IX. TECHNICAL SPECIFICATIONS

SECTION 01010

SUMMARY OF WORK

PART 1–GENERAL

1.01 DIVISION ONE

A. The requirements of Division 1 apply to all sections of the Contract(s).

1.02 PROJECT SCOPE

A. CONTRACTOR shall provide all items, articles, materials, operations or methods mentioned or scheduled on the Drawings or herein specified: including all labor, supervision, equipment, incidentals, taxes and permits necessary to complete the Work as described within the Contract Documents. CONTRACTOR shall install all items provided by OWNER as mentioned or scheduled on the Drawings or herein specified.

1.03 CONTRACT DOCUMENTS–INTENT AND USE

A. Intent of Documents:
   1. Singular notations and specifications shall be considered plural where application is reasonably inferred.
   2. Mention or indication of extent of work under any division or Specification section is done only for convenience of CONTRACTOR and shall not be construed as describing all work required under that division or section.
   3. Some individual sections may contain a list of related sections. The list of related sections in individual sections is provided for the convenience of CONTRACTOR and is not necessarily all-inclusive. CONTRACTOR may not rely upon this listing for determination of scope of work. Other sections of the Specifications, not referenced in individual sections shall apply as required for proper performance of the Work.
   4. Command type sentences may be used in the Contract Documents. These sentences refer to and are directed to CONTRACTOR.
   5. Symbols for various elements and systems are shown on the Drawings. Should there be any doubt regarding the meaning or intent of the symbols used, a written interpretation shall be obtained from ENGINEER.

B. Use of Documents:
   1. CONTRACTOR shall examine all Specifications and Drawings for the Work, including those that may pertain to Work CONTRACTOR does not normally perform with its own forces.
   2. CONTRACTOR shall use all of the Project Drawings and Specifications:
      a. For a complete understanding of the Project.
      b. To determine the type of construction and systems required.
      c. For coordination with other contractors.
      d. To determine what other work may be involved in various parts or phases.
      e. To anticipate and notify others when work by others will be required.
      f. And all other relevant matters related to the project.
   3. CONTRACTOR is also bound by all requirements of the Contract Documents which are applicable to, pertain to, or affect its Work, as may be shown or inferred by the entire set of Project Drawings and Specifications.

1.04 CONSTRUCTION REQUIREMENTS

A. In general, the following contract completion Milestones shall be followed. See Agreement for specific dates. For Substantial Completion: CONTRACTOR shall by that date, have all Work substantially completed.

B. General Information and Requirements:
   1. Site is within the confines of an active LFUCG wastewater treatment facility, more specifically a large concrete pad used to support the wastewater operation. CONTRACTOR shall in no way interfere with operations and assess to the pad outside the "area of the site" specified in the contract documents.
   2. General Access: The OWNER will provide 24 hour – 7 day per week access to the "area of the site" via a secure gate at the East Brannon Road entrance. The CONTRACTOR will be responsible for providing a padlock to be used in conjunction with OWNER padlocks so that the CONTRACTOR can freely access the construction site.
   3. Shared Access: CONTRACTOR shall maintain free access around the "area of the site" at all times. All city-owned roadways around the site shall be cleared of construction site materials, soil, and debris as necessary.

C. Construction Sequence:
   1. The OWNER following construction sequence is provided as a general guideline for the information and for the benefit of CONTRACTOR. This construction sequence is not intended to dictate means, method of construction or direct construction activities. This construction sequence is a conceptual general construction sequence. It is not intended to be all inclusive and does not list all work elements or details that are required to complete the Work. CONTRACTOR shall be responsible for implementing any additional details required at no additional cost to OWNER.
   2. CONTRACTOR shall make physical construction of the barn structure the highest priority. The barn structure must be physically ready to store road salt no later than **122 days after the Notice to Proceed date**. Overall salt barn project support work including stormwater collection and conveyance, electrical and incidental site work must be complete no later than **152 days after the Notice to Proceed date**.

1.05 CONTRACTOR USE OF SITE

A. General:
   1. The "area of the site" referred to in these Specifications shall be as shown on Sheet 2 of the Drawings. If the "area of the site" is not shown, OWNER's property lines, the Project right-of-way and/or any easements obtained for the Project shall be considered the "area of the site."
   2. Construction activities shall be confined within the "area of the site" limits.
   3. From the start of work to completion CONTRACTOR is responsible for the care of the site and the premises which are affected by operations of Work of this Contract.
   4. Except for permanent site improvements provided under the Contract, CONTRACTOR shall restore property disturbed during the Work, to the conditions which previously existed.
   5. Work in occupied spaces shall be restricted to specified Work and essential activities, such as making necessary connections and extending services or constructing temporary access ways. Such work shall be scheduled in advance with OWNER.

B. Parking and Deliveries:
   1. The OWNER has full control of the pad area which includes the "area of the site". Parking, deliveries and laydown areas are expected to be immediately adjacent to the "area of site".
   2. CONTRACTOR is responsible for control of traffic by vehicles and persons within the limits of its operations.
   3. Parking for employees, subcontractors, and agents of CONTRACTOR shall be in areas subject to approval of OWNER.
   4. Access to the site for delivery of construction material or equipment shall be subject to approval of OWNER.

1.06 EXISTING SERVICES, OVERHEAD UTILITIES, AND UNDERGROUND FACILITIES INCLUDING STRUCTURES

A. Interruption of existing services and systems including heating, ventilating, air conditioning, water, sanitary, lighting and power, signal and security will not be permitted, unless specifically indicated otherwise. Provide temporary facilities to maintain services.

B. Work shall not commence until all labor, materials and equipment are available so Work can continue without interruption or delay.

C. Should uncharted or incorrectly charted services or Underground Facilities be encountered during installation, notify OWNER and consult with utility owner immediately.

D. Cooperate with OWNER and utility companies in keeping respective services and Underground Facilities in operation and repair any damage.

E. CONTRACTOR shall not interrupt existing services and Underground Facilities occupied and used by OWNER or others, except when permitted in writing by OWNER.

F. Any accidental interruption of services and Underground Facilities shall be repaired immediately, including provision of temporary facilities until permanent repairs can be made.

G. Although the OWNER is essentially certain that no underground facilities other than the owner's storm and sanitary sewer pipes are on the site, the CONTRACTOR, prior to any excavation, demolition, or drilling on site, must contact owners of the Underground Facilities in and near the construction area of the intent to excavate, demolish, or drill. As part of this notification requirement, CONTRACTOR shall contact the utility notification service Kentucky 811 (811 or 1-800-752-6007) at least two but not more than 10 business days in advance of any work. CONTRACTOR shall be aware that not all owners participate in Kentucky 811. A call to this agency shall not absolve CONTRACTOR of the requirements for contacting all owners of Underground Facilities in and near the construction area. CONTRACTOR shall give reasonable advance notice to Kentucky 811 and other owners– such notification shall not be less than the minimum advance notification required.

H. Locations and elevations of services and Underground Facilities as shown on the Drawings are approximate. It shall be CONTRACTOR's responsibility to determine their exact location when in their vicinity. To this end, CONTRACTOR shall proceed with caution in the excavation and preparation of the Site so the exact location of services and Underground Facilities can be determined. With exception to storm sewer and sanitary sewer pipelines, the CONTRACTOR will be eligible for payment for any Extra Work authorized in writing by the ENGINEER for any costs for temporary or permanent relocations of such services and Underground Facilities required to complete the Work unless specifically indicated otherwise in the Specifications.

I. Where potential grade conflicts might occur with existing services and Underground Facilities, CONTRACTOR shall uncover such services and Underground Facilities sufficiently in advance of construction so that elevations may be determined to allow any necessary adjustments to be made.

J. CONTRACTOR shall coordinate with overhead utility companies prior to the Work. CONTRACTOR shall provide all necessary temporary and permanent support relocation or temporary and permanent restraint to maintain overhead utilities in service.

K. CONTRACTOR shall keep an accurate and complete record of all such services and Underground Facilities encountered and shall provide OWNER a copy of this record. The record shall include a description of the item encountered, opinion as to conditions, and adequate measurements and depths so that the item can be located in the future.

L. CONTRACTOR shall inspect all services and Underground Facilities for condition and soundness. Unsound conditions shall be reported to OWNER immediately after exposing. CONTRACTOR shall not proceed with the Work until the service or facility owner has been notified. Service or facility owner shall then be given time to inspect and correct, if required, the service or Underground Facility. CONTRACTOR may make claim under the provisions of Articles 11 and 12 of the General Conditions should CONTRACTOR feel a price or time adjustment is justified.

M. Any additional costs incurred because of failure of CONTRACTOR to report the condition of any and all existing services and Underground Facility encountered shall be paid for by CONTRACTOR.

N. Whenever ENGINEER feels it is necessary to explore and excavate to determine the location of existing services and Underground Facilities, CONTRACTOR shall make explorations and excavations for such purposes after receiving written authorization from the ENGINEER. If CONTRACTOR is required to perform additional Work in making the explorations and excavations, extra compensation will be allowed as provided for in the General Conditions.

