause additional cost to the Owner nor endanger buildings or structures whether on or off the site.
   2. Do not use explosives without written permission from the Architect.

F. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.

G. Borrow:
   1. Obtain material required for fill or embankment in excess of that produced within the grading limits of the Work from borrow areas selected and paid for by the Contractor and approved by the MoDOT Inspector.

H. Ditches and gutters:
   1. Cut accurately to the cross sections, grades and elevations shown.
   2. Maintain excavations free from detrimental quantities of leaves, sticks, trash, and other debris until completion of the Work.
   3. Dispose of excavated materials as shown on the Drawings or directed by the MoDOT Inspector; except do not, in any case, deposit materials less than 3'-0" from the edge of a ditch.

I. Unauthorized excavation:
   1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific instruction from the Architect or the MoDOT Inspector.
   2. Under footings, foundations, or retaining walls:
      a. Fill unauthorized excavations by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering the required top elevation.

      b. When acceptable to the soil engineer, lean concrete fill may be used to bring the bottom elevation to proper position.
   3. Elsewhere backfill and compact unauthorized excavations as specified for authorized excavations, unless otherwise directed by the soil engineer.

J. Stability of excavations:
1. Slope sides of excavations to 1:1 or flatter, unless otherwise directed by the MoDOT Inspector.
2. Shore and brace where sloping is not possible because of space restrictions or stability of the materials being excavated.
3. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

K. Excavating for structures:
1. Conform to elevations and dimensions shown within a tolerance of 0.10 ft, and extending a sufficient distance from footings and foundations to permit placing and removing concrete formwork, installation of services, other construction required and for inspection.
2. In excavating for footings and foundations, take care not to disturb bottom of excavation:
   a. Excavate by hand tools to final grade just before concrete is placed.
   b. Trim bottoms to required lines and grades to leave solid base to receive concrete.
3. Excavate for footings and foundations only after general site excavating, filling and grading are complete.

L. Excavating for pavements:
1. Cut surface under pavements to comply with cross sections, elevations and grades.

M. Cold weather protection:
1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

## 3.5 FILLING AND BACKFILLING

A. General:
1. For each classification listed below, place acceptable soil material in layers to required subgrade elevations.
2. In excavations:
   a. Use satisfactory excavated or borrowed materials.
3. Under building slabs:
   a. Use subbase materials.
4. Under building slabs:
   a. Use granular fill, if so called for on the Drawings, complying with aggregate acceptable under Section 03300 of these Specifications.

B. Backfill excavations as promptly as progress of the Work permits, but not until completion of the following.
1. Acceptance of construction below finish grade including, where applicable, dampproofing and waterproofing.
2. Inspecting, testing, approving and recording locations of underground utilities.
3. Removing concrete formwork.
4. Removing shoring and bracing and backfilling of voids with satisfactory materials.
5. Removing trash and debris.
6. Placement of horizontal bracing on horizontally supported walls.

C. Ground surface preparation:
1. Remove vegetation, debris, unsatisfactory soil materials, obstructions and deleterious matter from ground surface prior to placement of fills.
2. Plow, strip, or break up sloped surfaces steeper than one vertical to four horizontal so that fill material will bond with existing surface.
3. When existing ground surface has a density less than that specified under "compacting" for the particular area, break up the ground surface, pulverize, moisture-condition to the optimum moisture content and compact to required depth and percentage of maximum density.

D. Placing and compacting:
1. Place backfill and fill materials in layers not more than 8" in loose depth.
2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
3. Compact each layer to required percentage of maximum density for area.
4. Do not place backfill or fill material on surfaces that are muddy, frozen or containing frost or ice.
5. Place backfill and fill materials evenly adjacent to structures, to required elevations.
6. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.
7. Where the construction includes basement or other underground walls having structural floors over them, do not backfill such walls until the structural floors are in place and have attained sufficient strength to support the walls.

3.6 GRADING

A. General:
1. Uniformly grade the areas within limits of grading under this Section, including adjacent transition areas.
2. Smooth the finished surfaces within specified tolerance.
3. Compact with uniform levels or slopes between points where elevations are shown on the Drawings, or between such points and existing grades.
3. Where a change of slope is indicated on the Drawings, construct a rolled transition section having a minimum radius of approximately 8'0", unless adjacent construction will not permit such a transition or if such a transition defeats positive control of drainage.

B. Grading outside building lines:
1. Grade areas adjacent to buildings to achieve drainage away from the structures and to prevent ponding.

2. Finish the surfaces to be free from irregular surface changes, and:
a. Shape the surface of areas scheduled to be under walks to line, grade and cross-section, with finished surface not more than 0.10 ft above or below the required subgrade elevation.
b. Shape the surface of areas scheduled to be under pavement to line, grade and cross-section, with finished surface not more than 0.05 ft above or below the required subgrade elevation.

3.7 COMPACTING

A. Control soil compaction during construction to provide the minimum percentage of density specified for each area as determined according to ASTM D1557.

B. Provide not less than the following maximum density of soil material compacted at optimum moisture content for the actual density of each layer of soil material in place and as approved by the MoDOT Inspector.
1. Structures:
a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum density.

2. Lawn and unpaved areas:
a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum density.
b. Compact the upper 12" of filled areas, or natural soils exposed by excavating, at 85% of maximum density.

3. Walks:
   a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum density.
4. Pavements:
   a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum density.

C. Moisture control:
1. Where subgrade or layer of soil material must be moisture-conditioned before compacting, uniformly apply water to surface of subgrade or layer of soil material to prevent free water appearing on surface during or subsequent to compacting operations.
2. Remove and replace or scarify and air dry, soil material that is too wet to permit compacting to the specified density.
3. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by disking, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the MoDOT Inspector.

3.8 MAINTENANCE

A. Protection of newly graded areas:
1. Protect newly graded areas from traffic and erosion, and keep free from trash and weeds;
2. Repair and establish grades in settled, eroded and rutted areas to the specified tolerances.

B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape and compact to the required density prior to further construction.

**END OF SECTION**

**02221**

# TRENCHING, BACKFILLING AND COMPACTING

## PART 1 GENERAL

### 1.1 SUMMARY

A. Trench, backfill, and compact as specified herein and as needed for installation of underground utilities associated with the Work.

B. Related work:

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

### 1.2 QUALITY ASSURANCE

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

B. Use equipment adequate in size, capacity and numbers to accomplish the work in a timely manner.

C. In addition to complying with requirements of governmental agencies having jurisdiction, comply with the directions of the construction soil engineer.

### 1.3 DELIVERY, STORAGE AND HANDLING

A. Comply with pertinent provisions of Section 01620.

## PART 2 PRODUCTS

### 2.1 SOIL MATERIALS

A. Fill and backfill materials:

1. Provide soil materials free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension, and with not more than 15% of the rocks or lumps larger than 2-3/8" in their greatest dimension.
2. Fill material is subject to the approval of the owner/architect and is that material removed from excavations or imported from off-site borrow areas, predominantly granular, non-expansive soil free from roots and other deleterious matter.
3. Do not permit rocks having a dimension greater than 1" in the upper 12" of fill.
4. Cohesionless material used for backfill: Provide sand free from organic material and other foreign matter and as approved by the Owner/Architect

### 2.2 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

## PART 3 EXECUTION

### 3.1 SURFACE CONDITIONS

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

3.2 FINISH ELEVATIONS AND LINES

A. Comply with pertinent provision of Section 01050.

3.3 PROCEDURES

A. Utilities:
1. Unless shown to be removed, protect active utility lines shown on the drawings or otherwise made known to the Contractor prior to trenching. If damaged, repair or replace at no additional cost to the Owner.
2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Architect and secure his instructions.
5. Do not proceed with permanent relocation of utilities until written instructions are received form the Architect.

B. Protection of persons and property:
1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
3. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, washout and other hazards created by operations under this Section.

C. Dewatering:
1. Remove all water, including rainwater, encountered during trench and sub-structure work to an approved location by pumps, drains and other approved methods.
2. Keep trenches and site construction area free from water.

D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors and to other work being performed on or near the site.

E. Maintain access to adjacent areas at all times.

3.4 TRENCHING

A. Comply with pertinent provisions of Section 02220 and the provisions of this Section.

B. Provide sheeting and shoring necessary for protection of the Work and for the safety of personnel.
1. Prior to backfilling, remove all sheeting.
2. Do not permit sheeting to remain in the trenches except when, in the opinion of the Architect, field conditions or the type of sheeting or methods of construction such as use of concrete bedding are such as to make removal of sheeting impracticable. In such cases, the Architect may permit portions of sheeting to be cut off and remain in the trench.

C. Open cut:
1. Excavate for utilities by open cut.
2. If conditions at the site prevent such open cut and if approved by the Architect, trenching may be used.
3. Short sections of a trench may be tunneled if, in the opinion of the Architect, the conductor can be installed safely and backfill can be compacted properly into such tunnel.

4. Where it becomes necessary to excavate beyond the limits of normal excavations lines in order to remove boulders or other interfering objects, backfill the voids remaining after removal of the objects as directed by the construction soil engineer.
5. When the void is below the subgrade for the utility bedding, use suitable earth materials and compact to the relative density directed by the construction soil engineer, but in no case to a relative density less than 90%%.
6. When the void is in the side of the utility trench or open cut, use suitable earth or sand compacted or consolidated as approved by the construction soil engineer but in no case to a relative density less than 80%.
7. Remove boulders and other interfering objects and backfill voids left by such removals, at no additional cost to the Owner.
8. Excavating for appurtenances:
    a. Excavate for manholes and similar structures to a distance sufficient to leave at least 12" clear between outer surfaces and the embankment or shoring that may be used to hold and protect the banks.
    b. Overdepth excavation beyond such appurtenances that has not been directed will be considered unauthorized. Fill with sand, gravel or lean concrete as directed by the construction soil engineer and at no additional cost to the Owner.

D. Trench to the minimum width necessary for proper installation of the utility, with sides as nearly vertical as possible. Accurately grade the bottom to provide uniform bearing for the utility.

E. Depressions:
1. Dig bell holes and depressions for joints after the trench has been graded. Provide uniform bearing for the pipe on prepared bottom of the trench.
2. Except where rock is encountered, do not excavate below the depth indicated or specified.
3. Where rock is encountered, excavate rock to a minimum overdepth of 4" below the trench depth indicated or specified.

F. Where utility runs traverse public property or are subject to governmental or utility company jurisdiction, provide depth, bedding, cover and other requirements as set forth by legally constituted authority having jurisdiction but in no case less than the depth shown in the Contract Documents.

G. Where trenching occurs in existing lawns, remove turf in sections and keep damp. Replace turf upon completion of the backfilling.

H. Cover:
1. Provide minimum trench depth indicated below to maintain a minimum cover over the top of the installed item below the finish grade or subgrade.
    a. Areas subject to vehicular traffic:
        (1) Sanitary sewers:
        (2) Storm drains:
    b. Areas not subject to vehicular traffic:
        (1) Sanitary sewers: 30";
        (2) Storm drains: 18".
    c. All areas:
        (1) Water lines: 30";
        (2) Natural gas lines: 24";
        (3) Electrical cables: 42";
        (4) Electrical ducts: 36".
    d. Concrete encased:
        (1) Pipe sleeves for water and gas lines: 24";
        (2) Sanitary sewers and storm drains: 12";
        (3) Electrical ducts: 24".

2. Where utilities are under a concrete structure slab or pavement, the minimum depth need only be sufficient to completely encase the conduit or pipe sleeve and electrical long-radius rigid metal conduit rise, provided it will not interfere with the structural integrity of the slab or pavement.
3. Where the minimum cover is not provided encase the pipes in concrete as indicated. Provide concrete with a minimum 28th day compressive strength of 2500 psi.

3.5 BEDDING

A. Provide bedding as indicated on the Drawings.

3.6 BACKFILLING

A. General:
1. Do not completely backfill trenches until required pressure and leakage tests have been performed, and until the utilities systems as installed conform to the requirements specified in the pertinent Sections of these Specifications.
2. Except as otherwise specified or directed for special conditions, backfill trenches to the ground surface with selected material approved by the construction soil engineer.
3. Reopen trenches that have been improperly backfilled, to a depth as required for proper compaction. Refill and compact as specified or otherwise correct to the approval of the construction soil engineer.
4. Do not allow or cause any of the Work performed or installed to be covered up or enclosed by work of this Section prior to required inspections, tests and approvals.
5. Should any of the Work be so enclosed or covered up before it has been approved, uncover all such Work and, after approvals have been made, refill and compact as specified, all at no additional cost to the Owner.

B. Lower portion of trench:
1. Deposit approved backfill and bedding material in layers of 6" maximum thickness, and compact with suitable tampers to the density of the adjacent soil, or grade as specified herein, until there is a cover of not less than 24" over sewers and 12" over other utility lines.
2. Take special care in backfilling and bedding operations to not damage pipe and pipe coatings.

C. Remainder of trench:
1. Except for special materials for pavements, backfill the remainder of the trench with material free from stones larger than 6" or 1/2 the layered thickness, whichever is smaller, in any dimension.
2. Deposit backfill material in layers not exceeding the thickness specified and compact each layer to the minimum density directed by the construction soil engineer.

D. Adjacent to buildings: Mechanically compact backfill within ten feet of buildings.

E. Consolidation of backfill by jetting with water may be permitted, when specifically approved by the construction soil engineer, in areas other than building and pavement areas.

3.7 TEST FOR DISPLACEMENT OF SEWERS AND STORMDRAINS

A. Check sewers and storm drains to determine whether displacement has occurred after the trench has been backfilled to above the pipe and has been compacted as specified.
B. Flash a light between manholes or, if the manholes have not yet been constructed, between the locations of the manholes, by means of a flashlight or by reflecting sunlight with a mirror.
C. If the illuminated interior of the pipeline shows poor alignment, displaced pipes, or any other defects, correct the defects to specified conditions and at no additional cost to the Owner.

