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01019

CONTRACT REQUIREMENTS

PART 1 GENERAL

1.1 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.

1.2 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.

1.3 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.

1.4 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.

1.5 ALTERNATIVES

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

END OF SECTION

01039

COORDINATION AND MEETING REQUIREMENT

PART 1 GENERAL

1.1 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 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.

1.2 FIELD ENGINEERING

A. Employ a Land Surveyor registered in the State of Missouri and acceptable to Architect/Engineer/Designer.
B. Owner will locate and protect survey control and reference points.
C. Control datum for survey is that established by Owner provided survey.
D. Verify setbacks and easements; confirm drawing dimensions and elevations.
E. Provide field engineering services. Establish elevations, lines and levels, utilizing recognized engineering survey practices.

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 REFERENCES

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

1.2 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.

1.3 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.

1.4 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.

1.5 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.

1.6 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.

1.7 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.

1.8 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.

1.9 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.

1.10 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.

1.11 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.

1.12 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.

1.13 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 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.

1.2 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.

1.3 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.

1.4 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.

1.5 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.

1.6 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 TEMPORARY ELECTRICITY

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

1.2 TELEPHONE SERVICE

A. Provide, maintain, and pay for telephone service to field office and Architect/Engineer/Designer's field office at time of project mobilization.

1.3 TEMPORARY WATER SERVICE

A. Connect to existing water source as directed for construction operations at time of project mobilization.
B. Contractor will reimburse Owner for water used in construction as agreed upon at time of project mobilization.

1.4 TEMPORARY SANITARY FACILITIES

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

1.5 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.

1.6 WATER CONTROL

A. Grade site to drain. Maintain excavations free of water. Provide, operate and maintain pumping equipment.
B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

1.7 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.

1.8 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.

1.9 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.

1.10 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.

1.11 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.

1.12 FIELD OFFICES AND SHEDS

A. Office: Weather tight, with lighting, electrical outlets, heating and ventilating equipment and equipped with drawing rack and drawing display table.
B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.

1.13 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 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.

1.2 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.

1.3 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.

1.4 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.

1.5 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

01700

CONTRACT CLOSEOUT REQUIREMENT

PART 1 GENERAL

1.1 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.

1.2 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.

1.3 ADJUSTING

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

1.4 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.

1.5 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.

1.6 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.

1.7 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

02100

SITE PREPARATION

PART 1 SCOPE

A. The contractor shall visit the site and carefully examine the conditions of the premises to determine the amount of work and materials required for the work necessary to prepare the site in every respect for the construction of the building as shown on the plans.

B. The contractor shall be responsible for determining the quantities of materials to be excavated and handled and for the amount of backfilling, filling, subgrade, excavation for footings and grading to be done in order to perform all work required on the plans.

C. Included in the site grading is final. Provide finished grade material disturbed during construction to match existing.

D. Included in the finished site grading is to provide 6" compacted Type 5 rock base a minimum of 15'-0" beyond the building footprint.

E. Excavated soil and rock not used can be placed on site. Area to be designated by Owner.

F. MoDOT to have the four corners staked and building footprint leveled.

G. Verify utility locations before construction.

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 01600.

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 WEED KILLER

A. Provide a dry, free-flowing, dust-free chemical compound, soluble in water, capable of inhibiting growth of vegetation, and approved for use on this Work by governmental agencies having jurisdiction.

2.3 TOPSOIL

A. Where and if shown on the Drawings or otherwise required, provide topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic matter normal to the region, capable of sustaining healthy plant life, and 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.

2.4 OTHER MATERIALS

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

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

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

3.2 PROCEDURES

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

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

C. Dewatering:
1. Remove all water, including 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.

3.3 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.

3.4 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.

3.5 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.

3.6 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.

3.7 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 01600.

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 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.

3.3 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 2,500 psi.

3.4 BEDDING

A. Provide bedding as indicated on the Drawings.

3.5 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.

3.6 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.

3.7 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.

3.8 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.

3.9 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

02720

STORM SEWERAGE SYSTEM

PART 1 GENERAL

1.1 SUMMARY

A. Provide storm sewerage system 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. 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 01600.

PART 2 PRODUCTS

2.1 PIPE MATERIALS

A. Provide pipe and associated materials of the size indicated on the Drawings and meeting the following requirements.

1. Non-reinforced concrete pipe (NRCP): Provide "extra strength" complying ASTM C14.
2. Clay pipe (CP): Provide "extra strength" complying with ASTM C700.
3. Rectangular asbestos cement pipe (RACP) and transition units:
   a. Provide size as indicated on Drawings.
   b. Encase in concrete as shown on the Drawings.
   c. Acceptable products:
      (1) Manufactured by Industrial Building Materials Company, Los Angeles, California.
4. Polyvinyl chloride pipe (PVC):
   a. Acceptable products:
      (1) "Ringtite" plastic pipe and fittings, class 160, SDR 26, manufactured by Manville, Los Angeles, California.
5. Polyethylene material in plastic couplings: Comply with ASTM D2952.
6. Flexible watertight joints:

a. Provide rubber type gaskets for concrete pipe, complying with ASTM C433 but with shore durometer hardness type A, 40-55, in lieu of the hardness specified.
b. Provide factory-fabricated resilient materials for clay pipe, complying with ASTM C425.
c. Provide gasket and jointing materials with not more than one splice, except that two splices of rubber-gasket type will be permitted if the nominal diameter of the basket exceeds 54".

2.2 DRAINAGE STRUCTURES

A. General:
1. Construct manholes, inlets, and junction structures of reinforced concrete or precast reinforced concrete, complete with metal frames and covers or gratings and with fixed ladder rungs where indicated on the Drawings or required by codes.
2. Individual wall-mounted aluminum, plastic-covered steel or galvanized steel rungs are acceptable.

B. Materials:
1. Concrete: Comply with provisions for 3,000-psi concrete specified in Section 03300.
2. Mortar for pipe joints and connections to other drainage structures, and manhole construction:
a. Comply with requirements of ASTM C270, type M, except the maximum placement time shall be one hour.
b. Hydrated lime complying with ASTM C141, type B, may be added to the mixture of sand and cement in an amount equal to 25% of the volume of cement used.
c. Provide a quantity of water in the mixture sufficient to produce a stiff workable mortar, which shall be clean and free from harmful acids, alkalis, and organic impurities. Use the mortar within 30 minutes after water is added to the mix.