1.07 PROTECTION OF WORK AND IMPROVEMENTS

A. CONTRACTOR shall protect the property of OWNER, existing improvements, and the Work installed by CONTRACTOR and others from abuse, damage, dust, debris, and other objectionable materials resulting from construction activities.

B. CONTRACTOR shall provide suitable covers, partitions, or other dust and fume containment devices to suit construction operations.

C. CONTRACTOR shall keep property, existing improvements and the Work, including structures, mains, fittings and accessories free from dirt and foreign matter at all times.

D. CONTRACTOR shall provide temporary plugging of openings, holes and pipe ends that are existing or that CONTRACTOR has installed.

E. Property, improvements and Work damaged by CONTRACTOR shall be repaired or replaced by CONTRACTOR to the satisfaction of OWNER.

1.08 OWNER-FURNISHED PRODUCTS

A. OWNER is responsible for the following items when supplying material or equipment to CONTRACTOR for installation.

1. Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to CONTRACTOR.
2. Deliver supplier's bill of material to CONTRACTOR.
3. Arrange and pay for delivery to site.
4. Inspect deliveries jointly with CONTRACTOR.
5. Submit claims for transportation damage and arrange for replacement of damaged, defective, or missing items.

B. CONTRACTOR's responsibilities for OWNER-furnished products are:

1. Receive and unload products at the site.
2. Inspect deliveries jointly with OWNER and record shortage and damaged or defective items. Any materials and equipment furnished by OWNER and found to be defective shall be clearly marked and set aside to be removed by OWNER. Any materials and equipment furnished by OWNER and installed by CONTRACTOR, without discovery of such defects will be replaced with sound materials and equipment by OWNER. CONTRACTOR, however, shall at its own expense, furnish all equipment, labor and facilities necessary to remove the defective materials and equipment and install the sound materials and equipment.
3. Handle products at the site, including uncrating and storage.
4. Protect products from damage and from exposure to the elements.
5. Assemble, install, correct, adjust, and finish products in accordance with the appropriate technical section of these specifications.
6. Repair or replace items damaged by CONTRACTOR at no additional cost to OWNER.
7. CONTRACTOR's responsibility for materials and equipment furnished by OWNER shall begin at the point of delivery to CONTRACTOR. Materials and equipment already on the site shall become CONTRACTOR's responsibility on date of Notice to Proceed with Contract.

OWNER-supplied equipment and material to be installed by CONTRACTOR and agreement to be assumed by CONTRACTOR as part of this Contract have been typed in this text font and framed in this format and inserted in the appropriate Specification sections.

1.09 AVAILABILITY OF LANDS

A. Easements were not obtained for this Project and are not considered necessary for completion of the work. CONTRACTOR shall confine its operations, equipment and storage areas to the lands and rights-of-way in which the Project is to be located. At their own discretion, the CONTRACTOR may enter into written agreements with property owners for use of other lands during construction. Copies of such agreements shall be provided to OWNER.

PART 2–PRODUCTS

2.01 OWNER-FURNISHED PRODUCTS

A. The OWNER will provide the Jersey Barriers as shown on Plan Sheet 3.

B. The OWNER will also provide all electrical lighting fixtures specifically noted on Plan Sheet E-2: Light Fixture Schedule and Outdoor Light Fixture Schedule. Installation is to be performed by the CONTRACTOR as shown on Plan Sheets SE-1 and E-1.

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01019

CONTRACT CONSIDERATIONS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Cash Allowances.
   2. Inspection and Testing.
   3. Measurement and Payment–Lump Sum.

1.02 CASH ALLOWANCES

A. Refer to sections of the specifications identified in the Bid Form for specific information on use of cash allowances.

B. The Bid shall include the amount equal to the specified quantity times the unit price.

1.03 INSPECTION AND TESTING

A. Costs be included in the Contract Price:
   1. Costs of incidental labor and facilities required to assist inspection or testing firm.
   2. Costs of testing laboratory services used by CONTRACTOR separate from Contract Document requirements.
   3. Costs of retesting upon failure of previous tests.
   4. Costs of tests specified to be provided by CONTRACTOR.

B. Refer to technical sections of specifications for required testing and any associated allowances.

1.04 MEASUREMENT AND PAYMENT–LUMP SUM

A. Payment for Lump Sum projects will be based on the accepted schedule of values for the project.

B. An acceptable schedule of values will include the following features:
   1. Schedule shall list the installed value of the component parts of the work in sufficient detail to serve as a basis for computing values for progress payments during construction. Schedule shall be subdivided as necessary by specification section and work area.
   2. Identify each line item with the number and title of the respective Specification Section.
   3. For each major line item list sub-values of major products or operations under the item.
   4. For the various portions of the work:
      a. Each item shall include a directly proportional amount of CONTRACTOR's overhead and profit.
      b. For items on which progress payments will be requested for stored materials, break down the value into:

(1) The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials upon request by ENGINEER.
(2) The total installed value.

5. The sum of all values listed in the schedule shall equal the total Contract Sum.
6. Schedule shall include a separate listing of general items such as bonds, insurance, mobilization, demobilization, field supervision, and record documents.

C. Once a schedule of values is accepted, it shall not be revised, except for changes associated with subsequently executed change orders.

D. No separate measurement for payment will be performed for Lump Sum Work.

E. CONTRACTOR shall estimate percentage of Work completed. ENGINEER will review CONTRACTOR's estimate of quantity of Work completed.

F. Payment will be made based on the percentage of the Contract completed less retainage and/or liquidated damages.

G. Unless noted otherwise, all Work described in the Specifications and/or shown on the Drawings shall be included in the Lump Sum Bid.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01039

COORDINATION, FIELD ENGINEERING, AND MEETINGS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Coordination.
   2. Field engineering.
   3. Progress meetings.
   4. Pre-installation meetings.

1.02 COORDINATION

A. CONTRACTOR shall coordinate scheduling, submittals, and work of the various sections of the work to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later. See Section 01010–Summary of Work for specific construction sequence.

B. CONTRACTOR shall verify utility requirements and characteristics of operating equipment are compatible with building utilities and coordinate Work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. CONTRACTOR shall coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on the Drawings and shall follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

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

E. CONTRACTOR shall coordinate completion and cleanup of Work of separate sections in preparation for substantial completion and for portions of Work designated for OWNER's occupancy.

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

1.03 FIELD ENGINEERING

A. CONTRACTOR shall locate and protect legal survey monuments, benchmarks, and survey control and reference points. CONTRACTOR shall pay for replacement of disturbed legal survey monuments by a Registered Land Surveyor acceptable to OWNER and for replacement of benchmarks and survey control and reference points provided by ENGINEER.

B. CONTRACTOR shall provide field engineering services as required to establish elevations, lines, and levels, utilizing recognized engineering survey practices.

C. CONTRACTOR shall furnish all required plummets and graduated poles to check all Work.

D. If stakes and boards have to be reset because of negligence of CONTRACTOR, CONTRACTOR shall bear the cost of such work.

E. If laser beam is used, CONTRACTOR shall check its Work against intermediate grade stakes provided between manholes. Prior to initial use of the laser, CONTRACTOR shall set up laser on ground surface and check line and gradient controls. Lasers not functioning properly shall be immediately removed.

F. CONTRACTOR shall be responsible for all lines, elevations, and measurements of buildings, structures, piping, utilities, and other work executed by CONTRACTOR under the Contract. CONTRACTOR must exercise proper precaution to verify figures before laying out the Work, and will be held responsible for any error resulting from its failure to exercise such precaution.

G. See Specifications for additional requirements concerning layout of the Work.

1.04 PROGRESS MEETINGS

A. Progress meetings will be held throughout progress of the Work at intervals agreed to by OWNER, ENGINEER, and CONTRACTOR. Interval will generally be monthly.

B. CONTRACTOR's project manager, job superintendent, major subcontractors and suppliers shall attend as appropriate to address agenda topics for each meeting. CONTRACTOR's representatives shall have authority to bind CONTRACTOR to decisions at the meetings.

C. The project schedule shall be updated monthly and shall be reviewed at each progress meeting. CONTRACTOR shall provide the following information in written form at each meeting.
   1. Construction progress, including:
      a. Activities completed this reporting period.
      b. Activities in progress this reporting period.
      c. Activities scheduled to commence this reporting period.
   2. Description of problem areas.
   3. Current and anticipated delays.
      a. Cause of the delay.
      b. Corrective action and schedule adjustments to correct the delay.
      c. Impact of the delay on other activities, on milestones, and on completion dates.
   4. Changes in construction sequence.

D. CONSULTANT will prepare and distribute minutes to all attending parties.

1.05 PREINSTALLATION MEETING

A. When required in individual specification sections, CONTRACTOR shall convene a pre-installation meeting at Work Site prior to commencing Work of the section.

B. CONTRACTOR shall require attendance of parties directly affecting, or affected by, work of the specific section.

C. CONTRACTOR shall notify ENGINEER seven days in advance of meeting date.

D. CONTRACTOR shall prepare agenda and preside at meeting:
   1. Review conditions of installation, preparation and installation procedures.
   2. Review coordination with related work.