3.8 PIPE JACKING

A. The Contractor may, at his option, install steel pipe casings, tongue-and-groove reinforced concrete pipes, and steel pipes under existing roads or pavements by jacking into place using procedures approved by the governmental agencies having jurisdictional approved by the construction soil engineer.

3.9 TUNNELING OPERATIONS

A. The Contractor may, at his option, tunnel pipes into position using procedures approved by the construction soil engineer and the governmental agencies having jurisdiction.

3.10 FIELD QUALITY CONTROL

A. The construction soil engineer will inspect open cuts and trenches before installation of utilities, and will make the following tests:
   1. Assure that trenches are not backfilled until all tests have been completed.
   2. Check backfilling for proper layer thickness and compaction.
   3. Verify that test results conform to the specified requirements, and that sufficient tests are performed.
   4. Assure that defective work is removed and properly replaced.

**END OF SECTION**

**02660**

**WATER DISTRIBUTION SYSTEM**

## PART 1 GENERAL

1.1 SUMMARY

A. Provide water distribution system as shown on the Drawings, specified herein and needed for a complete and proper installation.

B. Related work:

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

1.2 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
3. Names and addresses of the nearest service and maintenance organization that readily stocks repair parts.
4. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.3 QUALITY ASSURANCE

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

1.4 DELIVERY, STORAGE AND HANDLING

A. Comply with pertinent provisions of Section 01620.

## PART 2 PRODUCTS

2.1 PIPE AND FITTINGS

A. General:

1. Assume connection point to building service lines as being approximately five feet outside buildings and structures to which service is required.
2. Pipe materials 3" size and larger: Use cast iron, ductile iron, plastic or asbestos cement pipes unless otherwise indicated or approved in advance by the Architect.
3. Pipe materials less than 3" size: Use PVC or galvanized steel.

B. Pipe:

1. Cast iron pipe:
   a. Comply with ANSI A-21.6 or ANSI A-21.8, with working pressure of not less than 150 psi unless otherwise shown or specified.
   b. Use cement mortar lining complying with ANSI A-21.4 or AWWA C205, standard thickness.

2. Ductile iron pipe:
    a. Comply with ANSI A-21.51, with working pressure of not less than 150 psi unless otherwise shown or specified.
    b. Use cement mortar lining complying with ANSI A-21.4 or AWWA C205, standard thickness.
3. Plastic pipe:
    a. Use acrylonitrile-butadine-styrene (ABS) complying with ASTM D15527; or
    b. Use polyvinyl-chloride (PVC) complying with ASTM D1785, schedule 40.
4. Galvanized steel:
    a. Use steel pipe risers and fittings, with PVC or ABS couplings below grade to steel risers for hose bibbs, and complying with ASTM A120.

C. Joints:
1. Cast iron or ductile iron pipe:
    a. Use mechanical joints of the stuffing-box type complying with ANSI A-21.11 as modified by ANSI A-21.51 for ductile iron pipe, with push-on joints complying with ANSI A-21.11 for cast iron, and ANSI A-21.51 for ductile iron; or
    b. Use rubber gaskets and lubricant complying with applicable requirements of ANSI A-21.11.
2. Plastic pipe:
    a. Use solvent cement for PVC joints complying with ASTM D2564.
    b. Use solvent cement for ABS joints complying with ASTM D2235.
3. Steel pipe fittings 2-1/2" or less in diameter:
    a. Use malleable iron bonded screw fittings, manufactured to standards of ANSI B-16.3.
    b. Use unions that are screwed, malleable iron, ground joint, 300 lb AAR, with bronze-to-iron seat.
4. Insulating joints:
    a. Provide between non-threaded ferrous and non-ferrous metallic pipe, fittings, and values.
    b. Use sandwich type flange insulating gasket of the dielectric type, insulating washers and insulating sleeves for flange bolts.
    c. Use full faced insulating gaskets with outside diameter equal to the flange outside diameter.
    d. Use full-length bolt insulating sleeves.
    e. Install in a manner to prevent metal-to-metal contact of dissimilar metallic piping elements.

D. Fittings and specials:
1. Cast iron pipe and ductile iron pipe:
    a. Use fittings and specials suitable for 150-psi pressure rating unless otherwise specified.
    b. For use with mechanical joint pipe, comply with ANSI A-21.10.
    c. For use with push-on joint pipe, comply with ANSI A21.10 and ANSI A-21.11.
    d. Use cement mortar lining complying with ANSI A-21.4, standard thickness.

2. Plastic pipe:
    a. Use fittings and specials suitable for schedule 40 rating, unless otherwise specified or directed.
    b. Use fittings and specials for PVC pipe complying with ASTM D2468.
    c. Use schedule 80 under paved areas with heavy truck traffic.
3. Steel pipe: Comply with ANSI B-16.3, using fittings and specials made for steel pipe.

E. Valves
1. Gate valves:
    a. Use gate valves designed for a working pressure of not less than 150 p.s.i.

b. Provide connections as required for the piping in which they are installed.
c. Provide a clear waterway equal to the full nominal diameter of the valve, opens by turning counter clockwise.
d. Provide an arrow on the operating nut or wheel, cast in metal, indicating direction of opening.
e. Valves smaller than 3":
(1) Provide all bronze, screwed, single wedge disc, screw-in bonnet, packing gland and nut with non-rising stem.
(2) Buried valves: Install in suitable precast concrete hand hole with cover marked "WATER".
f. Valves 3" and larger:
(1) Design in accordance with AWWA C500, standard, bronze trimmed, non-rising stem and solid wedge disc valves.
(2) Buried valves: Provide 2" operating nuts and in a suitable valve box with extension and marked cover.
(3) Provide tee handle socket operating wrenches of suitable size.

2. Check valves:
a. Use check valves designed for a working pressure of not less than 150 p.s.i or as indicated or directed, with a clear waterway equal to the full nominal diameter of the valve.
b. Use valves designed to permit flow in one direction, when the inlet pressure is greater than the discharge pressure and to close tightly to prevent return flow when discharge pressure exceeds inlet pressure.
c. Distinctly cast on the body of each valve:
(1) Manufacturer's name, initials or trademark by which he can be identified readily;
(2) Valve size;
(3) Working pressure;
(4) Direction of flow.
d. Valves 2" and smaller: Provide all bronze, designed for screwed fittings.
e. Valves larger than 2":
(1) Provide iron body, bronze mounted, with flanged ends, of the non-slam type;
(2) Provide class 125 flanges complying with ANSI B-16.1.

F. Service fittings:
1. Asbestos cement main, 6" or less in diameter:
a. For 3/4" service diameter, use 3/4" corporation stop.
b. For service 1" in diameter to 2-1/2" in diameter, use double strap service clamp with corporation stop.
2. Asbestos cement main, 8" and larger in diameter:
a. For service 3/4" in diameter to 1" in diameter, use 1" corporation stop.
b. For service 1-1/2" in diameter to 2-1/2" in diameter; use double strap service clamp with corporation stop.

3. PVC mains smaller than 2" in diameter:
a. Make 3/4" maximum service with tees or plastic valve tees.
b. Acceptable products:
(1) As manufactured by Mueller Company, Decatur, Illinois.

4. PVC mains 2" to 3-1/2" in diameter: For 3/4" service to 1" service, use bronze service clamp and bronze corporation stop designed for PVC pipe.
5. Service clamps and corporation stops:
a. Use bronze.
b. Provide service clamp with flattened straps and molded neoprene gaskets.

6. Services larger than those stated above: Make with standard tees on new lines and tapping tees on existing lines.

2.2 TAPPING SLEEVES

A. Provide sleeve type coupling for existing water mains, furnished with outlet flanged to American 125 standard (ASA series 15):
1. Acceptable products:
a. Clow Corporation, Corona, California; boltless type:
(1) Model C1 series for existing cast iron mains, complying with AWWA class A;
(2) Model CA for class 150 and class 200 existing asbestos cement mains.
2. Coordinate requirements of tapping sleeves with gate valves and other fittings as required.

2.3 VALVE BOXES

A. Valves 3" and larger:
1. Use service box of cast iron, extension type of the required length, with screw adjustment.
2. Provide the word "WATER" cast into the cover.
3. Acceptable products:
a. Alhambra Foundry Company, Alhambra, California:
(1) For valves 6" and smaller: Model A-3004;
(2) For valves 8" and larger: Model 3005.

B. Valves 201/2" and smaller:
1. Use precast concrete box with the word "WATER" cast into the cover.
2. Provide risers on pipeline to place valve within box depth.
3. Acceptable products:
a. Manufactured by Brooks Products, Inc., El Monte, California.

**PART 3 EXECUTION**

3.1 SURFACE CONDITIONS

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

3.2 FIELD MEASUREMENT

A. Make necessary measurements in the field to assure precise fit of items in accordance with the approved design.

3.3 HANDLING

A. Handle pipe accessories so as to ensure delivery to the trench in sound, undamaged condition:
1. Carry pipe into position; do not drag.
2. Use pinch bars or tongs for aligning or turning the pipe only on the bare end of the pipe.

B. Thoroughly clean interior of pipe and accessories before lowering pipe into trench. Keep clean during laying operations by plugging or other method approved by the Architect.

C. Before installation, inspect each piece of pipe and each fitting for defects:
1. Material found to be defective before or after laying: Replace with sound material meeting the specified requirements and without additional cost to the Owner.

D. Rubber gaskets: Store in a cool dark place until just prior to time of installation.

3.4 PIPE CUTTING

A. Cut pipe neatly and without damage to the pipe.
B. Unless otherwise recommended by the pipe manufacturer, and authorized by the Architect, cut pipe with mechanical cutter only.
   1. Use wheel cutters when practicable.
   2. Cut plastic pipe square, and remove all burrs.

3.5 LOCATING

A. Locate water pipe at least ten feet away, horizontally, from sewer pipes.
   1. Where bottom of the water pipe will be at least 12" above top of the sewer pipe, locate water pipe at least six feet away, horizontally, from the sewer pipe.
B. Where water lines cross under gravity-flow sewer lines, fully encase the sewer pipe in concrete for a distance of at least ten feet each side of the crossing or provide pressure pipe with no joint located within 36" of the crossing.
   1. Cross water lines in cases above sewage force mains of inverted siphons at least 24" above the sewer line.
   2. Encase in concrete those joints in the sewer main closer, horizontally, than 36" to the crossing.
C. Do not place water lines in the same trench with sewer lines or electric wiring.

3.6 JOINT DEFLECTION

A. Cast iron pipe:
   1. Maximum allowable deflection will be given in AWWA C600.
   2. Table I shows maximum deflections for 18-foot lengths of pipe. For other lengths, deflection may vary proportionately.
   3. If alignment requires deflection-exceeding limits shown in Table I, furnish special bends or a sufficient number of shorter lengths of pipe to provide angular deflections within the limits shown.
   4. Table I, deflection in inches:

| Diameter: | Push-on joint pipe: | Mechanical joint pipe: |
|---|---|---|
| 3" | 19" | 31" |
| 4" | 19" | 31" |
| 6" | 19" | 27" |
| 8" | 19" | 10" |

B. Plastic pipe: Unless a lesser amount is recommended by the pipe manufacturer, maximum allowable deflections from a straight line or grade or offsets, will be five degrees.

3.7 PLACING AND LAYING

A. General:
   1. Lower pipe and accessories into trench by means of derrick, ropes, belt slings or other equipment approved by the Architect.
   2. Do not dump or drop any of the materials of this Section into the trench.
   3. Except where necessary in making connections to other lines, lay pipe with the bells facing in the direction of laying.
   4. Rest the full length of each section of pipe solidly on the pipe bed, with recesses excavated to accommodate bells, couplings and joints.
   5. Take up and relay pipe that has the grade or joint disturbed after laying.

6. Do not lay pipe in water, or when trench conditions are unsuitable for the work; keep water out of the trench until jointing is completed.
7. Securely close open ends of pipe, fittings and valves when work is not in progress.
8. Where any part of coating or lining is damaged, repair to the approval of the Architect and at no additional cost to the Owner.

B. Plastic pipe:
1. Position pipe and fittings in trench in a manner that identifying markings will be readily visible for inspection.
2. Cutting and joining:
   a. Protect against abrasion from serrated holding devices.
   b. Remove burrs and glosses from surfaces to be jointed; use abrasive paper, file, or steel wool.
   c. Remove dirt, dust, and moisture by wiping clean with chemical cleaner or dry cloth.
   d. Using a pure bristle paint brush, apply an even coat of the specified solvent cement in the fitting socket and on the surface of the pipe to be joined.
   e. Promptly insert pipe into bottom of the fitting socket; turn the pipe slightly to assure an even distribution of cement.
   f. Remove excess solvent cement from exterior of the joint.
   g. Should cement begin to dry before the joint is made, reapply cement before assembling.
   h. Allow at least one hour for the joint to gain strength before handling or installing the pipe.
3. Do not thread plastic pipe; make connections only with the solvent cement or with special adapter fittings designed for the purpose
4. Align pipe system components without strain.
5. Support piping at intervals of not more than four feet, at ends, branch fittings and change of direction or elevation.
6. Support plastic pipe in trenches with a 3" layer of sand. Allow no rocks, debris, or potentially damaging substances within 6" of plastic pipe in trenches.
7. Provide an electrically continuous type TW insulated number 14 tracer wire in the trench along the pipe, fastened to the pipe at 20 foot intervals and terminating aboveground with a 12" lead taped around each riser.

C. Connections: Use special fittings to suit the actual conditions where connections are made between new work and existing mains. Use only those specials and fittings approved by the utility having jurisdiction.

D. Sleeves:
1. Where pipe passes through walls of valve pits or structures, provide cast iron wall sleeves.
2. Fill annular space between walls and sleeves with rich cement mortar.
3. Fill annular space between pipe and sleeves with mastic.