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 EXCAVATING, TRENCHING AND BEDDING

A. Excavate, trench, and bed for site drains in accordance with pertinent provisions of Section 02220, and the following.
B. Movement of construction machinery:
1. Use means necessary to avoid displacement of and injury to, pipe and structures while compacting by rolling or operating equipment parallel to the pipe.
2. Movement of construction machinery over a culvert or storm drain at any stage of construction is solely at the Contractor's risk.
C. Bedding:
1. Provide a bedding surface for the pipe with a firm foundation of uniform density throughout the entire length of the pipe.
2. Bed the pipe carefully in a soil foundation accurately shaped and rounded to conform to the lower 1/4 of the outside perimeter of circular pipe or set the pipe in a bed of sand.
3. Tamp bedding where necessary.
4. Provide bell holes and depressions for pipe joints of only the length, depth, and width required for making the particular pipe joint properly.
5. Where plastic pipe is used, provide a minimum of 4" of sand bedding over the top and under the pipe.

3.3 INSTALLING PIPE

A. General:
1. Carefully examine each pipe prior to placing.
a. Promptly set aside defective pipe and damaged pipe.
b. Clearly identify defects.
c. Do not install defective pipe or damaged pipe.
2. Place pipe to the grades and alignment indicated, with a tolerance of one in 1000 vertical and one in 500 horizontal, unless otherwise directed by the Architect.
3. Provide adequate facilities for lowering pipe safely into the trenches.
4. Do not place pipe in water, nor place pipe when trench or weather is unsuitable for that work.

3.4 JOINTS

A. Polyvinyl chloride pipe joints: Install with the specified materials and in accordance with the manufacturers' recommendations as approved by the Architect, applying solvent cement to pipe and fitting as recommended in ASTM D2855.

B. Joining pipe of different materials: Provide fittings couplings made for the pipe material jointing, or provide a concrete collar as approved by the Architect.

C. Joining pipe of different sizes:
1. Provide reducer fittings to the larger pipe.
2. Where pipes are different materials as well as different sizes, use the same material for reducer fitting as in the larger pipe.
3. Use eccentric collar joint when the slope of the pipe is less than 1%.

3.5 DRAINAGE STRUCTURES

A. Install drainage structures in accordance with the Drawings and with the manufacturers' recommendations as approved by the Architect.

3.6 BACKFILLING

A. Backfill and compact in accordance with pertinent provisions of Section 02220.

3.7 TESTING AND INSPECTING

A. Provide personnel and equipment necessary, and perform tests required to demonstrate that the work of this Section has been completed in accordance with the specified requirements.
B. Hydrostatic test on watertight joints:
1. Make a hydrostatic test on each watertight joint. Test one sample of each type watertight joint used. If one sample fails because of faulty workmanship, test an additional joint.
2. Demonstrate that joints in reinforced and unreinforced concrete pipe comply with ASTM C443.
3. Comply with ASTM C425 for tests of joints in clay pipe.
4. Make tests in concrete pipe and clay pipe at an internal hydrostatic pressure of 10 p.s.i for 24 hours.
5. Only joints within the building area and outside the building area but within ten feet of exterior walls or faces of the buildings need be tested.
6. Replace or repair joints found to be faulty. Repeat the test and repair cycle until joints are demonstrated to meet the specified requirements.

END OF SECTION

03100

CONCRETE FORMWORK

PART 1 GENERAL

1.1 REFERENCES

A. ACI 301 - Structural Concrete for Buildings.
B. ACI 318 - Building Code Requirements for Reinforced Concrete.
C. ACI 347 - Recommended Practice For Concrete Formwork.
D. PS 1 - Construction and Industrial Plywood.

1.2 DESIGN REQUIREMENTS

A. Design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; concrete to conform to required shape, line and dimension.

1.3 SUBMITTALS

A. Submit under provisions of Section 01300.
B. Product Data: Provide data on void form materials and installation requirements.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 347.

1.4 REGULATORY REQUIREMENTS

A. Conform to applicable code for design, fabrication, erection and removal of formwork.

1.5 FIELD SAMPLES

A. Provide under provisions of Section 01400. Coordinate with requirements stated in Section 03100 and 03300.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 01600.
B. Deliver void forms and installation instructions in manufacturer's packaging.
C. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

1.7 COORDINATION

A. Coordinate this Section with other Sections of work that require attachment of components to formwork.
B. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect/Engineer.

PART 2 PRODUCTS

2.1 WOOD FORM MATERIALS

A. Plywood: Douglas Fir species; grade B/B plyform class 1 or 2; sound undamaged sheets with clean, true edges.

B. Lumber: Douglas Fir species; standard grade; with grade stamp clearly visible.

2.2 PREFABRICATED FORMS

A. Preformed Steel Forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
B. Pan Type: Steel of size and profile required.
C. Tubular Column Type: Round, spirally wound laminated fiber material, surface treated with release agent, non-reusable, of sizes required.
D. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set; 2 inches thick.

2.3 FORMWORK ACCESSORIES

A. Form Ties: Snap-off type, galvanized metal, fixed length, cone type, with waterproofing washer, free of defects that could leave holes larger than 1 inch in concrete surface.

B. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

C. Dovetail Anchor Slot: Galvanized steel, 22 gauge thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.

D. Flashing Reglets: Galvanized steel, 22 gage thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.

E. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

F. Waterstops: Rubber, minimum 1,750 p.s.i tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, wide, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.2 EARTH FORMS

A. Earth forms are not permitted except for spread and column footings, which are to be square and free of debris.

3.3 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with ACI 301.
B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to over stressing by construction loads.
C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
D. Align joints and make watertight. Keep form joints to a minimum.
E. Obtain approval before framing openings in structural members that are not indicated on Drawings.
F. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.

3.4 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
B. Apply prior to placement of reinforcing steel, anchoring devices and embedded items.
C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to be embedded in passing through concrete work.
B. Locate and set in place items which will be cast directly into concrete.
C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts and components of other Work.
D. Install accessories in accordance with manufacturer's instructions, straight, level and plumb. Ensure items are not disturbed during concrete placement.
E. Install water-stops continuous without displacing reinforcement. Heat seal joints watertight.
F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
G. Close temporary openings with tight fitting panels, flush with inside face of forms and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.6 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.
B. Clean formed cavities of debris prior to placing concrete.
C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.7 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 301.

3.8 FIELD QUALITY CONTROL

A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design and that supports, fastenings, wedges, ties and items are secure.
B. Do not reuse wood formwork more than 2 times for concrete surfaces to be exposed to view. Do not patch formwork.

3.9 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
B. Loosen forms carefully. Do not wedge pry bars, hammers or tools against finish concrete surfaces scheduled for exposure to view.
C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION

03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 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.

1.2 QUALITY ASSURANCE

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

1.3 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 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.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301.