E. CONTRACTOR shall record minutes and distribute copies within two days after meeting to participants, with two copies to ENGINEER, participants, and those affected by decisions made.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01045

CUTTING, PATCHING, AND ALTERATIONS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: CONTRACTOR shall be responsible for all cutting, fitting, patching, and other alterations required to complete the Work as specified herein or to:
   1. Make its several parts fit together properly.
   2. Uncover portions of the Work to install improperly sequenced Work.
   3. Remove and replace defective Work.
   4. Remove and replace Work not conforming to requirements of the Contract Documents.
   5. Remove samples of installed Work as specified for testing.
   6. Provide penetrations of surfaces for installation of piping and electrical conduit.

1.02 REFERENCES

A. ANSI A10 Safety Requirements for Construction and Demolition.

1.03 QUALITY ASSURANCE

A. CONTRACTOR shall perform all cutting, patching, and alterations in strict accordance with pertinent requirements of these Specifications.

B. Except as modified by governing codes, CONTRACTOR shall comply with the applicable provision and recommendations of ANSI A10.

1.04 SUBMITTALS

A. CONTRACTOR shall submit a written request to OWNER well in advance of executing any cutting or alteration which affects the following:
   1. Work of OWNER or any separate contractor.
   2. Structural value or integrity of any element of the Project.
   3. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
   4. Efficiency, operational life, maintenance, or safety of operational elements.
   5. Visual qualities of sight-exposed elements.

B. The request shall include:
   1. Description of affected work.
   2. The necessity for cutting, patching, or alteration.
   3. Effect on work of OWNER or any separate contractor, or on the structural or weather-proof integrity of the Project.
   4. Description of proposed work to include:
      a. Scope of cutting, patching, or alteration.
      b. Trades who will execute the work.
      c. Products proposed to be used.
      d. Extent of refinishing to be done.
   5. Alternatives to cutting and patching.

6. Written permission of any separate contractor whose work will be affected.

C. Submit written notice to OWNER designating the date and the time the Work will be uncovered or executed.

1.05 SCHEDULING AND COORDINATION

A. All work under this section shall be coordinated with OWNER's work forces and those of other contractors and shall be accomplished at times acceptable to OWNER.

B. Before starting any work relating to existing utilities (electrical, sewer, water, heat, gas, fire lines, etc.) that will temporarily discontinue or disrupt service, notify ENGINEER and OWNER 72 hours in advance and obtain OWNER's approval before proceeding with this phase of the work. Temporary facilities, if required, shall be in place prior to disruption of service.

PART 2–PRODUCTS

2.01 NEW MATERIALS

A. For replacement of work removed, CONTRACTOR shall use materials which comply with the pertinent sections of these Specifications.

PART 3–EXECUTION

3.01 PREPARATION AND PROTECTION

A. CONTRACTOR shall provide temporary bracing, shoring, needling, and support of the structure during alterations work as necessary to prevent collapse, settling, or deflection and to protect persons and property from injury or damage.

B. Temporary supports must adequately carry all existing and imposed load.

C. CONTRACTOR shall provide and maintain temporary protection of surface finishes, equipment, and adjacent work designated to remain where demolition, removal, and new work is being done, connections are being made, materials are being handled, or equipment is being removed.

D. CONTRACTOR shall provide adequate fire protection in accordance with local Fire Department requirements.

E. CONTRACTOR shall provide waterproofing, weather protection, heat, and other facilities for that portion of the work which may be exposed by cutting and patching, demolition, or other alterations.

3.02 PERFORMANCE

A. CONTRACTOR shall accomplish all work of cutting, removal, demolition, patching or other alterations using only persons skilled in the appropriate trade.

B. CONTRACTOR shall execute the work in a careful and orderly manner.

C. CONTRACTOR shall execute cutting and demolition by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.

D. CONTRACTOR shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.

E. CONTRACTOR shall fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

F. CONTRACTOR shall thoroughly clean and prepare all surfaces to receive new finish or covering to completely remove all dirt, dust, grease, oil, paint, loose materials, and soil.

G. CONTRACTOR shall refinish entire surface as necessary to provide an even finish to match adjacent finishes:
   1. For continuous surfaces, refinish to nearest intersection.
   2. For an assembly, refinish entire unit.

3.03 DEMOLITION, CUTTING, AND REMOVAL

A. Cutting and removal of construction shall be performed by CONTRACTOR so as not to cut or remove more than is necessary and so as not to damage adjacent work.

B. CONTRACTOR shall cut out embedded anchorages and attachment items as required to properly provide for patching and repair of the respective finishes.

C. CONTRACTOR shall not cut structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio.

D. CONTRACTOR shall not cut operational elements and safety components in a manner resulting in decreased performance, shortened useful life, or increased maintenance.

E. CONTRACTOR shall not cut work exposed to view (exterior or interior) in a manner resulting in noticeable reduction of visual qualities as determined by OWNER.

F. Construction that is to remain which is loosened, cracked, or otherwise damaged or defaced as a result of careless cutting or demolition and is unsuitable for use intended shall be removed and replaced at no additional cost to OWNER.

G. CONTRACTOR shall clean demolished areas and remove debris, waste, and rubbish from the building at the conclusion of each day's work.

H. CONTRACTOR shall not let piled waste material endanger the structure.

3.04 PATCHING, EXTENDING, AND MATCHING

A. Patching work shall conform to the standards of the Specifications where applicable and where not specified, work shall conform to the highest standards of the applicable trade.

B. CONTRACTOR shall patch construction to match adjacent work unless noted otherwise.

C. Patching or restoration shall be carried to natural breaks (e.g., corners) wherever possible.

D. CONTRACTOR shall provide adequate support to substrate for patching finishes.

E. Transitions: CONTRACTOR shall restore existing work that is damaged during patching operations to a condition equal to its construction at the time of the start of work.

END OF SECTION

SECTION 01060

REGULATORY REQUIREMENTS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. OSHA requirements.
   2. Roadway limits.
   3. Permits.
   4. Recording and preserving historical and archaeological finds.
   5. American Iron and Steel requirements.

1.02 OSHA REQUIREMENTS

A. All work including site safety, equipment, materials, and fabricated items provided under the Contract shall comply with the provisions of the "Occupational Safety and Health Act" (OSHA), the Kentucky Occupational Safety and Health Act (KYOSH), and all other applicable federal, state, county and local laws, ordinances, codes, the requirements set forth herein, and any regulations that may be specified in other parts of these Contract Documents. Where any of these are in conflict, the more stringent requirements shall be followed.

B. CONTRACTOR's failure to thoroughly familiarize itself with the aforementioned safety provisions shall not relieve CONTRACTOR from compliance with the obligations and penalties set forth therein.

1.03 ROADWAY LIMITS

A. CONTRACTOR shall comply with roadway weight restrictions including seasonal weight restrictions.

1.04 PERMITS

A. The following permits are being obtained by OWNER: None applicable

B. A building permit issued by the Jessamine County – City of Wilmore Joint Planning Commission will be required and must be obtained prior to commencing work. The CONTRACTOR shall obtain the permit in their name and be responsible for all costs associated with the permit.

C. Any permits required for dewatering operations shall be obtained and paid for by CONTRACTOR.

1.05 RECORDING AND PRESERVING HISTORICAL AND ARCHAEOLOGICAL FINDS

A. In the event archaeological materials (arrowheads, stone tools, stone axes, prehistoric and historic pottery, bottles, foundations, Civil War artifacts, and other types of artifacts) are uncovered during the construction of the Project, Work is to immediately cease at the location and the Kentucky Heritage Council shall be contacted. The telephone number is (502) 564-7005. Construction shall not commence at this location until a written release is received from the Kentucky Heritage Council. Failure to report a find could result in legal action.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01090

REFERENCE STANDARDS AND DEFINITIONS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Reference Standards:
      a. Throughout the Contract Documents, reference is made to codes and standards which establish qualities and types of workmanship and materials, and which establish methods for workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics.
      b. Where materials or workmanship are required by these Contract Documents to meet or exceed the specifically named code or standard, it is CONTRACTOR's responsibility to provide materials and workmanship which meet or exceed that specifically named code or standard.
      c. It is also CONTRACTOR's responsibility, when so required by the Contract Documents, to deliver to ENGINEER all required proof that the material or workmanship, or both, meet or exceed the requirements of the specifically named code or standard.
   2. Definitions:
      a. A substantial amount of specification language constitutes definitions for terms found in other Contract Documents, including the Drawings which must be recognized as diagrammatic in nature and not completely descriptive of requirements indicated thereon.
      b. Certain terms used in the Contract Documents are defined generally in this section to supplement definitions of the Agreement, General Conditions, Supplementary Conditions, and other general contract documents.
      c. Definitions and explanations of this section are not necessarily either complete or exclusive, but are general for the Work.

B. Related Work Described Elsewhere: The specific naming of codes or standards occurs on the Drawings and in other sections of these Specifications.