3.8 JOINTING

A. All joints:
1. Cast iron pipe, ductile iron pipe, mechanical joints, and push-on type joints: Install in accordance with AWWA C600, modified as necessary by the recommendation of the manufacturer to provide for special requirements of ductile iron pipe.
2. Make connections between different pipe and accessories with transition fittings.
3. Rubber gaskets: Handle, lubricate where necessary and install in strict accordance with the recommendations of the manufacturer.

3.9 SETTING VALVES AND VALVE BOXES

A. General:
1. Center valve boxes on the valves, setting plumb.
2. Tamp earth fill around each valve box to a distance of four feet on all sides or to the undisturbed trench face if less than four feet.
3. Tighten stuffing boxes and fully open and close each valve to assure that all parts are in working condition.

B. Service boxes:
1. Where water lines are located below paved streets having curbs, install boxes directly back of the curbs.
2. Where no curbing exists, install boxes in accessible locations beyond limits of street surfacing, walks, and driveways.

3.10 THRUST BLOCKS

A. General:
1. Provide thrust blocks, or metal tie rods and clamps or lugs, on plugs, caps, tees and bends deflecting 22-1/2 degrees or more either vertically or horizontally and on water lines 6" in diameter or larger.
2. Provide concrete thrust blocking with a compressive strength of 2500 p.s.i in 28 days.

B. Installation:
1. Locate thrust blocking between solid ground and the fitting to be anchored.
2. Unless otherwise shown or directed by the Architect, place the base and thrust bearing sides of thrust blocking directly against undisturbed earth.
3. Sides of thrust blocking not subject to thrust may be placed against forms.
4. Place thrust blocking so the fitting joints will be accessible for repair.
5. Protect steel rods and clamps by galvanizing or by coating with bituminous paint.

3.11 TESTING AND INSPECTING

A. Closing uninspected work: Do not allow or cause any of the work of this Section to be covered up or enclosed until after it has been completely inspected and tested and has been approved by the Architect/owner.

B. Hydrostatic tests:
1. Where any section of a water line is provided with concrete thrust blocking for fittings, do not make hydrostatic tests until at least five days after installation of the concrete thrust blocking, unless otherwise directed by the Architect/owner.
2. Devise a method for disposal of wastewater from hydrostatic tests and for disinfecting, as approved in advance by the Architect/owner.

C. Pressure tests:
1. After the pipe is laid, the joints completed, fire hydrants permanently installed and the trench partially backfilled leaving the joints exposed for examination, subject the newly laid piping and valved sections of water distribution and service piping to a hydrostatic pressure of 200 p.s.i.
2. Open and close each valve several times during the test.
3. Carefully examine exposed pipe, joints, fittings and valves.
4. Replace or remake joints showing visible leakage.
5. Remove cracked pipe, defective pipe and cracked or defective joints, fittings and valves. Replace with sound material and repeat the test until results are satisfactory.
6. Make repair and replacement without additional cost to the Owner.

D. Leakage test:

1. Conduct leakage test after the pressure test has been completed satisfactorily.
2. Duration of each leakage test: At least two hours.
3. During the test, subject water lines to a pressure of 200 p.s.i.
4. Leakage is defined as the quantity of water to be supplied into the newly laid pipe or any valved or approved section thereof, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.
5. No piping installation will be accepted until the leakage is less than the number of gallons per hour as determined by formula, "L = 0.00304 ND x sq root of P," where:
   a. L = allowable leakage in gallons per hour;
   b. N = number of joints in length of pipe under test;
   c. D = nominal diameter of pipe in inches; and
   d. P = average test pressure in lbs per sq inch.
6. The allowable leakage in gallons per hour, per joint, at 200-psi average test pressure shall be in accordance with Table II
7. Should any test of pipe disclose leakage greater than that specified in Table II, locate and repair the defective joint or joints until the leakage is within the specified allowance and at no additional cost to the Owner.
8. Table II:

| Diameter: | Leakage in gal: | Diameter: | Leakage in gal: |
|---|---|---|---|
| 2" | 0.0153 | 12" | 0.0915 |
| 3" | 0.0231 | 14" | 0.1070 |
| 4" | 0.0306 | 16" | 0.1225 |
| 6" | 0.0458 | 18" | 0.1375 |
| 8" | 0.0610 | 20" | 0.1530 |
| 10" | 0.0765 | 24" | 0.1830 |

E. Time for making test:

1. Except for joint material setting, or where concrete reaction backing necessitates a five day delay, pipelines jointed with rubber gaskets, mechanical, or push-on joints or couplings may be subjected to hydrostatic pressure, inspected and tested for leakage at any time after partial completion of backfill.
2. Asbestos cement pipe and cement mortar lined pipe may be filled with water as recommended by the manufacturer before being subjected to the pressure test and subsequent leakage test.

F. Disinfecting:

1. Before acceptance of the potable water system, disinfect each unit of completed water supply, distribution and service line in accordance with AWWA C601.
2. Perform all such tests and disinfecting in a manner approved by government agencies having jurisdiction.
3. Furnish two copies of a Certificate of Disinfecting to the Architect.

3.12 PAINTING

A. Paint valves, pipe and vents in accordance with the provisions of Section 09900.

**END OF SECTION**

**02730**

**SANITARY SEWERAGE SYSTEM**

## PART 1 GENERAL

1.1 SUMMARY

A. Provide sanitary sewerage system as shown on the Drawings, specified herein and needed for a complete and proper installation.

B. Related work:

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

1.2 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.3 QUALITY ASSURANCE

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

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with pertinent provisions of Section 01620.

## PART 2 PRODUCTS

2.1 PIPE AND FITTINGS

A. Cast iron soil pipe and fittings (CIP):

1. Comply with ASTM A74, class SV.
2. Use rubber gaskets complying with ASTM C564 for compression joints.

B. Clay pipe and fittings (VCP):

1. Use extra strength, minimum of SDR 35.
2. Comply with ASTM D3034.

C. Polyvinyl chloride pipe and fitting (PVC)

1. Use extra strength, minimum of SDR 35.
2. Comply with ASTM D3034.

D. Acrylonitrile butadine styrene pipe and fittings (ABS):

1. Comply with ASTM D2680.

2.2 MANHOLES

A. Precast:
1. Provide reinforced precast concrete manhole sections complying with ASTM C478, except use Portland cement as specified below.
2. Provide joints of mortar, with approved mastic or rubber gasket or an approved combination of those types.
3. Provide precast units of concrete rings and eccentric cone section with ladder rungs cast into the units.
4. Approved manufacturer:
a. Ameron Pipe Products Group.

B. Portland cement:
1. For concrete in manholes, comply with ASTM C150, type II.
2. For concrete in cradle and encasement: Type optional with the Contractor.

C. Concrete:
1. Provide 3000 psi concrete in accordance with pertinent provisions of Section 03300 of these Specifications.

D. Mortar:
1. Comply with ASTM C270, type M.

2.3 FRAMES AND COVERS

A. Use cast iron frames and covers, with the wording "SEWER" cast into the covers in letters 2" high and plainly visible, as manufactured by Alhambra Foundry.

2.4 CLEANOUTS

A. Provide cleanouts as required and where shown on the Drawings.
1. Provide traffic weight covers and frames where clean-outs are within pavement, with the letters "SSCO" cast into the cover.
2. Acceptable products:
a. Alhambra Foundry, Model A_2100, 10" round cover, unless otherwise shown on the Drawings.

B. Where cleanout is within a graded area, construct as shown on the Drawings or 100 ft on center minimum.

2.5 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

**PART 3 EXECUTION**

3.1 SURFACE CONDITIONS

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

3.2 FIELD MEASUREMENTS

A. Make necessary measurements in the field to assure precise fit of items in accordance with the approved design.

3.3 INSTALLATION

A. Trench, backfill, and compact for the work of this Section in strict accordance with pertinent provisions of Section 02221 of these Specifications.

B. Location:

1. Where the sewer location is not located clearly by dimensions on the Drawings, locate the sewer:
    a. Where the bottom of the water pipe will be at least 12" above the top of the sewer pipe, the horizontal spacing may be a minimum of six feet.
    b. Where the gravity flow sewers cross above water lines, fully encase the sewer pipe for a distance of ten feet on each side of the crossing; or
    c. Use acceptable pressure pipe with no joint closer horizontally than three feet from the crossing.
    d. Where concrete encasement is used, provide not less than 4" thickness including that on pipe joints.

C. Pipe laying:

1. Protect pipe during handling against shocks and free fall. Remove extraneous material from the pipe interior.
2. Lay pipe by proceeding upgrade with the spigot ends of bell-and-spigot pipe pointing in direction of flow.
3. Lay each pipe accurately to the indicated line and grade, aligning so the sewer has a uniform invert.
4. Continually clear interior of the pipe free from foreign material.
5. Before making pipe joints, clean and dry all surfaces of the pipe to be joined.
6. Use lubricants, primers, and adhesives recommended for the purpose by the pipe manufacturer.
7. Place, fit, join, and adjust the joints to obtain the degree of water tightness required.

3.4 WYE BRANCHES

A. Provide wye branches where sewer connections are indicated or required.

1. Where joining an existing line, join by placing a saddle over the line, and make connection in a manner that will not obstruct or interfere with the existing flow.
2. When conditions are such that connection pipe cannot be supported adequately on undisturbed earth or compacted fill, encase the pipe in a concrete backfill or support on a concrete cradle.

B. Provide concrete required because of conditions resulting from faulty construction methods or negligence, at no additional cost to the Owner.

3.5 MANHOLES

A. General:

1. Shape the invert channels to be smooth and semicircular, conforming to the inside of the adjacent sewer section.
2. Make changes in direction of flow with a smooth curve of as large a radius as the size of the manhole will permit.
3. Make changes in size and grade of channels smoothly and evenly.
4. Form the invert channels directly in the concrete of the manhole base, with mortar, or by laying full section sewer pipe through the manhole and breaking out the top half after surrounding concrete has hardened.
5. Smooth the floor of the manhole outside the channels, and slope toward the channels at not less than 1" per foot nor more than 2" per foot.
6. Prevent free drop inside the manholes exceeding 18" measured from the invert of the inlet pipe to the top of the floor of the manhole outside the channels.

7. Construct drop manholes whenever the free drop otherwise would be greater than 18".

B. Manhole rungs:
   1. Provide each manhole with individual wall-mounted rungs fabricated of aluminum, plastic-covered steel or galvanized steel.
   2. Comply with the requirements of governmental agencies having jurisdiction.

C. Jointing and plastering:
   1. Completely fill mortar joints, and leave smooth and free from surplus mortar on the inside of the manhole.

D. Frames and covers: Unless otherwise shown on the Drawings, set frames and covers:
   1. In paved areas: So that the top of the cover will be flush with the finished pavement; or
   2. In unpaved areas: 2" higher than finished grade.

## 3.6 MANHOLE OVER EXISTING PIPE

A. Construct new manhole as specified, breaking upper half of existing pipe after base of manhole is completed so as not to obstruct flow of the existing pipe.

## 3.7 BUILDING CONNECTIONS

A. Terminate building connections where shown on the Drawings.

B. Provide temporary closures at terminals where the building pipe is not installed.
   1. Place marker post at grade end of plugged line.
   2. Where building piping has been installed, make connection to the building piping system.

## 3.8 TESTING AND INSPECTING

A. Do not allow or cause any of the work of this Section to be covered up or enclosed until after it has been inspected and tested and has been approved by the Architect.

B. Leakage tests:
   1. Test lines for leakage by exhilaration tests.
      a. Prior to testing for leakage, backfill the trench to at least the lower half of the pipe.
      b. If required, place sufficient additional backfill to prevent pipe movement during testing, leaving the joints uncovered to permit inspection.
   2. Water exhilaration tests:
      a. Test each section of sewer line between successive manholes by closing the lower end of the sewer to be tested and the inlet sewer of the upper manhole, using stoppers.
      b. Fill the manhole and pipe with water to a point four feet above the invert of the sewer at the center of the upper manhole; or, if groundwater is present, four feet above the average adjacent groundwater level.
      c. Allowable leakage will be computed by the formula:
         (1) For mortared joints: $E = 0.0001\ LD\ H$;
         (2) For all other joints: $E = 0.0002\ LD\ H$;
         (3) "L" is the length of sewer and house connections tested, in feet;
         (4) "E" is the allowable leakage in gallons per minute of sewer test;
         (5) "D" is the internal pipe diameter in inches;
         (6) "H" is the difference in elevation between the water surface in the upper manhole and the invert of the pipe at the lower manhole; or, if groundwater is present above the invert of the pipe in the lower manhole, the difference in elevation between water surface in the upper manhole and the groundwater at the lower manhole.
   3. Water infiltration test:
      a. If, in the opinion of the Architect, excessive groundwater is encountered in the

construction of a section of the sewer, the exhilaration test shall not be used.

b. Close the end of the sewer at the upper structure sufficiently to prevent the entrance of water.

c. Discontinue pumping of groundwater for at least three days, then test for infiltration.

d. Infiltration into each individual reach of sewer between adjoining manholes shall not exceed that allowed in the formula given for the exhilaration test, except that "H" in the formula shall be the difference between the groundwater surface and the invert of the sewer at the downstream manhole.

4. Provide and use measuring devices approved by the Architect.
5. Provide water, materials, and labor for making required tests.
6. Make tests in the presence of the Architect, gibing the Architect at least three days advance notice of being ready for test observation.

C. Submit test data to the Architect for review and approval.

**END OF SECTION**

**03200**

**CONCRETE REINFORCEMENT**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

1.2 RELATED SECTIONS

A. Section 03300 - Cast-in-Place Concrete.

1.3 REFERENCES

A. ACI 301 - Structural Concrete for Buildings.

B. ACI 318 - Building Code Requirements For Reinforced Concrete.

C. ACI SP-66 - American Concrete Institute - Detailing Manual.

D. ACI 315-99 – Details and Detailing of Concrete Reinforcement

E. ANSI/ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.

F. ANSI/ASTM A184 - Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.

G. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

H. ANSI/AWS D1.4 - Structural Welding Code for Reinforcing Steel.

I. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

J. AWS D12.1 - Welding Reinforcement Steel, Metal Inserts and Connections in Reinforced Concrete Construction.

K. CRSI - Concrete Reinforcing Steel Institute - Manual of Standard Practice.

L. CRSI - Placing Reinforcing Bars.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with CRSI - Manual of Standard Practice & ACI 318.