1.4 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 FIBEROUS REINFORCEMENT

A. Fiberous concrete reinforcement shall be one hundred percent (100%) virgin polypropylene fibrillated fibers specifically manufactured for use as concrete reinforcement, containing no reprocessed olefin materials. The fibers shall have the following physical characteristics:
    1. Specific gravity – 0.91.
    2. Tensile strength – 70,000 to 110,000 psi.
    3. Fiber length – per manufacturer's recommendation for specific use.
B. Add fiberous concrete reinforcement to concrete materials at the time the concrete is batched in the amounts recommended by the manufacturer (1.5 lb/cubic yard for sidewalks) or as indicated on the accepted plans.
C. Concrete shall be mixed in strict accord with the fiberous concrete reinforcement manufacturer's instructions and recommendations to assure uniform and complete dispersion.

2.6 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 not to exceed 1%. 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 requirements for concrete cover over reinforcement.
B. 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 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.

1.2 QUALITY ASSURANCE

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

1.3 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 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

05400

METAL STUD SYSTEM

PART 1 GENERAL

1.1 SUMMARY

A. Provide metal studs and accessories as indicated 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 45 calendar days after the Contractor has receive 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 prove compliance with the specified requirements.
3. Manufacturers' 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.

B. In addition to complying the pertinent codes and regulations of governmental agencies having jurisdiction, comply with pertinent recommendations contained in "Specifications for Metal Lathing and Furring" published by the Metal Lath/Steel Framing Association.

1.4 DELIVERY, STORAGE AND HANDLING

A. Comply with pertinent provisions of Section 01600.

PART 2 PRODUCTS

2.1 METAL STUDS AND ACCESSORIES

A. Meet or exceed minimum requirements of Fed Spec QQ-S-698 and Fed Spec Qq-S-775d, class D, for the item and use intended.

B. Metal studs:

1. At interior load bearing metal stud partitions, provide standard punched 6” steel studs 18 gage, either hot-dip galvanized or factory pre-primed.
3. Use only one type throughout the Work, unless otherwise shown on the Drawings or specifically approved n advanced by the Architect.

C. Accessories: Provide all accessories including, but not necessarily limited to, hat channels, tracks, clips, anchors, fastening devices, sound attenuation pencil rods and resilient clips and other accessories required for a complete and proper installation and as recommended by the manufacturer of the steel studs used.

2.2 GROUT

A. Provide a good grade of commercial grout for leveling the floor runner member of steel stud partitions as required.

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. Accurately lay out partition and wall lines from the dimensions shown on the Drawings.
B. Install metal studs and accessories in strict accordance with the manufacturer's recommendations as approved by the Architect, anchoring all components firmly into position.
C. Align partition and wall assemblies to a tolerance of one in 200 horizontally and one in 500 vertically.
D. Coordination:
    1. Space the studs as required for compliance with pertinent regulations, to give proper support for the covering material, and as indicated on the Drawings.
    2. Coordinate and provide required backing and other support for items to be mounted on the finished covering.
    3. Coordinate requirements for pipes and other items as designed to be housed within the partition and wall systems.

3.3 LEVELING

A. By use of the specified grout, or by other means approved by the Architect, provide continuous solid bearing under floor runner members of steel stud partitions and walls.
B. Level in a manner to provide uniform interface with ceilings and other overhead construction.

END OF SECTION

05500

METAL FABRICATIONS

PART 1 GENERAL

1.1 REFERENCES

A. ASTM A36 - Structural Steel.
B. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
C. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
D. ASTM A283 - Carbon Steel Plates, Shapes and Bars.
E ASTM A307 - Carbon Steel Bolts and Studs, 60,000 p.s.i Tensile Strength.
F. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
G. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
H. AWS A2.0 - Standard Welding Symbols.
I. AWS D1.1 - Structural Welding Code.
J. SSPC (Steel Structures Painting Council) - Steel Structures Painting Manual.

PART 2 PRODUCTS

2.1 MATERIALS - STEEL

A. Steel Sections: ASTM A36.
B. Steel Tubing: ASTM A500, Grade B.
C. Plates: ASTM A283.
D. Pipe: ASTM A53, Grade B, Schedule 40.
E. Bolts, Nuts, and Washers: ASTM A325 galvanized to ASTM A153 for galvanized components.
F. Welding Materials: AWS D1.1; type required for materials being welded.
G. Ladders: ANSI A14.3.
H. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

2.2 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.
B. Fabricate items with joints tightly fitted and secured.
C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush and hairline. Ease exposed edges to small uniform radius.
D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FABRICATION TOLERANCES

A. Squareness: 1/8-inch maximum difference in diagonal measurements.
B. Maximum Offset Between Faces: 1/16 inch.
C. Maximum Misalignment of Adjacent Members: 1/16 inch.
D. Maximum Bow: 1/8 inch in 48 inches.
E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

2.4 FINISHES - STEEL

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Prime paint items with one coat.
D. Structural Steel Members: Galvanize after fabrication to ASTM A123. Provide minimum 1.25 oz/sq ft galvanized coating.
E. Non-structural Items: Galvanized after fabrication to ASTM A123. Provide minimum 1.25 oz/sq ft galvanized coating.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.
B. Supply steel items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

3.3 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.
B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
C. Field weld components indicated on Drawings.
D. Perform field welding in accordance with AWS D1.1.
E. Obtain approval prior to site cutting or making adjustments not scheduled.
F. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.4 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
B. Maximum Offset From True Alignment: 1/4 inch.
C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

07411

METAL ROOF AND WALL PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Factory-formed metal roof and wall panels, including fascia, soffit and liner panels and includes:

1. Factory-formed panels in vertical installation.
2. Factory-formed panels in horizontal installation.
3. Metal flashings and trim.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. ASTM A653/A653M Standard specification for steel sheets, zinc-coated (galvanized) or zinc-iron alloy-coated (galvannealed) by the hot-dip process.
2. ASTM A792/A792M Standard specification for steel sheet, 55% aluminum-zinc alloy coated by the hot-dip process.
3. ASTM B209 Standard specification for aluminum and aluminum-alloy sheet and plate.
4. ASTM D2247 Standard practice for testing water resistance of coatings in 100% relative humidity.
5. ASTM E1680 Standard test method for determining the rate of air leakage through exterior metal roof systems under specified pressure differences across the specimen.
6. ASTM E1646 Standard test method for water penetration of metal roof systems by uniform static air pressure difference.
7. ASTM G90 Standard practice for performing accelerated outdoor weathering of non-metallic materials using concentrated natural sunlight.

1.3 SYSTEM DESCRIPTION

A. Panel Performance requirements: Provide panels, which have been manufactured, fabricated and installed to withstand structural and thermal movement, wind loading and weather exposure to maintain manufacturer’s performance criteria without defects, damage, failure or infiltration of water.

B. Finish Performance Requirements:
1. Color change and fade resistance: No cracking, peeling, blistering or loss of adhesion when tested in accordance with ASTM G23; color change, after removal of surface deposits sucha s dirt or chalk, maximum 5 Hunter units.
2. Humidit resistance: No blistering peeling, or loss of adhesion after 2000 hours testing in accordance with ASTM D2247.