1.02 QUALITY ASSURANCE

A. Familiarity with Pertinent Codes and Standards:
   1. It is CONTRACTOR's responsibility to verify the requirements of the specifically named codes and standards and to verify that the items procured for use in this Work meet or exceed the specified requirements.
   2. When required by individual sections of these specifications, CONTRACTOR shall obtain a copy of each pertinent code or standard and maintain the copies at the job site during submittals, planning, and progress of the Work until Substantial Completion of the Work is attained.

B. Overlapping or Conflicting Requirements:
   1. Where compliance with two or more industry standards or sets of requirements are specified, and the overlapping of those standards or requirements establishes different or conflicting minimums or levels of quality, the most stringent requirement (which is generally recognized to be also most costly) is intended and will be enforced, unless

more detailed language written directly into Contract Documents clearly indicates that a less stringent requirement is acceptable.

2. Refer all uncertainties to ENGINEER for written decision before proceeding.

1.03 REFERENCE STANDARDS

A. Applicable standards of the construction industry are made a part of the Contract Documents by reference as if copied directly into the Contract Documents, or as if published copies were bound herewith. See Article 3.02 of the General Conditions for additional provisions regarding references.

B. Standards referenced directly in the Contract Documents or by governing regulation, have precedence over nonreferenced standards which are recognized in industry for applicability to the Work.

C. Nonreference standards are hereby defined to have no particular applicability to the work except as a general measurement of whether the Work complies with standards recognized in the construction industry.

D. Reference standards and codes listed in these specifications may include, but are not necessarily limited to, standards or codes published by the following agencies and organizations:

1. AA — Aluminum Association
   1525 Wilson Boulevard, Arlington, VA 22209

2. AAMA — American Architectural Manufacturer's Association
   1827 Walden Office Square Suite 550, Schaumberg, IL 60173-4268

3. AASHTO — American Association of State Highway & Transportation Officials
   444 North Capitol Street NW Suite 249, Washington, DC 20001

4. ACI — American Concrete Institute
   38800 Country Club Drive, Farmington Hills, MI 48331-3439

5. AI — Asphalt Institute
   2696 Research Park Drive, Lexington, KY 40511-8480

6. AISC — American Institute of Steel Construction
   One East Wacker Drive Suite 700, Chicago, IL 60601-1802

7. AISI — American Iron and Steel Institute
   25 Massachusetts Avenue NW Suite 800, Washington, DC 20001

8. ANSI — American National Standards Institute
   25 West 43rd Street, New York, NY 10036

9. APA — American Plywood Association
   7011 South 19th, Tacoma, WA 98466-5333

10. API	American Petroleum Institute 1220 L Street NW, Washington, DC 20005-4070
11. ARI	Air-Conditioning & Refrigeration Institute 4100 North Fairfax Drive Suite 200, Arlington, VA 22203
12. ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers 1791 Tullie Circle NE, Atlanta, GA 30329
13. ASME	American Society of Mechanical Engineers Two Park Avenue, New York, NY 10016-5990
14. ASSE	American Society of Sanitary Engineering 901 Canterbury Suite A, Westlake, OH 44145
15. ASTM	ASTM International 100 Barr Harbor Drive, West Conshohoken, PA 19428-2959
16. AWI	Architectural Woodwork Institute 46179 Westlake Drive Suite 120, Potomac Falls, VA 20165-5874
17. AWPA	American Wood Protection Association P.O. Box 361784, Birmingham, AL 35236-1784
18. AWS	American Welding Society 8669 Doral Boulevard Suite 130, Doral, FL 33166
19. AWWA	American Water Works Association 6666 West Quincy Avenue, Denver, CO 80235
20. BHMA	Builder's Hardware Manufacturers Association 355 Lexington Avenue 15th floor, New York, NY 10017
21. BIA	Brick Industry Association 1850 Centennial Park Drive Suite 301, Reston, VA 20191
22. CRSI	Concrete Reinforcing Steel Institute 9333 North Plum Grove Road, Schaumburg, IL 60173
23. EJMA	Expansion Joint Manufacturers Association 25 North Broadway, Tarrytown, NY 10591
24. FM	FM Global FM Global Corporate Offices, 270 Central Avenue, Johnston, RI 02919
25. FTI	Facing Tile Institute Box 8880, Canton, OH 44711

26. GA	Gypsum Association 6525 Belcrest Road Suite 480, Hyattsville, MD 20782
27. GANA	Glass Association of North America 800 SW Jackson Street Suite 1500, Topeka, KS 66612-1200
28. ICC	International Code Council 500 New Jersey Avenue NW 6th Floor, Washington, DC 20001
29. IES	Illuminating Engineering Society 120 Wall Street, Floor 17, New York, NY 10005-4001
30. MIL	Military Specifications Naval Publications and Forms Center 5801 Tabor Avenue, Philadelphia, PA 19120
31. NAAMM	National Association of Architectural Metal Manufacturers 800 Roosevelt Road Building C Suite 312, Glen Ellyn, IL 60137
32. NCMA	National Concrete Masonry Association 13750 Sunrise Valley Drive, Herndon, VA 20171-4662
33. NECA	NECA National Electrical Contractors Association 3 Bethesda Metro Center Suite 1100, Bethesda, MD 20814
34. NEMA	National Electrical Manufacturers Association 1300 North 17th Street Suite 1752, Rosslyn, VA 22209
35. NFPA	National Fire Protection Association 1 Batterymarch Park, Quincy, MA 02169-7471
36. NIST	National Institute of Standards and Technology (U.S. Department of Commerce), 100 Bureau Drive, Stop 1070 Gaithersburg, MD 20899-1070
37. NRCA	National Roofing Contractors Association 10255 West Higgins Road Suite 600, Rosemont, IL 60018-5607
38. NSF	National Sanitation Foundation International P.O. Box 130140, 789 North Dixboro Road, Ann Arbor, MI 48113-0140
39. OSHA	Occupational Safety & Health Administration 200 Constitution Avenue NW, Washington, DC 20210
40. PCA	Portland Cement Association 5420 Old Orchard Road, Skokie, IL 60077
41. PCI	Prestressed Concrete Institute 200 West Adams Street Suite 2100, Chicago, IL 60606

42. SAE — Society of Automotive Engineers
SAE World Headquarters
400 Commonwealth Drive, Warrendale, PA 15096-0001

43. SDI — Steel Deck Institute
P.O. Box 25, Fox River Grove, IL 60021

44. SDI — Steel Door Institute
30200 Detroit Road, Westlake, OH 44145-1987

45. SIGMA — Sealed Insulating Glass Manufacturers Assoc.
401 North Michigan Avenue Suite 2400, Chicago, IL 60611

46. SJI — Steel Joist Institute
234 Cheves Street, Florence, SC 29501

47. SMACNA — Sheet Metal and Air Conditioning
Contractor's National Association
4201 Lafayette Center Drive, Chantilly, VA 20151-1219

48. SSPC — Society for Protective Coatings
40 24th Street 6th Floor, Pittsburgh, PA 15222-4656

49. TCA — Tile Council of America
100 Clemson Research Boulevard, Anderson, SC 29625

50. UL — Underwriters Laboratories
333 Pfingston Road; Northbrook, IL 60062

1.04 SUBMITTALS

A. For OWNER's records, CONTRACTOR shall submit copies of permits, licenses, certifications, inspection reports, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

1.05 DEFINITIONS

A. Indicated:
1. The term "indicated" is a cross-reference to details, notes, or schedules on the drawings, to other paragraphs or schedules in the specifications and to similar means of recording requirements in the Contract Documents.
2. Where terms such as "shown," "noted," "scheduled," and "specified" are used in lieu of "indicated", it is for the purpose of helping the reader locate cross-reference, and no limitation is intended except as specifically noted.

B. Approve (or Words of Similar Nature):
1. Where used in conjunction with ENGINEER's response to submittals, requests, applications, inquiries, reports, and claims by CONTRACTOR, the meaning of the term "approve" will be held to the limitation of ENGINEER's responsibilities and duties as specified in Paragraph 8.12 of the General Conditions.

2. In no case will "approval" by ENGINEER be interpreted as a release of CONTRACTOR from responsibility to fulfill requirements of the Contract Documents.

C. Minimum Requirements:
   1. Indicated requirements are for a specific minimum acceptable level of quality or quantity, as recognized in the industry.
   2. Actual work must comply with (or within specified tolerances) or exceed minimums.
   3. CONTRACTOR shall refer uncertainties to ENGINEER before proceeding.

D. Abbreviations: Abbreviations, where not defined in the Contract Documents, will be interpreted to mean the normal construction industry terminology.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Whenever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined either by manufacturer's name and catalog number or by reference to recognized industry standards.
   2. To facilitate CONTRACTOR's understanding of the design intent, procedures have been established for advance submittal of design data and for its review or rejection by ENGINEER.
   3. The type of submittal requirements specified in this section include progress schedule, shop drawings, product data, samples, and other miscellaneous work related submittals.

B. Related work described elsewhere: More detailed requirements for submittals are described in other sections of these specifications for some materials and equipment. They are to be considered additional requirements to supplement the requirements specified in this section. Submittals shall conform to Article 6 of the General Conditions.