1.5 COORDINATION

A. Coordinate work under provisions of Section 01039.
B. Coordinate with placement of formwork, formed openings and other Work.

## PART 2 PRODUCTS

2.1 REINFORCEMENT

A. Reinforcing Steel: ASTM A615, yield grade; deformed billet steel bars, unfinished.

B. Reinforcing Steel Plain Bar and Rod Mats: ASTM A704, ASTM A615, Grade 60; steel bars or rods, unfinished.
C. Stirrup Steel: ANSI/ASTM A82, unfinished.
D. Welded Steel Wire Fabric: ASTM A815; in flat sheets.

2.2 ACCESSORY MATERIALS

A. Tie Wire: Minimum gage annealed type.
B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.
C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel; size and shape as required.

2.3 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice ACI SP-66.

**PART 3 EXECUTION**

3.1 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
B. Do not displace or damage vapor barrier.
C. Accommodate placement of formed openings.
D. Conform to applicable code for concrete cover over reinforcement.

**END OF SECTION**

**03300**

**CAST-IN-PLACE CONCRETE**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cast-In-Place Concrete floors, shear walls, foundation walls and supported slabs.
B. Floors and slabs on grade.
C. Control, expansion and contraction joint devices associated with concrete work, including joint sealants.
D. Equipment pads, light pole base, flagpole base, thrust blocks and manholes.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Section 03100 - Concrete Formwork: Placement of joint device anchors in formwork.

1.3 RELATED SECTIONS

A. Section 03100 - Concrete Formwork: Formwork and accessories.
B. Section 03200 - Concrete Reinforcement.
C. Section 03346 - Concrete Floor Finishing.
D. Section 03370 - Concrete Curing.
E. Section 07900 - Joint Sealers.

1.4 REFERENCES

A. ACI 301 - Structural Concrete for Buildings.

B. ACI 302 - Guide for Concrete Floor and Slab Construction.

C. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

D. ACI 305R - Hot Weather Concreting.

E. ACI 306R - Cold Weather Concreting.

F. ACI 318 - Building Code Requirements for Reinforced Concrete.

G. ANSI/ASTM D994 - Preformed Expansion Joint Filler for Concrete (Bituminous Type).

H. ANSI/ASTM D1190 - Concrete Joint Sealer, Hot-Poured Elastic Type.

I. ANSI/ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

J. ANSI/ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

K. ASTM C33 - Concrete Aggregates.

L. ASTM C94 - Ready-Mixed Concrete.

M. ASTM C150 - Portland cement.

N. ASTM C260 - Air Entraining Admixtures for Concrete.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.
B. Product Data: Provide data on joint devices, attachment accessories and admixtures.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301.

1.7 COORDINATION

A. Coordinate work under provisions of Section 01039.
B. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

**PART 2 PRODUCTS**

2.1 CONCRETE MATERIALS

A. Cement: ASTM C150, Type I - Normal, Type II - Moderate, Type V - Sulfate Resistant.
B. Fine and Coarse Aggregates: ASTM C33.
C. Water: Clean and not detrimental to concrete.

2.2 ADMIXTURES

A. Air Entrainment: ASTM C260.

2.3 ACCESSORIES

A. Bonding Agent: Polymer resin emulsion.
B. Vapor Barrier: thick clear polyethylene film.
C. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

2.4 JOINT DEVICES AND FILLER MATERIALS

A. Joint Filler Type A: ASTM D1751; ASTM D994; Asphalt impregnated fiberboard or felt, 1/2" thick; tongue and groove profile.
B. Joint Filler Type B: ASTM D1752; Closed cell polyvinyl chloride foam, resiliency recovery of 95 percent if not compressed more than 50 percent of original thickness.
C. Joint Filler Type C; ASTM D1752; Pre-molded sponge rubber fully compressible with recovery rate of minimum 95 percent.
D. Expansion Joint Devices: ASTM B221 alloy, extruded aluminum; resilient filler strip with a Shore A hardness of 35 to permit plus or minus 25 percent joint movement with full recovery; extruded aluminum cover plate, of longest manufactured length at each location, flush Mounted, color as selected.
E. Sealant: ASTM D1190; polymer based asphalt or coal tar and rubber compound.

2.5 CONCRETE MIX

A. All concrete shall be Type 1 cement with a compressive strength of 4,000 p.s.i. at 28 days.
B. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.
C. Use accelerating admixtures in cold weather only when approved by Architect/Engineer. Use of admixtures will not relax cold weather placement requirements.
D. Use calcium chloride only when approved by Architect/Engineer.
E. Use set retarding admixtures during hot weather only when approved by Architect/Engineer.
F. Add air entraining agent to normal weight concrete mix for work exposed to exterior.

**PART 3 EXECUTION**

3.1 EXAMINATION

A. Verify site conditions under provisions of Section 01039.
B. Verify requirements for concrete cover over reinforcement.
C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely and will not cause hardship in placing concrete.

3.2 PREPARATION

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
B. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 304 & ACI 301.
B. Notify Architect/Engineer minimum 24 hours prior to commencement of operations.
C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.
D. Separate slabs on grade from vertical surfaces with ½" thick joint filler.
E. Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
F. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface. Conform to Section 07900 for finish joint sealer requirements.
G. Install joint devices in accordance with manufacturer's instructions.
H. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
I. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor and wall finish.
J. Install joint covers in longest practical length, when adjacent construction activity is complete.
K. Apply sealants in joint devices in accordance with Section 07900.
L. Place concrete continuously between predetermined expansion, control and construction joints.
M. Do not interrupt successive placement; do not permit cold joints to occur.
N. Place floor slabs in pattern indicated on drawings.
O. Saw cut joints within 24 hours after placing. Use 3/16" thick blade, cut into 1/4 depth of slab thickness. If in-slab-heating is used cut joints 1/2 inch deep
P. Screed floors and slabs on grade level, maintaining surface flatness of maximum.

3.4 SEPARATE FLOOR TOPPINGS

A. Prior to placing floor topping, roughen substrate concrete surface and remove deleterious material. Broom and vacuum clean.
B. Place required dividers, edge strips, reinforcing, and other items to be cast in.

C. Apply bonding agent to substrate in accordance with manufacturer's instructions.

3.5 CONCRETE FINISHING

A. Provide formed concrete surfaces to be left exposed with smooth rubbed finish.
B. Finish concrete floor surfaces to requirements of Section 03346.

3.6 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
C. Cure concrete floor surfaces to requirements of Section 03370.
D. Cure floor surfaces in accordance with ACI 308.

3.7 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed in accordance with ACI 301 and under provisions of Section 01400.
B. Provide free access to Work and cooperate with appointed firm.
C. Submit proposed mix design to architect for review prior to commencement of Work.
D. Contractor shall supply testing of cement and aggregates to ensure conformance with specified requirements.
E. Contractor shall provide three concrete test cylinders per day for every 75 or less cu yards of concrete placed.
F. One additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.
G. Contractor shall provide one slump test to be taken for each set of test cylinders taken.

3.8 PATCHING

A. Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.
B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect/Engineer upon discovery.
C. Patch imperfections as directed.

3.9 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
B. Repair or replacement of defective concrete will be determined by the Architect/Engineer.
C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

**END OF SECTION**

**03370**

**CONCRETE CURING**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Initial and final curing of horizontal and vertical concrete surfaces.

1.2 RELATED SECTIONS

A. Section 03300 - Cast-In-Place Concrete.
B. Section 03346 - Concrete Floor Finishing.

1.3 REFERENCES

A. ACI 301 - Structural Concrete for Buildings.
B. ACI 302 - Recommended Practice for Concrete Floor and Slab Construction.
C. ACI 308 - Standard Practice for Curing Concrete.
D. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
E. ASTM D2103 - Polyethylene Film and Sheeting.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301 and ACI 302.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products under provisions of Section 01600.
B. Deliver curing materials in manufacturer's packaging including application instructions.

## PART 2 PRODUCTS

2.1 MATERIALS

A. Curing/sealing compound equal to Ashford Formula as distributed by:
Curecrete Chemical Company, Inc.
1201 W. Spring Creek Place
Springville, UT 84663
(801)489-5663

## PART 3 EXECUTION

3.1 EXAMINATION

A. Verify substrate conditions under provisions of Section 01039.
B. Verify that substrate surfaces are ready to be cured.

3.2 EXECUTION - HORIZONTAL SURFACES

A. Cure floor surfaces in accordance with ACI 308.

3.3 EXECUTION - VERTICAL SURFACES

A. Cure surfaces in accordance with ACI 308.

3.4 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 01500.
B. Do not permit traffic over unprotected floor surface.

**END OF SECTION**

**06112**

**FRAMING AND SHEATHING**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Structural 2x wall framing.
B. ½" plywood wall sheathing.
C. Preservative treatment of wood at sill plates.
D. Miscellaneous framing and sheathing.
E. Concealed wood blocking for support of toilet and bath accessories, wall cabinets and wood trim.

1.2 RELATED SECTIONS

A. Sections 08111 Door openings to receive wood blocking.

1.3 REFERENCES

A. AHA (American Hardboard Association) A135.4 - Basic Hardboard.
B. ALSC (American Lumber Standards Committee) - Softwood Lumber Standards.
C. ANSI A208.1 - Mat-Formed Wood Particleboard.
D. APA (American Plywood Association).
E. NFPA (National Forest Products Association).
F. SPIB (Southern Pine Inspection Bureau).
G. WCLIB (West Coast Lumber Inspection Bureau).
H. WWPA (Western Wood Products Association).

1.4 SUBMITTALS FOR REVIEW

A. Shop Drawings For Site Fabricated Truss Frame: Indicate dimensions, wood species and grades, component profiles, drilled holes, fasteners, connectors, erection details and sequence.

1.5 QUALITY ASSURANCE

A. In lieu of grade stamping exposed to view lumber and plywood, submit manufacturer's certificate certifying that products meet or exceed specified requirements.
B. Design structural shop fabricated trusses under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of Missouri.

1.6 DELIVERY, STORAGE AND PROTECTION

A. Section 01600 - Material and Equipment: Transport, handle, store and protect products.
B. Protect trusses from warping or other distortion by stacking in vertical position, braced to resist movement.

## PART 2 PRODUCTS

2.1 SHEATHING MATERIALS

A. Wall Sheathing: ½" AC Plywood.

2.2 ACCESSORIES

A. Fasteners and Anchors:
   1. Fasteners: Hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.

**PART 3 EXECUTION**

3.1 FRAMING

A. Set structural members level and plumb, in correct position.
B. Make provisions for erection loads and for sufficient temporary bracing to maintain structure safe, plumb and in true alignment until completion of erection and installation of permanent bracing.
C. Place horizontal members, crown side up.
D. Construct load bearing framing members' full length without splices.
E. Double members at openings over 24 inches wide. Space short studs over and under opening to stud spacing.
F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists. Framed rigidly into joists.
G. Bridge joists or other framing in excess of 8 feet span at mid-span. Fit solid blocking at ends of members.

3.2 SHEATHING

A. Secure wall sheathing with long dimension parallel to wall studs, with ends over firm bearing and staggered.

3.3 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.
B. Surface Flatness of Floor: 1/4 inch in 10 feet maximum and 1/2 inch in 30 feet maximum.

**END OF SECTION**

**06240**

**PLASTIC LAMINATE**

## PART 1 GENERAL

1.1 SUMMARY

A. Provide laminated plastic where shown on the Drawings, as specified herein and as needed for a complete and proper installation.

B. Related work:

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

1.2 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. Product data: Within 60 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Materials list of items proposed to be provided under this Section.
2. Manufacturers' specifications and other data needed to demonstrate compliance with the specified requirements.
3. Samples of the full range of colors and patterns available in each of the specified grades from the proposed manufacturer.
4. Manufacturer's recommended methods of installation which, when approved by the Architect, will become the basis for acceptance or rejection of actual installation procedures used on the Work.

1.3 QUALITY ASSURANCE

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

1.4 DELIVERY, STORAGE AND HANDLING

A. Comply with pertinent provisions of Section 01600.

## PART 2 PRODUCTS

2.1 LAMINATED PLASTICS

A. Acceptable manufacturers:

1. Wilsonart Division of Ralph Wilson Plastics, 600 Bruce Drive, Temple, Texas 76501 (817) 778-2711.
2. Nevamar Corporation, 8339 Telegraph Road, Odenton, Maryland 21113 (301) 569-5000.
3. Micarta Division of Westinghouse Electric Corporation, 304 Hoover Street, Hampton, South Carolina 29924 (803) 943-2311.

B. Colors and patterns: Provide "solid colors, textured finish" selected by the Architect from standard colors and finishes of the approved manufacturer.

C. Qualities and types: Provide general-purpose type, 0.050" thick, complying with NEMA LD3.

2.2 ADHESIVES

A. For installation of laminated plastic, use only "rigid set" (urea-resin) or "semi-rigid set" (PVC acetate) adhesives. Do not use so-called "contact" adhesives.

**PART 3 EXECUTION**

3.1 SURFACE CONDITIONS

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

3.2 INSTALLATION

A. Install the approved laminated plastic in strict accordance with the manufacturer's recommendations as approved by the Architect.

**END OF SECTION**

**06411**

**PLASTIC LAMINATE CASEWORK**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Special fabricated cabinet units.
   1. Plastic laminate cabinets with white melamine interiors.
B. Plastic laminate countertops and backsplash.
C. Cabinet hardware.
D. Preparation for installing utilities.