1.4 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 submittal procedures section.
B. Product Data: Submit manufacturer’s product data for specified products.
C. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, accessories, finish colors and textures.
1. Indicate layout of panels and panel sizes, including custom-fabricated panels if indicated:

indicate each item of trim and accessories.

2. Indicate in detailed drawings profile and gauge of interior and exterior sheets, and location and types of fasteners; indicate locations, gauges, shapes and methods of attachment of panels, trim and accessory items.
3. Indicate products/materials required for construction activities of this section not supplies by manufacturer of products of this section.

D. Samples: Submit selection and verification samples for finishes, colors and textures.
   1. Selection Samples: For each product requiring color selection, 2 sets of manufacturer's sample chips representing full range of colors and finishes available.
   2. Verification Samples: For each color and finish selected, 2 chips indicating match to selected color and finish.

E. Quality Assurance Submittals: Submit the following
   1. Contractor Certificates: Contractor's certification that:
      a. Manufacturer of products of this section meets specified qualifications.
      b. Installer of products of this section meets specified qualifications.
   2. Manufacturer Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and physical requirements.
   3. Manufacturer's Instructions: Manufacturer's installation instructions.

F. Closeout Submittals: Submit the following
   1. Warranty: Warranty documents specified herein.
   2. Record Documents: Project record documents for installed materials in accordance with Division 1 Closeout submittals (project record documents) section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in the installation of work similar to that required for this project.
   1. Certificate: When requested, submit certificates indicating qualification.

B. Sheet Metal Industry Standard: Comply with Sheet Metal and Air Conditioning Contractors National Association (SMACNA) Architectural Sheet Metal Manual.

C. Preinstallation Meetings: Conduct preinstallation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination, Project Meetings Section.

1.6 DELIVERY, STORAGE & HANDLING

A General: Comply with Division 1 Product Requirements Sections.
   1. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

B. Deliver: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Indentify fabricated components with UL 90 label where appropriate.

C. Packing, Shipping, Handling, and Unloading:
   1. Bundle panels in waterproof wrapping paper when nested, or wooden crates when panels cannot be nested.
   2. Package trim and accessories in waterproof wrapping paper.

D. Storage and Protection: Store materials protected from exposure to harmful conditions. Store material in dry, above-ground location.
   1. Stack prefinished material to prevent twisting, bending, abrasion, scratching and denting. Elevate one end of each skid to allow for moisture run off.
   2. Store products of this section in manufacturer's unopened packaging until installation of products.
   3. Maintain dry, heated storage area for products of this section until installation of products.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual measurements/openings by field measurement before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

1.8 WARRANTY

A. Project warranty: Refer to conditions of the contract for project warranty provisions.
B. Manufacturer's Warranty: Submit for Owner's acceptance manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to and not a limitation of other rights Owner may have under the Contract Documents.
   1. Warranty Period: one year commencing on Date of Completion.

PART 2 PRODUCTS

2.0 METAL WALL AND ROOF PANELS

2.1 MANUFACTURES

A. Central States or equal; Toll Free 1-800-356-2733.
   Local supplier- Mac Steel Inc., 17982 Elder Road, Diamond MO 64840. macstell@jscomm.net
   Phone: 1-677-209-0886.

2.2 METAL PANELS

A. Specs for Prime Panel-Loc Plus for wall panels & DripX for roof panels or equal:
   1. 26 Gauge/.020 thickness.
   2. Paint Thickness Top Coat Paint: .80 mils.
   3. Top Coat Primer: .20 mils.
   4. Bottom Coat backer: .35 mils.
   5. Bottom Coat Primer: .35 mils.
   6. Rust Protectant Substrate Galvalume AZ50, Painted.
   7. Galvalume AZ55, Acrylic Bare.
   8. Steel Strength 80,000 PSI min.
   9. Paint System CentralGuard, powered by Valspar's WeatherX.
   10. Warranty 40 year paint adhesion.
   11. 30 year chalk and fade.
   12. 20 year galvalume perforation warranty.
   13. UL Ratings UL580, Class 90 for Wind Uplift resistance
   14. UL2218, Class 4 for Impact Resistance
   15. UL790 for Fire Resistance
   16. Panel Height: 3/4-inch minimum.
   17. Color: As selected by Architect from Manufacture's standard colors.
B. Trim
   1. Manufacturer's standard 26 gauge sheet metal matching panel material and finish, break-formed, to profiles indicated on drawings, and including, but not limited to:
      a. Copings.
      b. Gravel stops.
      c. Gutters and downspouts.
      d. Termination and transition strips.
   2. Color: Match panel finish.
   3. Color: Selected from full range of manufacturer's standard color.
C. Clips and Fasteners: Supply items required for installation of panels in accordance with manufacturer's installation instructions and other indicated items; supply galvanized clips and

fasteners.

2.3 MATERIALS

A. Galvanized Steel Sheet: ASTM A653, G90 steel sheet, zinc coated (galvanized) by hot dip process, structural quality.

2.4 RELATED MATERIALS

A. General: Coordinate use of related materials:
   1. Sealants: Refer to Division 7 Joint Sealants Section.

2.5 SOURCE QUALITY

A. Source Quality: Obtain metal panel products from a single manufacturer.

   1. Edge of roof and bottom of wall panel Closure Strips: Equal to Midwest Manufacturing Economy Vented Closure Strips.

2.6 ACCESSORIES

A. Fasteners: The steel panels shall be fastened to building framing by plated steel sharp point screws with zinc/.aluminum/cast nonferrous alloy hex washer heads pre-assembled with aluminum bond seal washers, which cannot red rust and are compatible with steel panel. Woodzac by Construction Fasteners, Inc., or equal are acceptable.

B. Snow Guards:
   1. Design Requirements: Continuous linear roof snow retention system along front of building should have a minimum performance of 500# per lineal foot of bar without deflection. Connection must be used at every roof seam.
   2. Bar: 26 ga. galvanized steel with 40-year polyester paint finish. The snow guard bar color to match metal roof or as selected by Architect.
   3. Connection: As required with stainless screws.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, recommendations and installations instructions for substrate verification, preparation requirements and installation.
   1. Verification of Conditions:
      a. Panel support systems are ready for construction activities of this section and within specified tolerances.
      b. Rough-in utilities are in correct locations.
   2. Installer's Examination:
      a. Have installer of this section examine conditions under which construction activities of this section are to be performed, then submit written notification if such conditions are unacceptable.
      b. Transmit 2 copies of installer's report to Architect within 24 hours of receipt.
      c. Delay construction activities of this section until unacceptable conditions have been corrected.
      d. Beginning construction activities of this section indicates installer's acceptance of conditions.

3.2 PREPARATION

A. Coordination: Coordinate metal roofing with other work including drainage, flashing and trim, deck substrates, parapets, copings, walls and other adjoining work to provide a noncorrosive and leakproof installation.