C. Definitions: "Electronic Submittal" is defined as any submittal transmitted electronically to ENGINEER for review.

1.02 IDENTIFICATION OF SUBMITTALS

A. CONTRACTOR shall completely identify each submittal and resubmittal by showing at least the following information:
   1. Name and address of submitter, plus name and telephone number of the individual who may be contacted for further information.
   2. Name and location of project and identification number.
   3. Drawing number and specifications section number to which the submittal applies.
   4. Include the date of each submittal or resubmittal.

1.03 GROUPING OF SUBMITTALS

A. Unless otherwise specifically permitted by ENGINEER, CONTRACTOR shall make all submittals in groups containing all associated items so that information is available for checking each item when it is received.

B. Partial submittals may be rejected as not complying with the provisions of the Contract Documents.

1.04 TIMING OF SUBMITTALS

A. CONTRACTOR shall make all submittals far enough in advance of scheduled dates of installation to provide required time for reviews, for securing necessary approval, for possible revision and resubmittal, and for placing orders and securing delivery.

B. The review period for submittals that are received after 3 P.M. shall commence on the following business day.

1.05 CONSTRUCTION PROGRESS SCHEDULE

A. Submit initial schedule in duplicate within 10 days after date of OWNER-CONTRACTOR Agreement.

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.

E. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

F. Indicate estimated percentage of completion for each item of Work at each submission.

G. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates.

1.06 SHOP DRAWINGS

A. Shop drawings shall include specially prepared technical data for this project including drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements, and similar information not in standard printed form for general application to a range of similar projects. Shop drawings shall be submitted for all manufactured or fabricated items. See individual technical sections for special requirements.

B. CONTRACTOR shall make all shop drawings accurately to scale and sufficiently large to show all pertinent aspects of the item and its method of connection to the work.

C. Shop drawings shall be checked, approved, and stamped by CONTRACTOR in accordance with the General Conditions before transmittal to ENGINEER for review and approval.

D. Complete shop drawings and descriptive data shall be submitted on all manufactured or fabricated items prior to 25% completion of the Work. Applications for payment beyond 25% of the Contract amount will not be recommended for payment until all shop drawings are submitted, including the required hard copies, or a revised schedule for any remaining submittals is agreed to by OWNER and ENGINEER.

E. CONTRACTOR shall submit shop drawings following the electronic submittal procedure described below. If electronic submittal is impossible, CONTRACTOR may request ENGINEER to review hard copy submittals on a limited basis. ENGINEER may request to review hard copy submittals on a limited basis for submittals that are over 100 pages in length. If ENGINEER agrees to or requests hard copy submittal review, CONTRACTOR shall submit six color copies of shop drawings and descriptive data to ENGINEER for

approval. Three copies of these will be returned to CONTRACTOR if approved. If shop drawings are not approved or if they are stamped "Approved as Noted-Resubmit," two corrected copies will be returned to CONTRACTOR for use in resubmittal. If CONTRACTOR desires more than three approved copies, submitted quantity shall be increased accordingly.

F. Hard copy shop drawings shall be submitted in 3-tab report covers, binder clips, or large envelopes.

G. Shop drawings submitted to ENGINEER will be reviewed and stamped "Approved," "Approved as Noted," "Approved as Noted-Resubmit," or "Not Approved." CONTRACTOR shall resubmit the above number of corrected shop drawings for all shop drawings stamped "Approved as Noted-Resubmit" and "Not Approved" and will continue this process until shop drawings are stamped "Approved" or "Approved as Noted." If drawings are stamped "Approved as Noted-Resubmit," fabrication may proceed in accordance with the marked-up shop drawings. Installation shall not proceed until shop drawings have been resubmitted and stamped "Approved" or "Approved as Noted."

H. If shop drawings are stamped "Approved as Noted" or "Approved as Noted-Resubmit" and CONTRACTOR does not agree with revisions or cannot conform with revisions, fabrication shall not proceed and shop drawings shall be resubmitted with explanation of CONTRACTOR's position.

I. All shop drawings used for construction site activities shall bear the "Approved" or "Approved as Noted" stamp of ENGINEER.

J. Arrangements may be made between CONTRACTOR and ENGINEER to provide additional copies of "Approved" shop drawings for field activity purposes.

K. Electronic Submittal Procedures:
   1. Summary:
      a. Shop drawing and product data submittals shall be transmitted to ENGINEER in electronic (PDF) format using Submittal Exchange, or equal, a website service designed specifically for transmitting submittals between construction team members, or equal.
      b. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.
      c. The electronic submittal process is not intended for color samples, color charts, or physical material samples.
   2. Procedures:
      a. CONTRACTOR shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer/product, dimensions and coordination of information with other parts of the work.
      b. CONTRACTOR shall transmit each submittal to ENGINEER using the Submittal Exchange website, www.submittalexchange.com., or equal.
      c. ENGINEER review comments will be made available on the Submittal Exchange website for downloading. CONTRACTOR will receive email notice of completed review.
      d. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of CONTRACTOR.
      e. Electronically submitted shop drawings shall follow the following format:

(1) Filenames for the shop drawing submittals shall follow a XXXXX.YYY-Z. Description convention where XXXXX is the specification section number, YYY is the submittal number, .Z is the resubmittal number, and description is a short description of what the submittal includes. Submittals shall be consecutively numbered in direct sequence of submittal. Resubmittals shall be consecutively numbered with the first submittal numbered with an -0 and the first resubmittal numbered with a -1.
   (a) Example file name: 03200.016-1. Structure 10 Concrete Reinforcement. This would be the first revision of the sixteenth submittal and contain information on concrete reinforcement.

(2) All files shall be delivered in PDF format with a minimum resolution of 300 dpi unless otherwise requested by ENGINEER. Scanned in material shall be scanned in color and any markings by CONTRACTOR shall be made in red. Pages shall be rotated to the appropriate position for easy reading on a computer monitor such that the majority of text is vertical.

(3) Files shall be delivered without security features activated.

(4) Shop Drawings shall be uploaded as individual files. Files combined into a zip drive are not acceptable. All pages of one submittal should be contained in one file.

(5) The file shall open to a cover page containing, at a minimum, the following information:
   (a) CONTRACTOR's stamp.
   (b) Name, e-mail, and telephone number of the individual who may be contacted for further information.
   (c) Project number.
   (d) Submittal number.
   (e) Submission date, if resubmittal, all previous submission dates.
   (f) Index detailing contents and the total number of pages in the submittal.

f. Once a shop drawing has been "Approved" or "Approved as Noted," CONTRACTOR shall provide three hard color copies of the "Approved" or "Approved as Noted," shop drawings to ENGINEER. CONTRACTOR is responsible for the hard copy color replication of ENGINEER's "Approved" or "Approved as Noted," shop drawings for use by CONTRACTOR. Hard copy shop drawings shall be submitted in 3-ring binders or 3-tab report covers.

3. Costs:
   a. CONTRACTOR shall include the full cost of Submittal Exchange, or equal, project subscription in their proposal. This cost shall be included in the Contract amount. Contact Submittal Exchange at 1-800-714-0024 to verify cost prior to Bid.
   b. At CONTRACTOR's option, training is available from Submittal Exchange regarding use of website and PDF submittals. Contact Submittal Exchange at 1-800-714-0024.
   c. Internet Service and Equipment Requirements:
      (1) Email address and Internet access at CONTRACTOR's main office.
      (2) Adobe Acrobat (www.adobe.com), Bluebeam PDF Revu (www.bluebeam.com), or other similar PDF review software for applying electronic stamps and comments.

L. CONTRACTOR is fully responsible for obtaining any and all copyright permission associated with conversion of shop drawing information to electronic format.

M. Shop drawings shall include verification that the item meets applicable codes and standards such as NFPA 30, ASTM, OSHA, and others.

1.07 PRODUCT DATA

A. CONTRACTOR shall provide product data as required to supplement shop drawings.

B. Product data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by CONTRACTOR to illustrate a material, product, or system for some portion of the work.

C. CONTRACTOR shall collect required product data into one submittal for each unit of work or system.

D. CONTRACTOR shall include manufacturer's standard printed recommendations for application and use, compliance with standards, performance characteristics, wiring and piping diagrams and controls, component parts, finishes, dimensions, required clearances, and other special coordination requirements.

E. CONTRACTOR shall mark each copy of standard printed data to identify pertinent products, models, options, and other data.

F. CONTRACTOR shall supplement manufacturer's standard data to provide information unique to the work.

1.08 RESUBMISSION REQUIREMENTS

A. Make any corrections or changes in the submittals required by ENGINEER.

B. Shop Drawings and Product Data:
   1. Revise initial drawings or data and resubmit as specified for initial submittal.
   2. Itemize in a cover letter any changes which have been made other than those requested by ENGINEER.

C. Electronic shop drawing resubmissions shall follow the nomenclature described in Section 1.06.L.2.e.

1.09 MANUFACTURER'S DIRECTIONS

A. Manufactured articles, materials, and equipment shall be stored, commissioned, operated, applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer, unless specified to the contrary.