1.2 RELATED SECTIONS

A. Section 06112 – Framing and Sheathing.

1.3 REFERENCES

A. ANSI A208.1 - Mat Formed Wood Particle board.
B. AWI (Architectural Woodwork Institute) - Quality Standards.
C. BHMA A156.9 - Cabinet Hardware.
D. FS MMM-A-130 - Adhesive, Contact.
E. HPMA (Hardwood Plywood Manufacturer's Association) HP - American Standard for Hardwood and Decorative Plywood.
F. PS 20 - American Softwood Lumber Standard.

1.4 SUBMITTALS FOR REVIEW

A. See section 01300 - Submittals: Procedures for submittals.
B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.
C. Samples: Submit two samples of drawer pulls and hinges, illustrating hardware finish.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with AWI Custom quality.
B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.6 PRE-INSTALLATION MEETING

A. See section 01039 - Coordination and Meetings: Pre-installation meeting.
B. Convene one week before starting work of this section.

1.7 DELIVERY, STORAGE AND PROTECTION

A. See section 01600 - Material and Equipment: Transport, handle, store and protect products.
B. Protect units from moisture damage.

1.8 ENVIRONMENTAL REQUIREMENTS

A. See section 01600 - Material and Equipment: Environmental conditions affecting products on site.
B. During and after installation of work of this section, maintain the same temperature and humidity

conditions in building spaces as will occur after occupancy.

## PART 2 PRODUCTS

### 2.1 PANEL MATERIALS

A. Wood Particleboard: PS1; ANSI A208.1; AWI standard, composed of wood chips, medium density, made with high water proof resin binders; of grade to suit application; sanded faces.

### 2.2 LAMINATE MATERIALS

A. Plastic Laminate: AWI 0.040 inch Post Forming; 0.050 inch General Purpose quality; color, pattern and surface texture as selected.
B. Laminate Backing Sheet: 0.020 inch Backing Sheet grade, undecorated plastic laminate.

### 2.3 ACCESSORIES

A. Adhesive: FS MMM-A-130 contact adhesive. Type recommended by laminate manufacturer to suit application.
B. Plastic Laminate Edge Trim; color as selected.
C. Fasteners: Size and type to suit application.
D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; Plain finish in concealed locations and brass finish in exposed locations.
E. Concealed Joint Fasteners: Threaded steel.

### 2.4 HARDWARE

A. Shelf Standards and Rests: formed steel channels and rests, cut for fitted rests spaced at 1 inch centers; satin finish.
B. Shelf brackets: Formed steel brackets, formed for attachment with lugs; satin finish.
C. Drawer and door pulls; Bronze with satin finish.
D. Catches: Magnetic.
E. Drawer Slides: Galvanized steel construction, ball bearings separating tracks, full extension type.
F. Hinges: Knuckle disappearing type, bronze with satin finish.

### 2.5 FABRICATION

A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.
B. Fit shelves, doors, and exposed edges with matching plastic laminate edging. Use one piece for full length only.
C. Cap exposed plastic laminate finish edges with material of same finish and pattern.
D. Door and Drawer Fronts: 3/4 inch thick; flush style.
E. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
F. Mechanically fasten back splash to countertops with steel brackets at 16 inches on center.
G. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, fixtures and fittings. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

## PART 3 EXECUTION

### 3.1 EXAMINATION

A. Section 01039 - Coordination and Meetings: Verification of existing conditions before starting work.

B. Verify adequacy of backing and support framing.
C. Verify location and sizes of utility rough-in associated with work of this section.

3.2 INSTALLATION

A. Set and secure casework in place; rigid, plumb and level.
B. Use fixture attachments in concealed locations for wall mounted components.
C. Use concealed joint fasteners to align and secure adjoining cabinet units and counter tops.
D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
E. Secure cabinet and counter bases to floor using appropriate angles and anchorages.
F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.3 ADJUSTING

A. Section 01400 - Quality Control: Adjust installed work. Test installed work for rigidity and ability to support loads.
B. Adjust moving or operating parts to function smoothly and correctly.
C. Clean casework, counters, shelves, hardware, fittings and fixtures.

**END OF SECTION**

**07210**

**BUILDING INSULATION**

## PART 1 GENERAL

1.1 SUMMARY

A. Provide building insulation where shown on the Drawings, as specified herein and as needed for a complete and proper installation.

B. Related work:

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

1.2 QUALITY ASSURANCE

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

B. Upon completion of this portion of the Work, complete and post a certificate of insulation compliance in accordance with pertinent requirements of governmental agencies having jurisdiction.

1.3 DELIVERY, STORAGE AND HANDLING

A. Comply with pertinent provisions of Section 01620.

## PART 2 PRODUCTS

2.1 MATERIALS

A. Provide the following building insulation where shown on the Drawings or otherwise needed to achieve the degree of insulation required under pertinent regulations of governmental agencies having jurisdiction.

1. Exterior Stud Wall Insulation - R-13 fiberglass batt insulation installed between the studs. Provide full height 6 mil. vapor barrier between the studs and gypsum board.
2. Interior Wall Insulation - 3-1/2" thick, unfaced glass fiber acoustical insulation complying with ASTM 665, Type I. Equal to Owens-Corning Fiberglass Corporation, Toledo, Ohio 43659. (Typical of all interior walls).

2.2 OTHER MATERIALS

A. Provide 6 mil. vapor barrier where specified on drawings.

B. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

## PART 3 EXECUTION

3.1 SURFACE CONDITIONS

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

B. Remove, or protect against, projections in construction framing that may damage or prevent proper insulation.

3.2 INSTALLATION

A. Install the work of this Section in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position.

**END OF SECTION**

**07900**

**JOINT SEALERS**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sealants and joint backing.
B. Precompressed foam sealers.
C. Hollow gaskets.

1.2 RELATED SECTIONS

A. Section 09260 - Gypsum Board Systems.

1.3 REFERENCES

A. ASTM C834 - Standard Specification for Latex Sealing Compounds.
B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
C. ASTM C1193 - Standard Guide for Use of Joint Sealants.
D. ASTM D1056 - Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
E. ASTM D1565 - Standard Specification for Flexible Cellular Materials -Vinyl Chloride Polymers and Copolymers (Open-Cell Foam).
F. ASTM D1667 - Standard Specification for Flexible Cellular Materials -Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.
B. Applicator Qualifications: Company specializing in performing the work of this section and approved by manufacturer.

1.5 ENVIRONMENTAL REQUIREMENTS

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

1.6 COORDINATION

A. Section 01039 - Coordination and Meetings: Coordination requirements.
B. Coordinate the work with all sections referencing this section.

1.7 WARRANTY

A. Section 01700 - Warranties.
B. Correct defective work within a five-year period after Date of Substantial Completion.
C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal and exhibit loss of adhesion or cohesion or do not cure.

1.8 SEALANTS

A. Type I - General Purpose Exterior Sealant: Polyurethane or Polysulfide; ASTM C920, Grade NS, Class 25, Uses M, G and A; single or multi- component.

1. Standard colors matching finished surfaces.

B. Type II - Exterior Expansion Joint Sealer: Precompressed foam sealer; urethane with water-repellent:
   1. Face color: Gray.
   2. Size as required providing watertight seal when installed.
   3. Provide product recommended by manufacturer for traffic-bearing use.
   4. Applications: Use for:
      a. Exterior wall expansion joints
      b. Paving surface joints
      c. Set in floor components

C. Type III - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, single component, paintable.
   1. .Standard colors matching finished surfaces. Applications: Use for:
      a. Interior wall and ceiling control joints.
      b. Joints between door and window frames and wall surfaces.
      c. Other interior joints for which no other type of sealant is indicated.

D. Type IV - Bathtub/Tile Sealant: White silicone; ASTM C920, Uses M and A; single component, mildew resistant.
   1. Applications: Use for:
      a. Joints between plumbing fixtures and floor and wall surfaces.
      b. Joints between kitchen and bath countertops and wall surfaces.

E. Type V - Interior Floor Joint Sealant: Polyurethane, self-leveling; ASTM C920, Grade P, Class 25, Uses T, M and A; single or multi-component.
   1. Approved by manufacturer for wide joints up to 1-1/2 inches.
   2. Standard colors matching finished surfaces.
   3. Applications: Use for:
      a. Expansion joints in floors.

## PART 2 PRODUCTS

2.1 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
C. Joint Backing: Round foam rod compatible with sealant; ASTM D1056, sponge or expanded rubber; oversized 30 to 50 percent larger than joint width.
D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

## PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces and joint openings are ready to receive work.
B. Verify that joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

A. Remove loose materials and foreign matter that might 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 disfiguration.

3.3 INSTALLATION

A. Perform installation in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
B. Perform installation in accordance with ASTM C1193.
C .Measure joint dimensions and size joint backers to achieve width-to-depth ratio,neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
D. Install bond breaker where joint backing is not used.
E. Install sealant free of air pockets, foreign embedded matter, ridges and sags.
F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
G. Tool joints concave.
H. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.
I. Compression Gaskets: Avoid joints except at ends, corners, and intersections; seal all joints with adhesive; install with face 1/8 to 1/4 inch below adjoining surface.

3.4 CLEANING

A. Clean adjacent soiled surfaces.

3.5 PROTECTION OF FINISHED WORK

A. Protect sealants until cured.

**END OF SECTION**

**08111**

**STANDARD STEEL DOORS**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-rated, fire rated and thermally insulated steel doors and panels.
B. Louvers. Glass and glazing. (N.I.C.)

1.2 RELATED SECTIONS

A. Section 08112 - Standard Steel Frames.
B. Section 08710 - Door Hardware.
C. Section 08800 - Glazing: Glass for doors. (N.I.C.)
D. Section 09900 - Painting: Field painting of doors.

1.3 REFERENCES

A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
B. ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
C. ASTM E152 - Methods of Fire Tests of Door Assemblies.
D. NFPA 80 - Fire Doors and Windows.
E. NFPA 252 - Fire Tests for Door Assemblies.
F. SDI-100 - Standard Steel Doors and Frames.
G. UL 10B - Fire Tests of Door Assemblies.

1.4 SUBMITTALS FOR REVIEW

A. Section 01300 - Submittals: Procedures for submittals.
B. Shop Drawings: Indicate door elevations, internal reinforcement, closure method and cutouts for glazing and louvers.

1.5 SUBMITTALS FOR INFORMATION

A. Section 01300 - Submittals: Procedures for submittals.
B. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

A. Manufacturer: Specializing in manufacturing products specified in this section with three years experience.

1.7 REGULATORY REQUIREMENTS

A. Installed Door and Panel Assembly: Conform to NFPA 80 for fire rated class as scheduled.

1.8 DELIVERY, STORAGE AND PROTECTION

A. Section 01600 - Material and Equipment: Transport, handle, store and protect products.
B. Accept doors on site in manufacturer's packaging. Inspect for damage.
C. Break seal on site to permit ventilation.

1.9 PROJECT CONDITIONS

A. Section 01039 - Coordination and Meetings.
B. Coordinate frame installation with size, location, and installation of service utilities.
C. Coordinate the work with door opening construction, doorframes and door hardware installation.
D. Sequence installation to ensure wire connections are achieved in an orderly and expeditious manner.

**PART 2 PRODUCTS**

2.1 ACCEPTABLE PRODUCTS:

A. Allied Steel Products, Inc.
B. Amweld/Div. American Welding & Mfg. Co.
C. Ceco Corp.
D. Curries Mfg., Inc.
E. Pioneer Builders Products Corp./Div. CORE Industries, Inc.
F. Steelcraft/Div. American Standard Co.
G. Republic Builders Products Corp./Subs. Republic Steel.

2.2 DOORS AND PANELS

A. Astragals for Double Doors: Steel T shaped, specifically for double doors (As required).
B. Fabricate doors with hardware reinforcement welded in place.
C. Attach fire rated label to each fire rated door unit.
D. Configure exterior doors with special profile to receive recessed weather stripping.
E. Type and Design:
    1. Tightly hemmed vertical seam on lock and hinge edges, with top flush channel and beveled lock edge, in the dimensions and types shown on the drawings, reinforced for the finish hardware being provided under Section 08710 of these Specifications, and in the following gauges:
        a. Interior Doors: 18 gauge honeycomb core. Labeled and/or Non-labeled.
        b. Exterior Doors: 16 gauge insulated core. Labeled and/or Non-labeled.

2.3 FINISH

A. Steel Sheet: Exterior doors to be galvanized to ASTM A525.
B. Primer: Air-dried.
C. Paint per Specification Section 09900: color as selected.

**PART 3 EXECUTION**

3.1 EXAMINATION

A. Section 01039 - Coordination and Meetings: Verification of existing conditions before starting work.
B. Verify that opening sizes and tolerances are acceptable.

3.2 INSTALLATION

A. Install doors in accordance with SDI-100 and DHI.
B. Coordinate installation of glass and glazing.
C. Install door louvers, plumb and level.
D. Coordinate installation of doors with installation of frames and hardware specified in Section 08710.
E. Touch-up finished doors.

3.3 ERECTION TOLERANCES

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

3.4 ADJUSTING

A. Section 01650 - Starting of Systems: Adjusting installed work.
B. Adjust door for smooth and balanced door movement.

3.5 SCHEDULE

A. Refer to Door and Frame Schedule on architectural drawings.

**END OF SECTION**

**08112**

**STANDARD STEEL FRAMES**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-rated and fire rated steel frames.
B. Interior and Exterior glazed light frames.

1.2 RELATED SECTIONS

A. Section 08111 - Standard Steel Doors.
B. Section 08710 - Door Hardware: Hardware, silencers and weather stripping.
C. Section 08800 - Glazing. (N.I.C.)