B. Dissimilar Metals: Prevent galvanic action of dissimilar metals.

3.3 INSTALLATION

A. General: Install metal roofing panels to profiles, patterns and drainage indicated and required for leakproof installation. Provide for structural and thermal movement of work. Seal joints for leakproof installation.
   1. Seams: Provide uniform, neat seams.
   2. Fasteners: Conceal fasteners where possible in exposed work. Cover and seal fasteners and anchors for watertight and leakproof installation.
   3. Sealant-Type Joints: Provide sealant-type joint where indicated. Form joints to conceal sealant. Comply with Division 7 Joint Sealants Section for sealant installation.

B. Panel Installation:
   1. Install panels plumb, true in correct alignment with structural framing, in accordance with shop drawings and manufacturer's printed installation instructions.
   2. Install panels in horizontal installations using manufacturer's concealed fastening system only; sight-exposed fasteners are prohibited.
   3. Install panels in vertical installations using manufacturer's concealed fastening system or noncorroding fasteners color-match to panel.
   4. Install trim using concealed fasteners where possible; sight-exposed noncorroding fasteners color-matched to trim are permitted on vertical surfaces only.

C. Installation Tolerances:
   1. Variation from Plumb: Maximum 1/8" (3.2 mm) in 20 feet (6.096m).
   2. Variation from Level: Maximum 1/8" (3.2 mm) in 20 feet (6.096m).
   3. Variation from True Plane: Maximum 1/8" (3.2 mm) in 20 feet (6.096m).

3.4 FIELD QUALITY REQUIREMENTS

A. Site Tests (Post-Installation Testing): Owner reserves right to perform post-installation testing of installed metal panel installation.

B. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

3.5 CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and leaglly dispose of the debris.
   1. Remove strippable coating from perform dry wipe-down cleaning of panels as erected.

3.6 PROTECTION

A. Protection: Protect installed product's finish surfaces from damage during construction.
   1. Protect installed products from damage by subsequent construction activities.
   2. Replace products having damage other than minor finish damage.
   3. Repair products having minor damage to finish in accordance with panel manufacturer's recommendations.
   4. Architect shall be sole judge of acceptability of repair to damaged finishes; replace products having rejected repairs.

END OF SECTION

07712

STEEL GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.1 REFERENCES

A. ASTM A361/A361M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process for Roofing and Siding.
B. ASTM B32 - Standard Specification for Solder Metal.
C. FS TT-C-494 - Coating Compound, Bituminous, Solvent Type, Acid Resistant.
A. SMACNA (Sheet Metal and Air Conditioning Contractors National Association) - Architectural Sheet Metal Manual.
B. Pre-Finished Galvanized Steel Sheet: ASTM A755 coil coated.

1.2 DESIGN REQUIREMENTS

A. Conform to BOCA code for size and method of rainwater discharge.

1.3 DELIVERY, STORAGE, AND PROTECTION

A. Section 01600 - Material and Equipment: Transport, handle, store and protect.
B. Stack material to prevent twisting, bending or abrasion and to provide ventilation. Slope to drain.
C. Prevent contact with materials during storage that may cause discoloration, staining or damage.

1.4 PROJECT CONDITIONS

A. Coordinate the work with downspout discharge pipe inlet.

PART 2 PRODUCTS

2.1 MATERIALS

A. Galvanized Steel Sheet: ASTM A361/A361M, ASTM A446/A446M, Grade A or ASTM A526/A526M, G90 zinc coating; 26 gauge core steel.
B. Primer: Zinc molybdate Galvanized iron type.
C. Protective Backing Paint: FS TT-C-494, bituminous.
D. Solder: ASTM B32; 50/50 type.
E. Base Metal: ASTM A653, zinc coating.
C. Exposed Finish: Silicone polyester or acrylic or electrolytic powder coating.

2.2 COMPONENTS

A. Gutters: CDA Square or profile as indicated on drawings.
B. Downspouts: CDA Rectangular or profile as indicated on drawings. **Total of ten required**.
C. Anchors and Supports: Profiled to suit gutters and downspouts.
    1. Anchoring Devices: In accordance with CDA requirements.
    2. Gutter Supports: Spikes and ferrules.
    3. Downspout Supports: Brackets.
D. Fasteners: Same material and finish as gutters and downspouts, with soft neoprene washers.

2.3 ACCESSORIES (Provide two)

A. Splash Pads: Precast concrete type, [size] [sizes] and profiles indicated; minimum 3,000 p.s.i. at 28 days, with minimum 5 percent air entrainment.

2.4 FABRICATION

A. Form gutters and downspouts of profiles and size indicated and free of distortion or defects.
B. Fabricate trim, flashing and other metal components from same material as metal gutter sections.
C. Fabricate strap ties of compatible material as gutters, to interlock with gutter.
D. Fabricate connector/expansion clips of same material as gutter that interlock with gutter by mechanical fastener.
A. Form gutter and downspout sections in single length sheets.
B. Hem exposed edges on ½-inch miter.
C. Provide expansion joints (slip joints) on gutters exceeding 50 feet in length.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work.

3.2 PREPARATION

A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil.

3.3 INSTALLATION

A. Install gutters, downspouts and accessories in accordance with manufacturer's instructions.
B. Sheet Metal: Join lengths with formed seams sealed or soldered watertight. Flash and seal gutters to downspouts and accessories.
A. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.
B. Install gutters ¾ inches below slope of roof at outside edge.
C. Connect downspouts to downspout boots at 8 inches above grade or to existing storm sewer system.
D. Locate downspouts per Drawings.
E. Strap downspouts at maximum 30 inches on center.
H. Set splash pads under downspouts (where required). Secure in place.

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 01600.

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 Wall Insulation – R-21 in 6” Steel stud walls & R-25 fiberglass batt insulation installed between the girts. Provide full height 6 mil. vapor barrier fabric between the girts and interior liner panels.
2. Roof Insulation - Equal to Simple Saver System, R-30 Double Layer System. The upper layer of fiberglass to be installed between the roof panels and the purlins, the lower layer to be installed between the purlins. The Simple Saver Suspension System to be all white with white grid system, fully encapsulating the purlins.

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 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).

1.2 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.

1.3 ENVIRONMENTAL REQUIREMENTS

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

1.4 COORDINATION

A. Coordinate the work with all sections referencing this section.

1.5 WARRANTY

A. Section 01700 - Warranties.
B. Correct defective work within a five-year period after Date of 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.

1.6 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 - Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, non-drying, non-skinning, non-curing.
   1. Applications: Use for:
   a. Concealed sealant bead in sheet metal work.
   b. Concealed sealant bead in siding overlaps.

D. Type IV - 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.

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.