B. Wherever specifications call for work to be performed or materials to be installed in accordance with the manufacturer's printed instructions or directions, CONTRACTOR shall furnish copies as required for shop drawings of those instructions or directions to ENGINEER before installing the material or performing the work.

1.10 MAINTENANCE MANUAL

A. Prior to 50% completion of the Contract or at a minimum of 45 days prior to the scheduled start-up date of any individual item of equipment, whichever is earlier, CONTRACTOR shall furnish to ENGINEER four complete copies of a maintenance manual for all equipment furnished. Applications for payment beyond 50% of the contract amount will not be recommended for payment until all maintenance manuals are submitted or a revised schedule for remaining maintenance manuals is agreed to by OWNER and ENGINEER.

B. The manuals shall include manufacturer's instructions for maintenance and operation for each item of mechanical and electrical equipment. Manuals shall be specific for the equipment as installed; provide project specific inserts as required. Manuals shall contain: operation instructions, lubrication schedules, types and quantities, preventative maintenance program, spare parts list, parts lists, I.D. No. and exploded views, assembly instructions, parts supplier location, trouble shooting and startup procedures and, where applicable, test data and curves.

C. All sheets have reduced dimensions as described for shop drawings, and shall be furnished in 3-ring binders or 3-tab report covers.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

The following information is included in O&M Manual:

Check or mark N/A

1. Recommended installation, adjustment, calibration, and troubleshooting. _____
2. Complete internal and connection wiring diagrams. _____
3. Complete parts lists, by generic title and identification number, with exploded views of each assembly. _____
4. Disassembly, overhaul, and reassembly instructions. _____
5. Recommended prestart checks. _____
6. Recommended start procedure. _____
7. Recommended shutdown procedure for both short and long term. _____
8. Recommended operating precautions that include safety for personnel and equipment. _____
9. Recommended standing maintenance procedure. _____

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1–GENERAL

1.01 SUMMARY

A. Work Includes:
   1. Quality Assurance–Control of Installation.
   2. Tolerances.
   3. Manufacturers' Field Services and Reports.

1.02 QUALITY ASSURANCE–CONTROL OF INSTALLATION

A. CONTRACTOR shall monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. CONTRACTOR shall comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, CONTRACTOR shall request clarification from ENGINEER before proceeding.

D. CONTRACTOR shall 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. Work shall be performed by persons qualified to produce workmanship of specified quality.

F. CONTRACTOR shall secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.03 TOLERANCES

A. CONTRACTOR shall monitor tolerance control of installed products to produce acceptable work and shall not permit tolerances to accumulate.

B. CONTRACTOR shall comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from ENGINEER before proceeding.

C. CONTRACTOR shall adjust products to appropriate dimensions; position before securing products in place.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Temporary utilities.
   2. Temporary stairs and access.
   3. Temporary support facilities.
   4. Construction sign.
   5. Removal of temporary facilities.

B. CONTRACTOR shall arrange for and provide temporary facilities as required for proper and expeditious prosecution of the Work.

C. CONTRACTOR shall pay all costs, except as otherwise specified, until final acceptance of the Work unless OWNER makes arrangements for use of completed portions of the Work after substantial completion in accordance with the provisions of the General Conditions.

D. CONTRACTOR shall make all temporary connections to utilities and services in locations acceptable to OWNER and local authorities having appropriate jurisdiction.
   1. Furnish all necessary labor and materials.
   2. Make all installations in a manner subject to the acceptance of such authorities and OWNER.
   3. Maintain such connections.
   4. Remove temporary installation and connection when no longer required.
   5. Restore services and sources of supply to proper operating conditions.

1.02 TEMPORARY UTILITIES

A. Temporary Toilets: CONTRACTOR shall provide and maintain sanitary temporary chemical toilets located where approved by OWNER and in sufficient number required for the work force employed by CONTRACTOR.

B. Temporary Electrical Services:
   1. CONTRACTOR must provide temporary electrical power supply CONTRACTOR shall make all necessary arrangements, furnish, install, and maintain necessary temporary electrical services at the Site. CONTRACTOR shall remove all temporary services when Project is complete.
   2. All utility charges for installation of the temporary services shall be paid for by CONTRACTOR. All metering installation charges and all energy charges for electric current used for temporary lighting and power are to be paid by CONTRACTOR.
   3. No permanent electrical equipment or wiring shall be used without express written permission of OWNER. Such approval, if given, shall not affect guarantee period. If OWNER authorizes use of permanent service facilities, CONTRACTOR shall pay all metering costs until acceptance or occupancy (whichever occurs first) of building by OWNER.

C. To prevent interruption of the project due to the local electric utility's failure to provide a temporary power supply connection point prior to contract award, CONTRACTOR must purchase a new industrial grade portable generator to be used exclusively for this project. The portable generator will become the property of the OWNER upon acceptance of the completed work. The portable generator shall be a Honda EB10000 or equivalent with the following specifications:

1. 6,000 to 10,000 watt
2. 120/240 single phase
3. Electric start
4. Gasoline powered

D. Weather Protection and Temporary Heat: CONTRACTOR shall provide weather protection to protect the Work from damage because of freezing, rain, snow, and other inclement weather.

E. Temporary Water: CONTRACTOR shall supply its own water during construction. CONTRACTOR shall also provide its own piping, valves, and appurtenances for its requirements.

F. Temporary Fire Protection: CONTRACTOR and Subcontractor(s) who maintain or provide an enclosed shed or trailer shall provide and maintain in operating order in each shed or trailer a minimum of one fire extinguisher. More extinguishers shall be provided as necessary. Fire extinguishers shall be minimum dry chemical, nonfreezing-type, UL rating 2A-30BC, with 10-pound capacity for Class A, B, and C fires.

G. CONTRACTOR's and Subcontractor(s)' personnel shall refrain from smoking during excavation, laying pipe, backfilling, and other work at the Site which may involve potential contact with explosive vapors or gasoline products.

1.03 TEMPORARY STAIRS AND ACCESS

A. CONTRACTOR shall provide and maintain all equipment such as temporary stairs, ladders, ramps, runways, chutes, and so on as required for proper execution of the Work. CONTRACTOR shall be responsible for providing its own scaffolds, hoists, etc.

B. All such apparatus, equipment, and construction shall meet all requirements of OSHA, the labor laws, and other applicable State and local laws. Provide stairs with handrails. As soon as possible and where applicable, permanent stairs shall be installed.

C. As soon as permanent stairs are created, provide temporary protective treads, handrails, and shaft protection.

D. Provide barricades at hazardous locations, complete with signs, temporary general lighting, warning lights, and similar devices as required.

1.04 TEMPORARY SUPPORT FACILITIES

A. CONTRACTOR shall provide whatever facilities and services which may be needed to properly support primary construction process and meet compliance requirements and governing regulations.

B. CONTRACTOR shall not use permanent facilities except as otherwise indicated, unless

authorized by OWNER.

1.05 CONSTRUCTION SIGN

A. Not applicable

1.06 REMOVAL OF TEMPORARY FACILITIES

A. Remove temporary materials, equipment, services, and construction as soon as practicable but no later than just prior to final completion inspection.

B. Clean and repair damage caused by installation or use of temporary facilities and restore existing facilities used during construction to specified, or to original, condition.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01560

TEMPORARY CONTROLS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Dust Control.
   2. Water, Erosion, and Sediment Control.
   3. Traffic Control.
   4. Site Security.
   5. Daily Cleanup.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

3.01 DUST CONTROL

A. CONTRACTOR shall execute the Work by methods to minimize raising dust from construction operations.

B. CONTRACTOR shall provide positive means to prevent air-borne dust from dispersing into atmosphere.

3.02 WATER, EROSION, AND SEDIMENT CONTROL

A. CONTRACTOR shall grade site to drain and shall maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. CONTRACTOR shall protect Site from puddling or running water.

C. CONTRACTOR shall provide erosion control measures as necessary to control discharge of sediment laden water to surface waters and wetlands.

D. Except as provided for in the document, overland discharge of water from dewatering operations shall not be allowed. Depending on water quality, such water shall either be piped directly to the surface water or shall be directed to sedimentation basins or other such structures or features prior to discharge to surface waters so as not to cause damage to existing ground and improvements, erosion, or deposition in the discharge area.

E. CONTRACTOR shall use jute or synthetic netting, silt fences, straw bales, dikes, channels, and other applicable measures to prevent erosion of soils disturbed by its construction operation.

F. Restoration of the Site shall proceed concurrently with the construction operation. See Drawings and Specifications for erosion control measures in addition to that which may be required above.

G. Erosion control measures shall comply with the following document: Kentucky's Best Management Practices for Construction Activities.

3.03 TRAFFIC CONTROL

A. CONTRACTOR shall be responsible for providing all signs, barricades, flagmen and other traffic control devices in the construction zone.

B. CONTRACTOR shall be responsible for providing all signs, barricades, flagmen and other traffic control devices in the construction zone. All traffic control measures shall meet the requirements Manual on Uniform Traffic Control Devices for Streets and Highways, Latest Edition.