1.3 REFERENCES

A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
B. ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
C. ASTM E152 - Methods of Fire Tests of Door Assemblies.
D. DHI - Door Hardware Institute: The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
E. NFPA 80 - Fire Doors and Windows.
F. NFPA 252 - Fire Tests for Door Assemblies.
G. SDI-100 - Standard Steel Doors and Frames.
H. UL 10B - Fire Tests of Door Assemblies.

1.4 SUBMITTALS FOR REVIEW

A. Section 01300 - Submittals: Procedures for submittals.
B. Shop Drawings: Indicate frame elevations, reinforcement, anchor types and spacing, location of cutouts for hardware and finish.

1.5 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.6 REGULATORY REQUIREMENTS

A. Fire Rated Frame Construction: Conform to NFPA 252 or UL 10B.
B. Installed Frame Assembly: Conform to NFPA 80 for fire rated class same as fire door.

1.7 DELIVERY, STORAGE AND PROTECTION

A. Section 01600 - Material and Equipment: Transport, handle, store and protect products.
B. Accept frames on site in manufacturer's packaging. Inspect for damage.

1.8 PROJECT CONDITIONS

A. Section 01039 - Coordination and Meetings.
B. Coordinate the work with frame opening construction, door and hardware installation.

C. Sequence installation to ensure wire connections are achieved in an orderly and expeditious manner.

1.9 FRAMES

A. Frames: To suit SDI-100 Grade and Model of door specified in Section 08111.

**PART 2 PRODUCTS**

2.1 FRAMES

A. 16 gauge. To suit SDI-100 Grade.
   1. Provide drywall wrap around frames for interior and exterior doors.

2.2 ACCESSORIES

A. Removable Stops: Rolled steel channel shape, butted corners; prepared for countersink style tamper proof screws.
B. Bituminous Coating: Fibered asphalt emulsion.
C. Primer: Zinc chromate type.
D. Silencers: Specified in Section 08710.
E. Weatherstripping: Specified in Section 08710.

2.3 FABRICATION

A. Fabricate frames as welded unit.
B. Mullions for Double Doors: Fixed type, of same profiles as jambs.
C. Transom Bars for Glazed Lights: Fixed type, of same profiles as jamb and head.
D. Fabricate frames with hardware reinforcement plates welded in place. Provide mortar guard boxes.
E. Reinforce frames wider than 4" with roll formed steel channels fitted tightly into frame head, flush with top.
F. Configure exterior frames with special profile to receive recessed weather stripping.
G. Attach fire rated label to each fire rated door unit.

2.4 FINISH

A. Steel Sheet: Galvanized.
B. Primer: Air-dried.
C. Paint per Specification Section 09900: color as selected.
D. Coat inside of frame profile with bituminous coating.

**PART 3 EXECUTION**

3.1 EXAMINATION

A. Section 01039 - Coordination and Meetings: Verification of existing conditions before starting work.
B. Verify that opening sizes and tolerances are acceptable.

3.2 INSTALLATION

A. Install frames in accordance with SDI-100 and DHI.
B. Coordinate with masonry, gypsum board or concrete wall construction for anchor placement.
C. Coordinate installation of glass and glazing.
D. Coordinate installation of frames with installation of hardware specified in Section 08710 and doors in Section 08111.

E. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

3.3 ERECTION TOLERANCES

A. Maximum Diagonal Distortion: 1/8" measured with straight edges, crossed corner to corner.

3.4 SCHEDULE

A. Refer to Door Schedule on drawings.

**END OF SECTION**

**08710**

**DOOR HARDWARE**

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Hardware for hollow steel doors.
B. Thresholds.
C. Weatherstripping, seals and door gaskets.

### 1.2 RELATED SECTIONS

A. Section 08111 - Standard Steel Doors.
B. Section 08112 - Standard Steel Frames.

### 1.3 REFERENCES

A. NFPA 80 - Fire Doors and Windows.
B. NFPA 101 - Life Safety Code.
C. NFPA 252 - Fire Tests of Door Assemblies.
D. UL 10B - Safety Fire Tests of Door Assemblies.

### 1.4 SUBMITTALS FOR REVIEW

A. Section 01300 - Submittals: Procedures for submittals.
B. Shop Drawings:
   1. Indicate locations and mounting heights of each type of hardware, schedules and catalog cuts.
   2. Submit manufacturer's parts lists and templates.
C. Samples:
   1. Submit 1 sample of hinge, latchset, lockset and closer, illustrating style, color and finish.
   2. Samples will be incorporated into the Work.

### 1.5 SUBMITTALS AT PROJECT CLOSEOUT

A. Section 01700 - Operation and Maintenance Data.
B. Section 01300 - Procedures for submittals.
C. Maintenance Data: Include data on operating hardware, lubrication requirements and inspection procedures related to preventative maintenance.
D. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.

### 1.6 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.

### 1.7 DELIVERY, STORAGE AND PROTECTION

A. Section 01600 - Material and Equipment: Transport, handle, store, and protect products.
B. Package hardware items individually, label and identify each package with door opening code to match hardware schedule.

1.8 PROJECT CONDITIONS

A. Section 01039 - Coordination and Meetings.
B. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.
C. Sequence installation to ensure utility connections are achieved in an orderly andexpeditious manner.
D. Coordinate Owner's keying requirements during the course of the Work.

1.9 WARRANTY

A. Provide five-year manufacturer warranty for door closers.

1.10 MAINTENANCE PRODUCTS

A. Section 01730 - Operation and Maintenance Data.
B. Provide special wrenches and tools applicable to each different or special hardware component.
C. Provide maintenance tools and accessories supplied by hardware component manufacturer.

1.11 EXTRA MATERIALS

A. Section 01730 - Operation and Maintenance Data.

**PART 2 PRODUCTS**

2.1 KEYING

A. Door Locks: Keyed in like-groups. Master keyed.
B. Include construction keying, and control keying with removable core cylinders. Key to the existing keying system where requested.
C. Supply keys in the following quantities:
    1. Two master keys.
    2. Four construction keys.
    3. Three change keys for each lock.

**PART 3 EXECUTION**

3.1 EXAMINATION

A. Section 01039 - Coordination and Meetings: Verification of existing conditions before starting work.
B. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings.
C. Verify that electric power is available to power operated devices and is of the correct characteristics.

3.2 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions.
B. Use templates provided by hardware item manufacturer.

3.3 FIELD QUALITY CONTROL

A. Section 01400 - Quality Control 01650 - Starting of Systems: Field inspection, testing, and adjusting.

B. Architectural Hardware Consultant will inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.4 ADJUSTING

A. Section: 01650 - Starting of Systems: Adjusting installed work.
B. Adjust hardware for smooth operation.

3.5 SCHEDULE

A. Hardware group 1: Door: 1

| | | | |
|---|---|---|---|
| 1-1/2 | Pr. Butts | F179-4-1/2 x 4-1/2 US26D | Stanley |
| 1 | Privacy Lockset | AU 5402 LN - 626 | Yale |
| 1 | Closer | 8616DS | Dorma |
| 1 | Wall Stop | 409-26D | Rockwood |
| 1 | Sweep | 18061CNB – 36” | Pemko |

**END OF SECTION**

**09260**

**GYPSUM BOARD SYSTEM**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Gypsum board and joint treatment.

1.2 RELATED SECTIONS

A. Section 06112 - Framing and Sheathing: Building wood framing system.
B. Section 07212 - Batt Insulation: Thermal insulation.

1.3 REFERENCES

A. ASTM C36 - Standard Specification for Gypsum Wallboard.
B. ASTM C79 - Standard Specification for Gypsum Sheathing Board.
C. ASTM C442 - Standard Specification for Gypsum Backing Board and Coreboard.
D. ASTM C475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
E. ASTM C630 - Standard Specification for Water-Resistant Gypsum Backing Board.
F. ASTM C645 - Standard Specification for Non-Load (Axial) Bearing Steel Studs,Runners (Track) and Rigid Furring Channels for Screw Application of Gypsum Board.
G. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Board.
H. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.
I. ASTM C1002 - Standard Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases.
J. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
K. GA-201 - Using Gypsum Board for Walls and Ceilings.
L. GA-214 - Recommended Specification: Levels of Gypsum Board Finish.
M. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board.
N. GA-600 - Fire Resistance Design Manual.
O. UL - Fire Resistance Directory.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM C840.
B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years experience.

## PART 2 PRODUCTS

2.1 GYPSUM BOARD MATERIALS

A. Fire Rated Gypsum Board: ASTM C36; fire resistive type, UL or WH rated; 5/8 inch thick, maximum available length in place; ends square cut, tapered edges.

2.2 ACCESSORIES

A. Corner Beads: Metal.
B. Edge Trim: GA-201 and GA-216; Type LC exposed reveal bead.
C. Joint Materials: ASTM C475; reinforcing tape, joint compound, adhesive and water.

D. Textured Finish Materials: Latex based texturing material, containing fine aggregate.
E. Fasteners: ASTM C1002, Type S12 and GA-216.

**PART 3 EXECUTION**

3.1 EXAMINATION

A. Section 01039 - Coordination and Meetings: Verification of existing conditions before starting work.
B. Verify that site conditions are ready to receive work and opening dimensions are as indicated on drawings.

3.2 GYPSUM BOARD INSTALLATION

A. Install gypsum board in accordance with GA-201, GA-216 and GA-600.
B. Erect single layer standard gypsum board horizontal, with ends and edges occurring over firm bearing.
C. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.
D. Erect exterior gypsum sheathing horizontally, with edges butted tight and ends occurring over firm bearing.
E. Use screws when fastening gypsum board to metal furring or framing.
F. Double Layer Applications: Use gypsum-backing board for first layer, placed perpendicular to framing or furring members. Use fire rated gypsum-backing board for fire rated partitions and ceilings.
G. Place second layer perpendicular to first layer. Offset joints of second layer from joints of first layer.
H. Treat cut edges and holes in moisture resistant gypsum board with sealant.
I. Place control joints 12 feet apart, or consistent with lines of building spaces as directed.
J. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.
K. Install backing board over plywood sheet in accordance with manufacturer's instructions.

3.3 JOINT TREATMENT

A. Tape, fill, and sand exposed joints, edges and corners to produce smooth surface ready to receive finishes.
B. Feather coats on to adjoining surfaces so that camber is maximum 1/32 inch.

3.4 TOLERANCES

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

**END OF SECTION**

**09900**

**PAINTING**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation.
B. Field application of paints.

1.2 REFERENCES

A. ASTM D16 - Standard Terminology Relating to Paint, Varnish, Lacquer and Related Products.
B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
C. NACE (National Association of Corrosion Engineers) - Industrial Maintenance Painting.
D. NPCA - Guide to U.S. Government Paint Specifications; National Paint and Coatings Association.
E. PDCA - Architectural Specifications Manual; Painting and Decorating Contractors of America.
F. SSPC - Steel Structures Painting Manual; Steel Structures Painting Council.

1.3 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

1.4 SUBMITTALS FOR REVIEW

A. Section 01300 - Submittals: Procedures for submittals.
B. Samples:
   1. Submit two paper chip samples, 2 x 4 inches in size illustrating range of colors and textures available for each surface finishing product scheduled.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years experience.

1.6 DELIVERY, STORAGE AND PROTECTION

A. Section 01600 - Material and Equipment: Transport, handle, store and protect products.
B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
C. 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.
D. 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.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01600 - Material and Equipment: Environmental conditions affecting products on site.
B. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
C. Do not apply exterior coatings during rain or snow or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior, unless required otherwise by manufacturer's instructions.
E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
F. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.8 PROJECT CONDITIONS

A. Section 01039 - Coordination and Meetings.
B. Sequence application to the following:
1. Do not apply finish coats until paintable sealant is applied.
2. Back prime wood trim before installation of trim.

1.9 EXTRA MATERIALS

A. Section 01730 - Operation and Maintenance Data.
B. Supply 1 gallons of each color, type and surface texture; store where directed.
C. Label each container with color, type, texture and room locations in addition to the manufacturer's label.

**PART 2 PRODUCTS**

2.1 MATERIALS

A. Coatings: Ready mixed, except field-catalyzed coatings. Prepare pigments:
1. To a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
2. For good flow and brushing properties.
3. Capable of drying or curing free of streaks or sags.
B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.
C. Patching Materials: Latex filler.
D. Fastener Head Cover Materials: Latex filler.

2.2 FINISHES

A. Refer to finish schedule on drawings for surface finish.

2.3 BRAND OF PAINT

A. Sherwin-Williams or equal.

**PART 3 EXECUTION**

3.1 EXAMINATION

A. Section 01039 - Coordination and Meetings: Verification of existing conditions before starting Work.
B. Verify that surfaces and substrate conditions 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 is below the following maximums:
1. Plaster and Gypsum Wallboard: 12 percent.

2. Masonry, Concrete and Concrete Unit Masonry: 12%.
3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
4. Concrete Floors: 8 percent.

3.2 PREPARATION

A. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons and fittings prior to preparing surfaces or finishing.
B. Surfaces: Correct defects and clean surfaces that affect work of this section.
C. Marks: Seal with shellac those that may bleed through surface finishes.
D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
E. Concrete Floors: Remove contaminations, acid etch and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow it to dry.
F. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.
G. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powded and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow it to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow it to dry.
H. Plaster Surfaces: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
I. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with a solvent. Prime paint bare steel surfaces.
J. Interior Wood Items Scheduled to Receive Paint 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.
K. Metal Doors Scheduled for Painting: Prime metal door top and bottom edge surfaces.

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. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
D. Sand wood 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. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
G. Prime concealed surfaces of interior woodwork with primer paint.
H. Prime concealed surfaces of interior wood surfaces scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with thinner.

3.4 CLEANING

A. Collect waste material that may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.5 SCHEDULE - EXTERIOR SURFACES

A. Concrete, Concrete Block, Restored Masonry Cement Plaster:
1. One coat of primer sealer latex.
2. One coat of alkyd, match existing.