F. Cold Joint Expansion Joint Material equal to Homex 300, ½" x 6" pull top. Model #1381260.

PART 2 PRODUCTS

2.2 ACCESSORIES

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

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify 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 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.

1.2 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.

1.3 SUBMITTALS FOR INFORMATION

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

1.4 QUALITY ASSURANCE

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

1.5 REGULATORY REQUIREMENTS

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

1.6 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.

1.7 PROJECT CONDITIONS

A. Coordinate frame installation with size, location, and installation of service utilities.
B. Coordinate the work with door opening construction, doorframes and door hardware installation.
C. 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. Mesker Door, 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. 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 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.

1.2 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.

1.3 QUALITY ASSURANCE

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

1.4 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.

1.5 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.

1.6 PROJECT CONDITIONS

A. Coordinate the work with frame opening construction, door and hardware installation.

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

1.7 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. 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

08360

SECTIONAL OVERHEAD DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Provide electric overhead sectional door.
B. Provide operating hardware, supports and controls.

1.2 REFERENCES

A. ANSI A216.1 - Sectional Overhead Type Door (NAGDM 102).
B. ASTM A526/A526M - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
C. NEMA MG 1 - Motors and Generators.
D. NFPA 70 - National Electrical Code. Conform to BOCA code for motor and motor control requirements. Listed and classified by Underwriters Laboratories, Inc.

1.3 SYSTEM DESCRIPTION

A. Panels: Insulated with glazed panels.
B. Lift Type: High lift operating style with track and hardware.
C. Operation: Electric, jack shaft.
D. Loads: Design and size components to withstand dead and live loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with BOCA code.

1.4 SUBMITTALS FOR REVIEW

A. Section 01300 - Submittals: Procedures for submittals.
B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations and installation details.
C. Product Data: Provide component construction, anchorage method and hardware.
D. Samples: Submit two exterior and interior panel finish samples, 18 x 18 inches in size, illustrating color and finish.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

A. Section 01700 - Operation and Maintenance Data: Procedures for submittals.
B. Operation Data: Include electrical control adjustments.
C. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.
D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with ANSI A216.1, Application Type: Industrial. Maintain one copy on site.
B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.
C. Installer: Company specializing in performing the work of this section and approved by manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in labeled protective packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage from weather, excessive temperatures and construction operations.

1.8 WARRANTY

A. Section 01700 - Warranties.
B. Correct defective Work within a one-year period after Date of Completion.
C. Warranty: Include coverage for electric motor and transmission.
D. Provide a one-year manufacturer warranty for electric operating equipment.

PART 2 PRODUCTS

2.1 SECTIONAL OVERHEAD DOORS

A. Provide standard sectional overhead doors of the dimensions and arrangements shown on the drawings, and with the following attributes: Equal to Model 3216, C.H.I. Overhead Doors, which is located at: 1485 Sunrise Dr.; Arthur, IL 61911; Toll Free Tel: 800-590-0559; Fax: 217-543-4454; Email: lschrock@chiohd.com; Web: www.chiohd.com

1. Design wind load: Comply with NAGDM specification 102-1976, except that minimum wind load shall be 80 mph.

2. Door sections:
   a. Exterior: Roll-form from .016" hot-dip galvanized steel, with integral reinforcing ribs consisting of six longitudinal ribs and two flat bottom V-grooves.
   b. Provide meeting rails of double-rabbeted weatherproof interlocking joints functioning as integral struts and assuring alignment full width of each section.
   c. Provide a minimum thickness of 2", R-Value 16.00. U-Value of .057.

3. Glass openings: Provide insulated glass, sealed in automotive type rubber gaskets of the maximum size allowable, one per door in the 3rd section panel, size 24" x 7".

4. Track and Hardware:
   a. Tracks shall be 2" wide galvanized steel, mounted by continuous galvanized steel angle. Use Hi-Lift track.
   b. Stainless Steel lift cables shall have a safety factor of 8 to 1.
   c. Roller shall be full-floating ball bearings with hardened steel racers.
   d. Counterbalance shall consist of a torsion spring mounted on a continuous thru solid steel shaft.
   e. Provide interior side locking device, which with a slide bar extends through the left and right side tracks.
   f. Astragal - Provide "U" type rubber astragal at the bottom edge of each door or an approved equal.

5. Finish: Provide the manufacturer's standard pre-finish system in color selected by the owner from the manufacturer's standard colors.

6. Insulation: Rigid foamed-in-place polyurethane core free of CFC's and will be fully encapsulated in non-permeable materials to prevent loss of thermal efficiency over time. Insulation shall have a back cover of .013" steel.

7. Electric Sensing Edge: Standard pneumatic safety edge with photo cells.

8. Weather strip
   a. Between sections will be EPDM rubber tube seals fitted every joint.
   b. Jamb seals. Provide pliable bulb seals.

9. Springs: Springs will be 25,000 cycles.

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.
B. Sheet Steel: ASTM A526/A526M galvanized to G60, pre-coated with silicone polyester finish, plain surface.
C. Exterior Surfaces: Factory painted. (White)
D. Interior Surfaces: Factory painted. (White)

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
B Verify that electric power is available and of the correct characteristics.

3.2 PREPARATION

A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.

3.3 INSTALLATION

A. Install door unit assembly in accordance with manufacturer's instructions.
B. Anchor assembly to wall construction and building framing without distortion or stress.
C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
D. Fit and align door assembly including hardware.
E. Coordinate installation of electrical service, power and control wiring by electrical contractor from disconnect to unit components.
F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.
G. Install perimeter trim and closures.

3.4 ERECTION TOLERANCES

A. Section 01400 - Quality Assurance: Tolerances.
B. Maximum Variation from Plumb: 1/16 inch.
C. Maximum Variation from Level: 1/16 inch.
D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.
E. Maintain dimensional tolerances and alignment with adjacent work.

3.5 MANUFACTURER'S FIELD SERVICES

A. Ensure the operation and adjustments to door assembly for specified operation.

3.6 ADJUSTING

A. Adjust door assembly to smooth operation and in full contact with weather stripping.

3.7 CLEANING

A. Section 01700 - Contract Closeout: Cleaning installed work.
B. Clean doors, frames and glass.
C. Remove temporary labels and visible markings.

3.8 PROTECTION OF FINISHED WORK

A. Section 01700 - Contract Closeout: Protecting installed work.
B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

3.9 SCHEDULES

Refer to Door Schedule on Architectural Drawings.

END OF SECTION

08710

DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

A. Provide hardware for insulated steel doors.
B. Provide thresholds.
C. Provide weatherstripping, seals and door gaskets.

1.2 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.

1.3 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.

1.4 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.

1.5 REGULATORY REQUIREMENTS

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

1.6 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.

1.7 PROJECT CONDITIONS

A. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.
B. Sequence installation to ensure utility connections are achieved in an orderly andexpeditious manner.