C. Do not close or obstruct roadways without approval of OWNER.

D. Maintain two-way traffic on streets at all times.

E. Conduct operations with minimum interference to roadways.

3.04 SITE SECURITY

A. CONTRACTOR shall have the sole responsibility of safeguarding the Area of Site perimeter to prevent unauthorized entry to the Site throughout the duration of the Project. CONTRACTOR shall at all times provide such permanent and temporary fencing or barricades or other measures as may be necessary to restrict unauthorized entry to its construction area including construction in public rights-of-way or easements. Site security measures shall include safeguards against attractive nuisance hazards as a result of construction activity.

B. CONTRACTOR shall at all times be responsible for the security of the Work including materials and equipment. OWNER will not take any responsibility for missing or damaged equipment, tools, or personal belongings. CONTRACTOR shall have the sole responsibility of safeguarding the Work and the Site throughout the duration of the Project.

3.05 DAILY CLEANUP

A. CONTRACTOR shall clean up the Site and remove all rubbish on a daily basis.

B. CONTRACTOR shall clean up public streets and highways and remove any dirt, mud or other materials due to project traffic on daily basis and shall comply with all local and state ordinances and permit requirements.

END OF SECTION

SECTION 01590

FIELD OFFICES AND SHEDS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Materials, equipment, and furnishings.
   2. Construction.
   3. Environmental control.
   4. CONTRACTOR office and facilities.
   5. Storage areas and sheds.
   6. Preparation.
   7. Installation.
   8. Maintenance and cleaning.
   9. Removal.

PART 2–PRODUCTS

2.01 MATERIALS, EQUIPMENT, AND FURNISHINGS

A. Materials, equipment and furnishings shall be serviceable, new or used, and adequate for required purpose.

2.02 CONSTRUCTION

A. Portable or mobile buildings, or buildings shall be constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.

B. CONTRACTOR shall provide structurally sound, secure, weathertight enclosures for office and storage spaces.

C. Temperature transmission resistance of floors, walls, and ceilings shall be compatible with occupancy and storage requirements.

D. Exterior materials shall be weather resistant.

E. Interior materials in offices shall consist of sheet type materials for walls and ceilings, pre-finished or painted; resilient floors and bases.

F. Lighting for offices shall be 50-foot candles minimum at desk top height, with exterior lighting at entrance doors.

G. Provide appropriate type fire extinguisher at each office and each storage area.

H. Interior materials in storage sheds shall be as required to provide specified conditions for storage of products.

2.03 ENVIRONMENTAL CONTROL

A. Heating, cooling, and ventilating for offices shall consist of automatic equipment to maintain comfort conditions; 70°F heating and 78°F cooling.

B. Heating and ventilation for storage spaces shall be as needed to maintain products in accordance with Contract Documents and to provide adequate lighting for maintenance and observation of products.

2.04 CONTRACTOR OFFICE AND FACILITIES

A. CONTRACTOR may elect to provide office facilities to meet CONTRACTOR's needs but do so entirely at the CONTRACTOR's expense.

B. The CONTRACTOR's Project Manager must provide a cell phone number so that the OWNER and ENGINEER can reach the Project Manager, as necessary, 24 hours per day / 7 days per week.

2.05 STORAGE AREAS AND SHEDS

A. Provide storage areas and sheds of size to meet storage requirements for products of individual sections, allowing for access and orderly provision for maintenance and for observation of products to meet requirements of Section 01600 - Materials and Equipment.

B. The CONTRACTOR is responsible for security of any material or equipment storage areas / sheds. The OWNER is not responsible for any material or equipment loses incurred by the CONTRACTOR.

PART 3–EXECUTION

3.01 PREPARATION

A. CONTRACTOR shall fill and grade sites for temporary structures to provide drainage away from buildings.

3.02 INSTALLATION

A. CONTRACTOR shall install office spaces ready for occupancy 15 days after date fixed in Notice to Proceed or as agreed upon by ENGINEER.

3.03 MAINTENANCE AND CLEANING

A. CONTRACTOR shall maintain approach walks free of mud, water, and snow.

3.04 REMOVAL

A. Upon final acceptance and completion of the Work, CONTRACTOR shall remove field offices, foundations, utility services, and debris, and shall restore areas.

END OF SECTION

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: CONTRACTOR shall be responsible for the delivery, handling, storage and protection of all material and equipment required to complete the Work as specified herein.

B. Related Sections and Divisions: Specific requirements for the handling and storage of material and equipment are described in other sections of these Specifications.

1.02 PRODUCTS

A. Components required to be supplied in quantity within a Specification section shall be the same, and shall be interchangeable.

B. When any construction deviations from the Drawings and/or Specifications necessary to accommodate equipment supplied by CONTRACTOR, result in additional costs to CONTRACTOR or other contractors, such additional costs shall be borne by CONTRACTOR. CONTRACTOR shall also pay any additional costs necessary for revisions of Drawings and/or Specifications by ENGINEER.

C. Each major component of equipment shall bear a nameplate giving the name and address of the manufacturer and the catalogue number or designation.

1.03 TRANSPORTATION AND HANDLING

A. Materials, products and equipment shall be properly containerized, packaged, boxed, and protected to prevent damage during transportation and handling.

B. CONTRACTOR shall not overload any portion of the structure in the transporting or storage of materials.

C. CONTRACTOR shall not damage other construction by careless transportation, handling, spillage, staining or impact of materials.

D. CONTRACTOR shall provide equipment and personnel to handle products, including those provided by OWNER, by methods to prevent soiling and damage.

E. CONTRACTOR shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.

F. CONTRACTOR shall handle product by methods to avoid bending or overstressing. Lift large and heavy components only at designated lift points.

1.04 DELIVERY AND RECEIVING

A. CONTRACTOR shall arrange deliveries of products in accordance with the Progress Schedule, allowing time for observation prior to installation.

B. CONTRACTOR shall coordinate deliveries to avoid conflict with the Work and conditions at the Site; work activities of OWNER; limitations on storage space; availability of personnel and handling equipment and OWNER's use of premises.

C. CONTRACTOR shall deliver products in undamaged, dry condition, in original unopened containers or packaging with identifying labels intact and legible.

D. CONTRACTOR shall clearly mark partial deliveries of component parts of equipment to identify equipment and contents to permit easy accumulation of parts and to facilitate assembly.

E. Immediately on delivery, CONTRACTOR shall inspect shipment to assure:
   1. Product complies with requirements of Contract Documents and reviewed submittals.
   2. Quantities are correct.
   3. Accessories and installation hardware are correct.
   4. Containers and packages are intact and labels legible.
   5. Products are protected and undamaged.

1.05 STORAGE AND PROTECTION

A. General:
   1. CONTRACTOR shall store products, immediately on delivery, in accordance with manufacturer's instructions, with all seals and labels intact and legible.
   2. CONTRACTOR shall allocate the available storage areas and coordinate their use by the trades on the job.
   3. CONTRACTOR shall arrange storage in a manner to provide access for maintenance of stored items and for observation.

B. In enclosed storage, CONTRACTOR shall:
   1. Provide suitable temporary weather tight storage facilities as may be required for materials that will be damaged by storage in the open.
   2. Maintain temperature and humidity within ranges stated in manufacturer's instructions.
   3. Provide ventilation for sensitive products as required by manufacturer's instructions.
   4. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.
   5. Store solid materials such as insulation, tile, mechanical and electrical equipment, fittings, and fixtures under shelter, in original packages, away from dampness and other hazards.
   6. Store liquid materials away from fire or intense heat and protect from freezing.

C. At exterior storage, CONTRACTOR shall:
   1. Store unit materials such as concrete block, brick, steel, pipe, conduit, door frames, and lumber off ground, out of reach of dirt, water, mud and splashing.
   2. Store tools or equipment that carry dirt outside.
   3. Store large equipment so as not to damage the Work or present a fire hazard.
   4. Cover products subject to discoloration or deterioration from exposure to the elements, with impervious sheet material and provide ventilation to avoid condensation.
   5. Completely cover and protect any equipment or material which is prime coated or finish painted with secured plastic or cloth tarps. Store out of reach of dirt, water, mud and splashing.

6. Store loose granular materials on clean, solid surfaces such as pavement, or on rigid sheet materials, to prevent mixing with foreign matter.
7. Provide surface drainage to prevent erosion and ponding of water.
8. Prevent mixing of refuse or chemically injurious materials or liquids.
9. Cover aggregates such as sand and gravel in cold wet weather.
10. Remove all traces of piled bulk materials at completion of work and return site to original or indicated condition.

1.06 MAINTENANCE OF STORAGE

A. CONTRACTOR shall periodically inspect stored products on a scheduled basis.

B. CONTRACTOR shall verify that storage facilities comply with manufacturer's product storage requirements, and verify that manufacturer required environmental conditions are maintained continually.

C. CONTRACTOR shall verify that surfaces of products exposed to the elements are not adversely affected and that any weathering of finishes is acceptable under requirements of Contract Documents.

D. CONTRACTOR shall perform scheduled maintenance of equipment in storage as recommended by the manufacturer. A record of the maintenance shall be kept and turned over to ENGINEER when the equipment is installed.

1.07 INSTALLATION REQUIREMENTS

A. Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the respective manufacturers, unless otherwise specified.