3.6 SCHEDULE - INTERIOR SURFACES

A. Wood - Painted:
   1. One coat of latex prime sealer.
   2. One coat of alkyd enamel, semi-gloss.

B. Concrete, Concrete Block, Restored Masonry Cement Plaster:
   1. One coat of block filler.
   2. Two coats of high-gloss polyamide epoxy.

C. Interior Gypsum Drywall Ceiling
   1. Two coats of latex ceiling paint.

D. Steel - Unprimed:
   1. One coat of alkyd primer.
   2. Two coats of alkyd enamel, gloss.

E. Steel - Shop Primed:
   1. Touch-up with zinc chromate primer.
   2. Two coats of alkyd enamel, gloss.

**END OF SECTION**

**10800**

**TOILET AND BATH ACCESSORIES**

## PART 1 GENERAL

1.1 SECTION INCLUDES

A. Toilet and shower room accessories.

1.2 RELATED SECTIONS

A. Section 06112: Placement of concealed anchor devices and placement of backing plate reinforcement.

1.3 REFERENCES

A. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
C. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
D. ASTM C1036 - Standard Specification for Flat Glass.
E. FS DD-M-411C -- Mirrors, Glass.

1.4 COORDINATION

A. Section 01039 - Coordination and Meetings.
B. Coordinate the work with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

## PART 2 PRODUCTS

2.1 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with fittings, steel anchor plates, adapters and anchor components for installation.
   1. Grind welded joints smooth.
   2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
B. Keys: Provide 3 keys for each accessory to Owner.
C. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof type.
D. Expansion Shields: Fiber, lead or rubber as recommended by accessory manufacturer for component and substrate.

2.2 FINISHES

A. Chrome/Nickel Plating: ASTM B456, Type SC 2, satin finish, unless otherwise noted.
B. Baked Enamel: Pretreat to clean condition, apply one coat of primer and minimum two coats epoxy baked enamel.
C. Galvanizing for Items other than Sheet: ASTM A123 to 1.25 oz/sq yd. Galvanize ferrous metal and fastening devices.
D. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.
E. Back paint components where contact is made with building finishes to prevent electrolysis.

2.3 TOILET ROOM ACCESSORIES

A. Toilet Paper Dispenser: Double roll surface mounted bracket type, chrome-plated zinc alloy brackets eccentric-shaped plastic spindle for 1/2 revolution delivery designed to prevent theft of tissue roll.
B. Paper Towel Dispenser: Surface Mounted automatic. Four D-sized batteries. Non-perforated paper towels. Provide one roll of towels. Equal to Bobrick B-72974.
C. Mirrors: Stainless steel framed, 6 mm thick float glass, abrasion-resistant coated mirror.
   1. Size: As indicated on drawings.
   2. Frame: 0.05 inch channel shapes, with mitered and welded and ground corners, and tamperproof hanging system; No.4 bright annealed finish.
   3. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
D. Grab Bars: Stainless steel, 1-1/4 inches outside diameter, minimum 0.05 inch wall thickness, nonslip grasping surface finish, exposed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar. Length and Configuration: As indicated on drawings.
E. Hat and Coat Hook: Equal to Bobrick B-682.
   1. Wall Mounting Flange: 2”x 2” bright polished stainless steel.
   2. Hook: 1” wide x 6-1/4” high, bright polished stainless steel with 3” projection.

**PART 3 EXECUTION**

3.1 EXAMINATION

A. Section 01039 - Coordination and Meetings: Verification of existing conditions before starting work.
B. Verify exact location of accessories for installation.
C. Verify that field measurements are as indicated on product data.

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.
B. Install plumb and level, securely and rigidly anchored to substrate.
C. Mounting Heights and Locations: As required by accessibility regulations.

**END OF SECTION**

**15050**

**MATERIALS AND METHODS**

## PART 1 GENERAL

1.1 OPERATION PRIOR TO ACCEPTANCE

A. When any equipment is operable, and it is to the advantage of the Contractor to operate the equipment, he may do so provided that he properly supervises the operation, and retains full responsibility for the equipment operated. Before final acceptance by the owner, the Contractor shall properly clean the equipment, install clean filter media, make all required adjustments and complete all punch list items.

1.2 WARRANTY

A. Warrant to Owner that materials, equipment, and workmanship provided under this Division of the Specifications will be free from defects for a period of one year from the date of acceptance by Owner. Additional equipment warranty requirements are stated in other sections of the specifications.

## PART 2 PRODUCTS

2.1 MATERIALS

A. Products are to be new and free from defects, and are to be installed by competent specialist for each trade in accordance with the manufacturer's recommendations. Materials or equipment not meeting these standards, or the acceptance of the Engineer, may be rejected and will be replaced at no additional costs to the owner.

## PART 3 EXECUTION

3.1 PIPING INSTALLATION

A. Conceal piping in pipe chases, walls, furred spaces and above ceiling, unless otherwise indicated.
B. Should any condition arise which would cause piping or ductwork to be exposed in finished areas,it will be called to the architect/owner's attention immediately and corrected in accordance with the architect/owner's instructions.

3.2 HANGERS AND SUPPORTS

A. Provide and install per ANSI Standards SP-58 and SP-69.

B. Adequately support pipes throughout the buildings, both horizontal and vertical.

C. Hanger Schedule

| PIPE SERVICE | HANGER SIZE | TYPE | GRINNELL NO. |
|---|---|---|---|
| Uninsulated Steel | 2" & smaller | Split Ring | 108 with 114 |
| Uninsulated Copper | 2" & smaller | Ring | CT 99 |

| | | | |
|---|---|---|---|
| Cast Iron Soil Pipe | All | Clevis | 590 |
| Insulated Steel | 4" & smaller | Clevis | 260 with shield |
| Insulated Copper | 2" & smaller | Clevis | CT 65 |

D. Multiple or Trapeze Hangers" Steel channels with angles or unistrut spacers and hanger rods.

E. Wall Support 2 1/2 inch and over: Welded steel bracket and wrought steel clamp.

F. Vertical Support: Steel riser clamp.

G. Provide copper plated hangers and supports for copper piping or provide sheet plastic tape wrapping between hanger or support and piping.

H. Equivalent products of Fee and Mason or Elcen are acceptable substitutes for the Grinnell hangers specified.

I. Maximum horizontal pipe hanger support spacing and minimum rod diameter for rigid rod hangers (see chart).

J. Install hangers to provide minimum 1/2-inch clear space between finished covering and adjacent work.

K. Place a hanger within one foot of each horizontal elbow.

L. Support horizontal soil pipe near each hub, with 10 feet maximum spacing between hangers.

M. Support PVC piping per manufacturer's recommendations.

3.3 ELECTRICAL WIRING OF MOTORS AND EQUIPMENT

A. Follow manufacturer's published directions in the delivery, storage, protection, installation, piping and wiring and start-up of equipment and materials.

3.4 ACCESS PANELS AND DOORS

A. Install access panels and doors for concealed equipment and valves.

3.5 TESTS

A. Field test mechanical equipment furnished and installed under this Contract as required by the Engineer Tests.
B. Perform tests required by governing authorities, in addition to tests specified in individual Sections.
C. Complete final installation and testing 14 days prior to Contract Substantial Completion Date.
D. All pipe work shall be tested at the pressure equal to the design working pressure of the pipe for the intended service and maintain this pressure for not less than two hours with not more than 1% drop in pressure.
E. Notify architect/owner of any test failures. Submit weekly pipe test log listing service; section tested, initial and final pressure, time and temperature.

**END OF SECTION**

**15400**

**PLUMBING SYSTEMS**

## PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Water piping.
   2. Sanitary drainage.
   3. Condensate piping.
   4. Testing.

B. Comply with other Division 15 Sections, as applicable. Refer to other Divisions for coordination of work.

1.2 SUBMITTALS

A. Make submittals for all products specified in the specification.

## PART 2 PRODUCTS

2.1 MATERIALS

A. Water Piping Above Grade, Type "L" hard drawn, seamless copper water tube, ASTM B88 and Federal Specification WW-T-799. Joined with wrought copper pressure fittings, ANSI B16.22. Make joints using "lead free" solder and a non-corrosive paste-type flux. Core solder is not allowed. Solder will be solid string or wire type. Where soldered copper piping is connected to threaded brass piping, use a cast brass adaptor.

B. Water Piping Below Grade, Type "K" hard drawn, seamless copper water tube, ASTM B88 and Federal Specification WW-T-799. Joined with wrought copper pressure fittings, ANSI B16.22. Make joints using "lead free" solder and a non-corrosive paste-type flux. Core solder is not allowed. Solder will be solid string or wire type. Where soldered copper piping is connected to threaded brass piping, use a cast brass adaptor.

C. Make piping connections to fixtures and equipment with chrome-plated seamless brass tube, ASTM B-125 and Federal Specification WW-T0791. No ferrous piping or materials are allowed in water piping smaller than 4 inches.

2.2 SANITARY DRAINAGE

A. Sanitary Drainage lines (Soil, Waste and Vent): Cast iron soil pipe and fittings, coating inside and outside, ASTM A74 and Federal Specification WW-P-401. Label with Cast Iron Soil Pipe Institutes' "Mark of Quality and Permanence". Weights of pipe are required by code for location and duty. Joints shall be fabricated by use of "Push-On" type gasketed joints (above or below ground) or "No-Hub" mechanical joints (above ground only). Where permitted by local codes, PVC-DWV Plastic Schedule 40, NSF Seal CS-272 may be used for sanitary drainage pipes (soil, waste, and vent), with solvent-welded joints.

2.3 VALVES

A. Valves for Domestic Water Piping Systems: Nibco S580 or equal.

2.4 PRESSURE REDUCING VALVE

A. When the water system static pressure is greater than 75 PSI, furnish and install a pressure-reducing valve ahead of all fixtures and located in an accessible place. Set pressure at 50 PSI downstream of backflow preventer. Contractor to verify supply pressure.

2.5 COMMERCIAL TYPE WATER HAMMER ARRESTERS

A. Provide commercial type water hammer arrester on hot and cold water supplies as generally indicated, with precise location and sizing to be in accordance with PD1-WH201.
B. Water hammer arresters, where concealed, shall be accessible by means of access doors or removable panels.
C. Water hammer arresters shall be in accordance with PD1-WH201, as furnished by Watt, Josam or equal.
D. Vertical capped pipe columns will not be permitted.

2.6 BACKFLOW PREVENTER

A. Provide a Watts #909 reduced pressure backflow preventer for the domestic water service.

2.6 PLUMBING FIXTURES

A. Provide and install fixtures as shown on plans.

**PART 3 EXECUTION**

3.1 PIPING INSTALLATION

A. Install piping neatly and parallel with or perpendicular to lines of the structure. Install pipe hangers to maintain accurately aligned piping systems, adequately supported both laterally and vertically. Install horizontal soil, waste, and vent pipe with a grade of 1/4" per foot where possible and not less than 1/8" per foot. Where practicable, connect two or more vents together and extend as one vent through roof. Make vent connections to stacks by appropriate use of 45 wyes, long sweep quarter bends, sixth, eighth or sixteenth bends, except that sanitary tees may be used on the vertical stacks.
B. Extend condensate drain piping from units with condensate discharge.
C. Install drains at all low points and vents at high points in water distribution system.

3.2 PIPING

A. Refer to Section 15700 for insulation requirements.

3.3 PIPE TESTS

A. Test water piping before installing equipment and before insulation is applied, using specified methods and conditions. Subject piping to test for not less than 24 hours under inspection by the Engineer. Make necessary replacements and repairs and repeat tests until entire system is accepted as satisfactory. Work includes testing equipment. After installation of equipment, operate systems; clean out scale, dirt, oil, waste and foreign matter, and correct additional leaks. Test underground piping prior to backfilling.
B. Test plumbing drainage systems under 10 foot static head. Test water systems under 150 PSIG hydrostatic pressure.
C. Flush system thoroughly of dirt and foreign matter, then fill with water treated with 50 ppm of chlorine. During filling process, open valves and faucets several times to assure treatment of entire system. Leave treated water in system for 24 hours after which time system may be flushed; if residual chlorine is not less than 10 ppm, repeat flushing. After sterilization, receive approval by regulatory agency on samples of water in system.

**END OF SECTION**

**15440**

**PLUMBING FIXTURES**

## PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Plumbing fixtures and trim.
B. Related Sections:
   1. Refer to other Divisions for coordination of work.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's descriptive literature for all products specified.

## PART 2 PRODUCTS

2.1 FITTINGS AND PIPING

A. Provide brass fittings and piping in connection with plumbing fixtures; polished chrome-plated where exposed to view.
B. Provide tight-fitting wall or floor escutcheons of chrome-plated brass wherever pipes pass through floors, walls or ceilings.
C. Provide required water, waste, soil, and vent connections to plumbing fixtures and equipment, together with fittings, supports, fastening devices, cocks, valves and traps, leaving all in complete working order.

2.2 FIXTURES

A. Provide new plumbing fixtures, first quality, free from mars or chips. Sufficient means to support each fixture in an adequate and rigid manner that permits no perceptible movement of fixture by manually applied forces. Fixtures to be standard products as manufactured by American Standard, Crane, Eljer or Kohler. The space between fixtures and floor or walls to be sealed with silicone sealant.
B. Each fixture shall be complete with required trim, and exposed piping and trim shall be polished chrome-plated brass. Each fixture shall be furnished with stop valves having metal-to-metal seats.
C. Provide for each lavatory and sink, a flow-limiting device that will limit flow to not more than 3 g.p.m. Devices shall be integral with fixture trim, wherever possible and shall be products of the fixture trim Manufacturer in all cases.
D. Provide plumbing fixtures as scheduled on Drawings.
E. See Specification Section 15410 - Compressed Air Piping, 2.2 Valves and Specialties.

## PART 3 EXECUTION

3.1 INSTALLATION

A. Plumbing fixtures and equipment shall be set in place at locations indicated on the Drawings, leveled and connected. Fixtures shall be protected from damage during construction.
B. Installation procedures shall be in accordance with these Specifications and the Manufacturer's directions.