C. Coordinate Owner's keying requirements during the course of the Work.

1.8 WARRANTY

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

1.9 MAINTENANCE PRODUCTS

A. Section 01700 - 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.

1.10 EXTRA MATERIALS

A. Section 01700 - Operation and Maintenance Data.

PART 2 PRODUCTS

2.1 KEYING

A. Door Locks: Keyed in like-groups. Master keyed. **Locksets** to be **Marshall Best only**.
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.

2.2 SCHEDULE

A. Furnish the following hardware groups in the amounts as indicated on the drawings for each door.

1. Hardware group 1: Doors: 1, & 3

1-1/2	Pr. Butts	FBB179-4-1/2 x 4-1/2 US26D NRP	Stanley
1	Entrance	RE-12-S-626	Marshall Best
1	Closer	8616DS	Dorma
1	Threshold	2005A 36" x AL	Pemko
1	Sweep	18062 36" x AL	Pemko
1	Weather strip	305CN x W x H	Pemko
1	Top Filler Plate		

END OF SECTION

08720

ELECTRIC DOOR OPERATORS

PART 1 GENERAL

1.1 SUMMARY

A. Provide electric jack shaft sectional overhead door operator 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. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Materials list of items proposed to be provided under this Section;
2. Manufacturers' specifications and other data needed to prove compliance with the specified requirements;
3. Shop drawings showing general layout, installation, materials, construction and assembly wiring.
4. Manufacturers' recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

B. Upon completion of this portion of the work and as a condition of its acceptance, deliver to the owner three copies of the operation and maintenance manual.

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. Comply with all governmental agencies having jurisdiction in this work.

C. Each operator shall have a minimum one (1) year manufacturer's warranty.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with pertinent provisions of Section 01600.

PART 2 PRODUCTS AND MATERIAL

2.1 REQUIRED ATTRIBUTES

A. Upward-Acting:

1. Motor - 115/230V single phase, 1/2 hp instant reversing with automatic reset thermal overload. Equal to Overhead Door Corp. Model “RSX”.
2. Track - Heavy duty.
3. Jack Shaft - Side mount.
4. Brake - Solenoid actuated.
5. Quick Disconnect - For manual or emergency operation.
6. Control Circuit - 24 volt, three button, OPEN-CLOSE-STOP enclosure meeting NEMA 1.
7. Reversing Contactor - Heavy Duty, electrically and mechanically interlocked.
8. Provisions for the connection of a 2-wire monitored photo electric eye cell system.

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.

B. Provide a one-button remote for each garage door opener.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

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

3.2 INSTALLATION

A. Install the work of this section in strict accordance with the manufacturer's recommendations and shop drawings and in accordance with pertinent requirements of governmental agencies having jurisdiction.

B. Electrical contractor will run electricity to the electric door operator. Final connection to the door operator shall be the responsibility of the electric door operator installer.

3.3 ADJUSTMENTS AND INSTRUCTIONS

A. Upon completion of the installation, carefully inspect each component and verify that all items have been installed in the proper location, adequately anchored and adjusted to achieve optimum operation.

B. Demonstrate to the owner, operation and maintenance procedures.

END OF SECTION

09900

PAINTING

PART 1 GENERAL

1.1 SUMMARY

A. Provide surface preparation.
B. Provide field application of paints, stains, varnishes and other coatings.

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 paint aluminum gutters before installation.

1.9 EXTRA MATERIALS

A. Section 01700 - 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 BRAND OF PAINT

A. Sherwin-Williams or equal.

PART 3 EXECUTION

3.1 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. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt and rust. Where heavy coatings of scale are evident, remove by [hand] [power tool] wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts and nuts are similarly cleaned. Spot prime paint after repairs.

F. 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.

G. Metal Doors Scheduled for Painting: Prime metal door top and bottom edge surfaces.

3.2 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. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

3.3 CLEANING

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

3.4 SCHEDULE - EXTERIOR SURFACES

A. Steel - Unprimed:
   1. One coat of alkyd primer.
   2. Two coats of alkyd enamel, gloss.
B. Steel - Shop Primed:
   1. Touch-up with zinc chromate primer.
   2. Two coats of alkyd enamel, gloss.

3.5 SCHEDULE - INTERIOR SURFACES

A. Steel - Unprimed:
   1. One coat of alkyd primer.
   2. Two coats of alkyd enamel, gloss.
B. Steel - Shop Primed:
   1. Touch-up with zinc chromate primer.
   2. Two coats of alkyd enamel, gloss.

END OF SECTION

13121

PRE-ENGINEERED BUILDINGS

PART 1 GENERAL

1.1 SCOPE

A. Provide Pre-engineered, shop fabricated structural steel building frame.

1.2 REFERENCES

A. AISC - Specification for Structural Steel for Buildings - Allowable Stress Design and Plastic Design.
B. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
C. ASTM A325/A325M - High Strength Bolts for Structural Steel Joints.
D. ASTM A446/A446M - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
E. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
F. ASTM A529/A529M - Structural Steel with 42 k.s.i. Minimum Yield Point (1/2 in Maximum Thickness).
G. AWS A2.0 - Standard Welding Symbols.
H. AWS D1.1 - Structural Welding Code - Steel.
I. MBMA (Metal Building Manufacturers Association) - Metal Building Systems Manual.
J. UL - Building Materials Directory - Roof Deck Construction.

1.3 SYSTEM DESCRIPTION

A. Clear span equal gabled slope rigid frame with tapered columns and tapered rafter sections of shop welded steel plates. Refer to Drawings.

1.4 DESIGN REQUIREMENTS

A. See Cover Sheet.
B. Permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of -15 to +115 degrees F.
C. Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.

1.5 SUBMITTALS FOR REVIEW

A. Section 01300 - Submittals: Procedures for submittals.
B. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections, attachments anchor bolt layout and openings; wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage, method of installation; framing anchor bolt settings, sizes and locations from datum and foundation loads; indicate welded connections with AWS A2.0 welding symbols; provide professional seal and signature.
C. Samples: Submit two samples of precoated metal panels for each color selected, 12x12 inch in size illustrating color and texture of finish.
D. Perform Work in accordance with Current IBC or as shown on Cover Sheet.
E. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
F. Erector Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience or approved by manufacturer.

G. Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of Missouri.