3.2 ADJUSTING AND CLEANING

A. Prior to final acceptance, inspect faucets, flush valves, stop valves, and similar devices, to determine that they operate properly and discharge the proper quantities of water. Correct any deficiencies as directed by the Engineer.

B. Clean fixtures, trim and accessories of foreign materials, including labels.

**END OF SECTION**

**15500**

**HEATING, VENTILATING AND AIR CONDITIONING**

## PART 1 GENERAL

1.1 SUMMARY

A. Provide heating, ventilating, and air conditioning systems where shown on the Drawings, as specified herein and as needed for a complete and proper installation including but not necessarily limited to:
   1. Wall Heater.

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.2 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Manufacturers catalogs, samples and other items needed to fully demonstrate the quality of the proposed materials and equipment.

C. Record drawings:
   1. Comply with pertinent provisions of Section 01720.
   2. Include a copy of the Record Drawings in each copy of the operation and maintenance manual described below.

D. Upon completion of this portion of the Work, and as a condition of its acceptance, deliver to the Architect two copies of an operation and maintenance manual compiled in accordance with the provisions of Section 01730 of these Specifications.

1.3 QUALITY ASSURANCE

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

B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

C. Provide minimum 1-year manufacturer's warranty on all units.

1.4 DELIVERY, STORAGE AND HANDLING

A. Comply with pertinent provisions of Section 01620.

## PART 2 PRODUCTS

2.1 HEATING UNIT

A Location of unit per Construction Documents.

2.2 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

**PART 3 EXECUTION**

3.1 SURFACE CONDITIONS

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

3.2 COORDINATION

A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

3.3 EQUIPMENT INTERFACE

A. For electrically operated equipment, verify the electrical characteristics actually available for the work of this Section and provide equipment meeting those characteristics.

3.4 INSTRUCTIONS

A. Upon completion of this portion of the Work, and prior to its acceptance by the Owner, provide a qualified engineer and fully instruct the Owner's maintenance personnel in the proper operation and maintenance of items provided under this Section.
B. Demonstrate the contents of the approved operation and maintenance manual required under Article 1.2 above.

3.5 TESTING AND ADJUSTING

A. Test and adjust each piece of equipment and each system as required to assure proper balance and operation.
   1. Test and regulate systems to conform to the air volumes shown on the approved design drawings.
B. Eliminate noise and vibration, and assure proper function of all controls, maintenance of temperature and operation in accordance with the approved design.

C. Secure required approval from governmental agencies having jurisdiction.

**END OF SECTION**

**16100**

**ELECTRICAL WORK**

**16101 GENERAL**

A. Requirements of the conditions of the contract and Instruction to Bidders, and General Conditions, apply to all work of this Section.

B. Provide complete electrical service where shown on the drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to:
   1. Panelboards as needed.
   2. Branch circuit wiring, in conduit for lighting, receptacles, junction boxes and motors.
   3. Hangers, anchors, sleeves, chases, supports, for fixtures and other electrical material and equipment in association therewith.
   4. Lighting fixtures and lamps.
   5. Wiring system, in conduit, for equipment and control provided under other Sections of these specifications.
   6. Other items and services required to complete the system.

C. Related Work
   1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these specifications

**16102 FIELD CONDITIONS AND MEASUREMENTS**

A. The Electrical Contractor shall visit the site of the work and familiarize himself with all available information concerning the structural, excavations, the location condition bearing on transportation, handling, and storage of materials. The Electrical Contractor shall make his own estimate of the facilities needed, and difficulties of execution of the contract including local conditions, availability of labor, uncertainties of weather, transportation, and other contingencies. Failure of the contractor to acquaint himself with all available information concerning these conditions will not relieve him from responsibility for estimating the difficulties and costs or successfully performing the complete work.

**16103 CLEANUP**

A. The Electrical Contractor shall have electrical rubbish and debris removed from the premises as directed. On completion of the electrical contract all associated debris and rubbish shall be removed from the premises.

B. All electrical equipment and materials furnished by this contractor shall be thoroughly cleaned and ready for use upon completion of the work.

**16104 GUARANTEE**

A. Contractor guarantees by his acceptance of the contract, that all work installed shall be free from any defects in workmanship and/or materials and that all apparatus will develop capacities and characteristics specified and that if, during a period of one year or as therefore specified, from substantial completion of work, any such defects in workmanship, materials or performance appear, he will with no cost to owner remedy such defect.

**16105 CODES**

A. All electrical work shall be done in strict accordance with the National Electrical Code and all regulations, laws and ordinances which may be applicable.

**16106 SUBMITTALS**

A. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this section.

2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
3. Manufacturer's recommended installation procedures which, when approved by the owner/architect, will become the basis for accepting or rejecting actual installation procedures used on the work.

B. Submittals shall include the following:
1. Panelboards. (N.I.C.)
2. Lighting fixtures
3. Wiring devices
4. Electric cord reels. (N.I.C.)

C. Samples
1. When so requested by the owner/architect, promptly provide samples of items scheduled to be exposed in the final structure.
2. When specifically so requested by the Contractor and approved by the Architect, approved samples will be returned to the Contractor for installation on the work.

D. Manuals: Upon completion of this portion of the work, and as a condition of its acceptance, deliver to the owner/architect two copies of an operation and maintenance manual. Include with each manual.
1. Copy of the approved record documents for this portion of work.
2. Copies of all circuit directories.
3. Copies of all warranties and guarantees.

**16107 QUALITY ASSURANCE**

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

B. Without additional cost to the owner, provide such other labor and materials as are required to complete the work of this section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these contract documents.

**16108 CONDUIT**

A. All interior wiring above grade shall be installed in electrical metallic tubing with screw coupling fittings.

B. All interior wiring below slab shall be Galvanized Rigid Steel conduit. Schedule 40 PVC conduits may be used if approved by Owner/Architect. If PVC is used the last two feet to point of emergence shall be Galvanized Rigid Steel conduit with grounding bushing and a grounding conductor sized according to ART. 250-95 of the National Electrical Code shall be installed.

C. Wiring in office areas shall be concealed, wiring in shop and storage areas shall be installed on surface.

D. All exterior wiring shall be in galvanized Rigid Steel Conduit.

E. Type MC cable with grounding conductor or type AC cable may be used for fixture whips.

**16109 WIRE AND CABLE**

A. Building wire and cable with 600 volt insulation shall be 98% conductivity copper unless otherwise noted. The minimum size conductor for lighting and power shall be No. 12 AWG. The minimum size conductor for control shall be No. 14 AWG.

B. Conductors sized No. 10 and smaller shall be Type "THHN" solid or stranded as required unless otherwise noted, sizes No. 8 and larger shall be type "THHN" stranded unless otherwise noted.

C. Conductors shall be colored coded as required by governmental agencies having jurisdiction or as required by the National Electrical Code.

D. Contractor shall provide and install all telephone and data cable and equipment as required by the project and per specifications sections 16930.

E. Contractor shall provide and install all of the grounding and grounding field as required by this project and per specification section 16931.

F. Tele/ data cables installed above accessible ceilings may be installed without conduit. Tele/data cables installed above non-accessible ceilings and on surface shall be in conduit. Open cables installed in space used for environmental air shall be rated for plenum use.

**16110 JUNCTION AND OUTLET BOXES**

A. Outlet Boxes
   1. Provide standard one-piece units, galvanized or sherardized steel of shape and size best suited to that particular location, of sufficient size to contain enclosed wires according to ART. 370-16 of the National Electrical Code.
   2. Provide outlet boxes 2 1/8" deep for 1" conduits.
   3. For lighting outlets, provide standard 4" octagon or square units with 3/8" fixture stud and box hanger where required.
   4. For switches and receptacles, provide standard boxes with plaster or dry wall ring with stainless steel cover plate for concealed devices and pressed steel boxed with galvanized or cadmium plated steel cover plates for exposed devices.

B. Junction or Pull Boxes
   1. Interior junction boxes shall be galvanized code-gauge sheet steel units with screw-on covers, of size and shape required to accommodate wires without crowding, and to suit the location.
   2. Exterior boxes shall meet NEMA 3R or 4 standards.

**16111 LIGHTING FIXTURES**

A. Install lighting fixtures, complete with lamps, as shown on drawings and schedules. Manufacturers shown on schedules are for quality and type only, manufacturers of equal quality will be accepted if approved by owner.
   1. Recessed fixtures:
      a. Provide unit having an attached pull box and with UL label.
      b. Provide local label in addition if so required by governmental agencies having jurisdiction..
   2. Fluorescent fixtures
      a. Provide ballasts thermally protected against overheating by built-in thermal protectors sensitive to ballast winding temperature and current.
      b. Provide protector preventing winding temperature from exceeding 120 degrees C, allowing winding temperatures to reach 105 degrees C under normal operating conditions at 40 degrees C ambient and, after opening, not reclosing above 80 degrees C.
      c. Exterior ballast shall be cold weather type.
      d. Where fixture substitutes are proposed, submit a sample fixture with materials list required to be submitted under Art. 16106 above.
      e. Light fixtures in work areas shall be located so as not to interfere with the operation of overhead doors.

**16112 WIRING DEVICES**

A. Toggle switches - Mount 48" above finished floor.
   1. Single pole Leviton 5521-I
   2. 3-way Leviton 5523-I

B. Receptacles - Mount 18" above Finished Floor in office area 48" above Finished Floor in garage and storage areas and above splashboard over counters.
   1. Duplex receptacles Leviton 5800-I
   2. Weatherproof duplex receptacles Leviton 6599-I mounted in FS box and 6196-VFS cover.
   3. Ground Fault Interrupter duplex receptacles Leviton 6599-I
   4. Isolated ground receptacles Leviton 5262-IG

C. Telephone and Computer Outlets shall be 4" x 4" x 1 1/2" outlet box with plaster ring. Install 3/4" EMT from box to just above accessible ceiling as required.

D. Outlets in finished walls shall be 4' x 4" x x1 1/2" outlet box with plaster ring and a cover plate.

E. Outlets on surface shall be 4" x 4" x 1 1/2" outlet box and 4" x 4" raised cover plate.

F. Devices of the following manufacturers will be accepted as equal.
   1. Hubbel
   2. Arrow-Hart
   3. General Electric

**16115 DISCONNECT SWITCHES**

A. Disconnect switches shall be Sq. 'D' Class 3130 General Duty fusible or non-fusible as shown on drawings. Interior switches shall be NEMA 1 and Exterior switches shall be NEMA 3R.

**16117 OTHER MATERIALS**

A. Provide other materials, not specifically described but required for a complete and proper installation as approved by the Architect.

**16118 EXECUTION**

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

**16119 PREPARATION**

A. Coordinate
   1. Coordinate as necessary with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this section.
   2. Coordinate the installation of electrical items with the schedule for work of other trades to prevent unnecessary delays in the total work.

B. Data indicated on the drawings and in these specifications are as exact as could be secured but there absolute accuracy is not warranted. The exact locations, distances, levels and other conditions will be governed by actual construction and the drawings and specifications should be used only for guidance in such regard.

C. Verify all measurements at the building. No extra compensation will be allowed because of differences between work shown on the drawings and actual measurements at the site of construction.

D. Branch circuit wiring and arrangement of home runs have been designed for maximum economy consistent with adequate sizing for voltage drops and other considerations. Install the wiring and circuits arranged exactly as shown on the Drawings, except as otherwise approved in advance by the architect.

E. The electrical drawings are diagrammatic, but are required to be followed as closely as actual

construction and work of other trades will permit. Where deviations are required to conform actual construction and the work of other trades, make such deviations without additional cost to the owner.

**16122 INSTALLATION OF CONDUCTORS**

A. Unless otherwise shown use #12 type THHN conductors for all branch circuits protected by 20 amp circuit breakers. Where so indicated on the drawings, use larger wires to limit voltage drops.

B. Use identified (white) neutrals and color-coded phase wires for all branch circuit wiring.
   1. Make splices electrically and mechanically with pressure-type connectors.
      a. For wire size #6 AWG and smaller, provide "Scotch-Lock" connectors.
   2. Insulate splices with a minimum of two half-lapped layers of Scotch Brand #33 vinyl-plastic electrical tape where insulation is required.

C. Tape all joints with rubber tape 1 1/2 times the thickness of the conductor insulation, than cover with vinyl-plastic electrical tape specified above.

D. The drawings do not indicate the home runs. Continue all home runs to the panel as though the routes were shown completely.

**16124 TESTING AND INSPECTION**

A. Make required tests in the presence of the owners representative and required approvals from the owner/architect and governmental agencies having jurisdiction.

B. Make written notice to the owner/architect adequately in advance of each of the following stages of construction.
   1. In the underground condition prior to placing concrete floor slab, when all associated electrical is in place.
   2. When all rough in is complete, but not covered.
   3. At completion of the work of this section.

C. When material and/or workmanship is found to not comply with the specified requirements, within three days after receipt of notice of such non-compliance remove the non-complying items from the job site and replace them with items complying with the specified requirements, all at no additional cost to the owner.

D. In the owner/architect's presence:
   1 Test all parts of the electrical systems for phase to phase and phase to ground short circuits and prove that all such items provided under this section function electrically in the required manner.
   2. Immediately submit to the architect a report of maximum and minimum voltages and a copy of the recording voltmeter chart.
   3. Also measure voltages between phase wires and neutral and report these voltages to the Architect.

**16125 PROJECT COMPLETION**

A. Upon completion of the work of this section, thoroughly clean all exposed portions of the electrical installation, removing all traces of soil, labels, grease, oil, and other foreign material and using only the type cleaner recommended by the manufacturer of the item being cleaned.

B. Thoroughly indoctrinate the owner's operation and maintenance personnel in the contents of the operations and maintenance manual required to be submitted under article 16106 of this section of these specifications.

**END OF SECTION**