1.6 PRE-INSTALLATION MEETING

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

1.7 WARRANTY

A. Provide a five-year warranty for weather tightness of building enclosure elements after installation.

PART 2 PRODUCTS

2.1 MATERIALS - FRAMING

A. Structural Steel Members: ASTM A36/A36M.
B. Structural Tubing: ASTM A500, Grade B.
C. Plate or Bar Stock: ASTM A529/A529M.
D. Anchor Bolts: ASTM A307, unprimed.
E. Bolts, Nuts, and Washers: ASTM [A325, galvanized to ASTM A153.
F. Welding Materials: AWS D1.1; type required for materials being welded.
G. Primer: 1 to 2 mils. Keeping with Steel Structures Painting Council Paint Specification No. 25 and Federal Specifications TT-P-636-D and TT-P-664-C.
H. Grout: ASTM C1107, Non-shrink type, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents, capable of developing minimum compressive strength of 2,400 p.s.i. in two days and 7,000 p.s.i. in 28 days.

2.2 FABRICATION - WALL AND ROOF SYSTEMS (40-year polyester finish)

A. See Specification Section 07411 Metal Roof and Wall Panels.
C. Interior Liner Panels: Minimum 26 gauge metal thickness, ribbed wall panels, lapped edges.
D. Girts/Purlins: Rolled formed structural shape to receive siding, roofing and liner sheet.
E. Internal and External Corners: Same material thickness and finish as adjacent material, profile shop cut and factory mitered to required angles. Back brace mitered internal corners.
F. Flashings, Closure Pieces, Fascia, Infills and Caps. Same material and finish as adjacent material, profile to suit system.
G. Fasteners: To maintain load requirements and weather tight installation, same finish as cladding, non-corrosive type.
H. Provide rat-guard typical at bottom of exterior metal panels and at roof edge nearest gutter.

2.3 FINISHES

A. Framing Members: Clean, prepare and shop prime. Do not prime surfaces to be field welded.
B. Exterior Surfaces of Wall Components and Accessories: Precoated enamel on steel of polyester finish, color as selected from manufacturer's standard range.
C. Exterior Surfaces of Roof Components and Accessories: Galvalum finish.

2.4 SNOBAR (roof snow retention)

A. Design Requirements: Continuous linear roof snow retention system along front and rear of building should have a minimum performance of 500# per lineal foot of bar without deflection. Connection must be used at every standing/corrigated seam.
B. Bar: 24 ga. double-crimped with polyester finish. Bar color to match metal roof or as selected by Architect.

C. Connection: prefinished steel clamp with gasketed stainless steel screws.
D. Quality Assurance: 5-years.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01039 - Coordination and Meetings: Verification of existing conditions before starting work.
B. Verify that foundation, floor slab, mechanical and electrical utilities and placed anchors are in correct position.

3.2 ERECTION - FRAMING

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

3.3 ERECTION - WALL AND ROOFING SYSTEMS

A. Install in accordance with manufacturer's instructions.

B. Exercise care when cutting prefinished material to ensure cuttings does not remain on finish surface.
C. Fasten cladding system to structural supports, aligned level and plumb.
D. Locate end laps over supports. End laps minimum 2 inches. Place side laps over bearing.
E. Provide expansion joints where indicated.
F. Use concealed fasteners on roof.
G. Install insulation and vapor retarder utilizing adhesive for attachment. Place vapor retarder for support between framing members.
H. Install sealant and gaskets to prevent weather penetration.
I. Thermal-break mastic strip continuous horizontally along the outside of all exterior girts before the attachment of the exterior metal panels.

3.4 TOLERANCES

A. Framing Members: 1/4 inch from level; 1/8 inch from plumb.
B. Siding and Roofing: 1/8 inch from true position.

END OF SECTION

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 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.
2. Lighting fixtures.
3. Wiring devices.

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, unfinished areas in shop and storage areas shall be surfaced mounted.

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 maximum 6 foot 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.

G. Contractor shall install ¾” EMT conduit from data receptacle to 2” above acoustical ceiling tile. Tele/ data cabling by MoDOT.

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

16113 PANELBOARDS

A. Panelboards shall be Sq. 'D' Type with circuit breakers as shown on drawings and schedules, and shall be Service Entrance Rated.

B. Devices of the following manufactures will be accepted as equal.
   2. General Electric
   3. Cuttler-Hammer

16114 TRANSFORMERS

A. Service Entrance Transformer is not part of this contract.

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.

16116 GROUNDING

A. Install a 5/8" x 10' copperclad ground rod at service entrance with a #6 bare copper conductor between ground rod and grounding bus in Panel board.

B. All grounding shall comply with ART. 250 of the National Electrical Code.

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.

16120 TRENCHING AND BACKFILLING

A. Perform trenching and backfilling associated with the work of this section in strict accordance with the provisions of the appropriate sections of these specifications.

16121 INSTALLATION OF RACEWAYS AND FITTINGS

A. Where conduit is installed concealed in the walls or above the ceiling, or exposed in work areas, provide rigid galvanized conduit or electrical metallic tubing with screw type fittings.

B. Use flexible metal conduit only for short motor connections or where subject to vibration.

C. Provide necessary sleeves and chases where conduits pass through floors and walls, and provide other necessary openings and spaces, arranging for in proper time to prevent unnecessary cutting in connection with the work. Perform cutting and patching in accordance with the provisions for the original work.

D. Where conduit is exposed, run parallel to or at right angle with lines of the building.

E. Securely and rigidly support conduits throughout the work. Conduits and wiring above a ceiling assembly shall not be supported to, or supported by, the ceiling assembly, including the ceiling support wires.

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.

16123 INSTALLATION OF PANELS

A. Install panels as shown on drawings and specifications or as directed by the owner/architect.

B. Mount a typewritten directory behind glass or plastic on the inside of each panel door and, on the directory, show the number and complete description of all outlets on each circuit.

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

16931

GROUNDING AND GROUND FIELD

Requirements for MoDOT Project Office shall follow the TIA/EIA - 607 Commercial Building Grounding Requirements for Telecommunications.

This building will require a separate telecommunications ground system. The requirements for this ground system is (15 ohms to ground or less), and shall be tested and certified at time of installations.

This system will consist of the following:

A. A (TMGB) Telecommunications Main Ground Busbar (Erico grounding bar kit p/n b544a017 or equivalent). This Grounding Busbar shall be located in the telecommunication room and serves as the dedicated extension of the building grounding electrode system for telecommunications only.

B. A Number four Green Insulated stranded copper cable run from the (TMGB) in the telecommunication room to the new grounding electrode system located outside the building.

C. The grounding electrode system shall consist of all specifications found in the IEEE Green and Emerald Books. Their shall be a minimum of (4) or (as many as needed) copper electrodes (5/8" x 8') spaced 8' apart, connected with number four bare copper cable as needed to achieve 15 ohms to ground or less.

D. All connectors and splices shall be of copper compression type and meet the specifications of the Standard IEEE 837 latest revision and the specifications of the NEC code, section 250-81 and 250-91.

E. There shall be no other grounding electrode system connected to this Telecommunication room grounding electrode system except by a number six stranded green copper cable connected to the Building (TMGB) Main Grounding Bar or system.

REV. on 12-22-03

END OF SECTION