B. After installation, CONTRACTOR shall protect all materials and equipment against weather, dust, moisture, and mechanical damage.

C. CONTRACTOR shall be responsible for all damages that occur in connection with the care and protection of all materials and equipment until completion and final acceptance of the Work by OWNER. Damaged material and equipment shall be immediately removed from the Site.

1.08 EQUIPMENT WARRANTIES

A. Warranties shall be nonprorated, include all parts and labor, and be in written form. Warranties shall specifically exclude buyer's indemnification language. Warranty language shall not eliminate manufacturer's responsibility for sizing of the equipment. During warranty period, manufacturer shall be responsible for any travel expenses, outside contractor fees, and rental equipment fees associated with providing warranty service. Warranties shall not exclude normal wear items. Manufacturer shall pay expenses incurred for repairs and parts replacement not made by manufacturer if manufacturer's response is not within 72 hours of notification by OWNER. Warranty language shall be provided with the shop drawings.

1.09 CONCRETE EQUIPMENT BASE

A. Cast-in-place concrete equipment bases shall be provided for all new and relocated equipment including electrical control panels, motor control centers, switchgear, etc. Concrete equipment bases shall be provided by CONTRACTOR except where specifically noted to be provided by others. Bases shall be 3-1/2 inch minimum height and shall be a minimum of 3 inches larger than equipment being supported. Grouting of equipment bases shall be as recommended by equipment manufacturer.

B. Concrete and grout shall meet applicable sections of the specifications.

C. Provide all anchor bolts, metal shapes and templates to be cast in concrete or used to form concrete for support of equipment.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01650

STARTING OF SYSTEMS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. General.
   2. Equipment and System Installation.
   3. Starting equipment and systems.
   4. Demonstration, Instructions, and Operator Training.
   5. Start-up and testing.

B. CONTRACTOR shall perform the Work described in the following subsections.

1.02 GENERAL

A. The number of days for manufacturer's services stated in the Specifications shall be considered as the minimum number of days. Should additional time be required for services because of equipment malfunction or other problem, such time shall be at the expense of CONTRACTOR, with no change in Contract Price.

B. "Days" specified shall consist of 8-hour days on-site, excluding travel time.

C. CONTRACTOR shall designate and provide one person to be responsible for scheduling, coordinating, and expediting the specified services. Scheduling the services shall be done in cooperation with, and with the prior approval of ENGINEER and OWNER. Such schedule shall be arranged with the appropriate subcontractors, manufacturers, and suppliers with sufficient time to allow their compliance with the service requirements.

D. CONTRACTOR shall manage equipment checkout such that checkout has been completed and deficiencies addressed prior to demonstration and training. Scheduling training prior to checkout may result in cancellation when checkout cannot be completed prior to training.

1.03 EQUIPMENT AND SYSTEM INSTALLATION

A. Competent and experienced technical personnel shall represent the manufacturers of all equipment and systems for as many days as may be necessary to provide proper installation and to resolve assembly or installation problems at the site that are attributable to, or associated with, the equipment furnished. This requirement applies to manufacturers for all equipment furnished, whether or not specifically set forth in the Specifications.

B. Where a manufacturer's certificate is called for in this Specification Section, the manufacturer's representative shall provide the attached certificate stating that the equipment or system has been installed in accordance with the manufacturer's instructions and has been inspected by a manufacturer's authorized representative, that it has been serviced with the proper initial lubricants, that applicable safety equipment has been properly installed, that the proper electrical and mechanical connections have been made, and that any other manufacturer requirements have been met. This certification shall be

provided to ENGINEER and OWNER prior to the start-up. This certificate is in addition to the manufacturer's standard startup reports, checklists, and other pertinent information.

C. Functional (or run) testing is required for all equipment and systems. The manufacturer's representative shall supervise the functional test, which shall include checking for proper rotation, alignment, speed, excessive vibration, and noisy operation. The Manufacturer's Certificate of Proper Installation shall state that proper adjustments have been made and that the equipment or system is ready for start-up.

1.04 STARTING EQUIPMENT AND SYSTEMS

A. Where field testing and start-up services are called for in the Specifications, or when technical assistance is necessary as a result of any malfunction of the equipment or system furnished, the manufacturer's representative shall provide such services.

B. Manufacturer's representative shall also conduct and/or assist with performance testing, as required by the Specifications. These services shall continue until such times as the applicable equipment or system has been successfully tested for performance and has been accepted by OWNER for full-time operation.

C. Coordinate schedule for start-up of various equipment and systems. Coordination includes, but is not limited to, communication with subcontractors, suppliers, OWNER, and ENGINEER. CONTRACTOR shall confirm that all necessary work is complete and that the equipment and systems can be operated in conjunction with all associated processes.

D. Notify ENGINEER and OWNER a minimum of 7 days prior to start-up of each item.

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

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

G. Verify wiring and support components for equipment are complete and tested.

H. Execute start-up under supervision of applicable manufacturer's representative and CONTRACTOR's personnel in accordance with manufacturers' instructions.

I. Require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up and to supervise placing equipment or system in operation.

J. Equipment manufacturer shall provide a written report covering checkout, testing, inspections, and start-up and shall identify any deficiencies noted. Report shall be submitted to ENGINEER. CONTRACTOR shall be responsible for correcting all deficiencies noted in report.

1.05 DEMONSTRATION, INSTRUCTIONS, AND OPERATOR TRAINING

A. For all mechanical equipment and systems and where called for in the Specifications, provide a qualified technical representative to provide detailed instructions to OWNER's personnel for operation and maintenance of equipment and associated instrumentation.

B. Refer to the Specifications for additional training requirements.

C. CONTRACTOR shall coordinate the pre-start-up training periods with OWNER's operating personnel and manufacturers' representatives.
   1. Schedule training dates and times with OWNER, that are acceptable to the OWNER. Normal hours available for training are between 7:30 A.M. to 3 P.M., Monday through Friday, except for holidays.
   2. During the training, instructor will dedicate its time solely to training and not start-up services.
   3. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with OWNER's personnel in detail to explain all aspects of operation and maintenance.
   4. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment.
   5. Prepare and insert additional data in operation and maintenance manuals when need for additional data becomes apparent during instruction.

D. Operation and maintenance manual submitted in accordance with Section 01300–Submittals shall be provided prior to operator training.

E. For equipment or systems requiring seasonal operation, perform demonstration for dormant season at start of dormant season.

F. Final payment for various items of equipment will not be made by OWNER until the equipment is operating to OWNER's satisfaction.

1.06 START-UP AND TESTING

A. Prior to acceptance of any portion of the Work, start-up and testing of all equipment and testing of all materials furnished on the Project by CONTRACTOR shall have been conducted in the presence of representatives of CONTRACTOR, OWNER, and ENGINEER and also manufacturer if requested by OWNER or ENGINEER.

B. CONTRACTOR shall provide whatever temporary installations and conditions are necessary in order to perform start-up and testing operations on all equipment and materials furnished under the Contract. Temporary connections and equipment necessary during start-up and testing operations shall include, but not be limited to, temporary piping and electrical power and control equipment and devices, temporary connection from various parts of the systems and any other labor, materials, fuel, devices, or items that may be required for start-up and testing operations. Temporary conditions shall include filling with water, if necessary, to check equipment and materials.

C. All temporary installations and conditions shall be removed by CONTRACTOR upon completion of start-up and testing.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

3.01 EQUIPMENT SYSTEMS REQUIRING CERTIFICATION OF PROPER INSTALLATION.

A. Brine Making System, enclosure, pumps, and Brine Boss alternate, if chosen.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Closeout procedures.
   2. Final cleaning.
   3. Adjusting.
   4. Project record documents.
   5. Warranties.
   6. Spare parts and maintenance materials.

1.02 CLOSEOUT PROCEDURES

A. CONTRACTOR shall provide submittals to ENGINEER that are required by governing or other authorities.

B. CONTRACTOR shall comply with General Conditions and Supplementary Conditions and complete the following before requesting ENGINEER's observation of the Work, or designated portion thereof, for substantial completion.
   1. Submit executed warranties, workmanship bonds, maintenance agreements, inspection certificates, and similar required documentation for specific units of Work, enabling OWNER's unrestricted occupancy and use.
   2. Submit record documentation, maintenance manuals, tools, spare parts, keys, and similar operational items.
   3. Submit consent of surety (if surety required in Contract).
   4. Complete final cleaning, touch-up work of marred surfaces, and remove temporary facilities and tools.

1.03 FINAL CLEANING

A. It is CONTRACTOR's responsibility to completely clean up the inside and outside of all buildings and the construction site at the completion of the Work.

B. CONTRACTOR shall clean areas of the building in which painting and finishing work is to be performed just prior to the start of this work, and maintain these areas in satisfactory condition for painting and finishing. This cleaning includes:
   1. Removal of trash and rubbish from these areas.
   2. Broom cleaning of floors.
   3. Removal of any plaster, mortar, dust, and other extraneous materials from finish surfaces, including but not limited to exposed structural steel, miscellaneous metal, masonry, concrete, mechanical equipment, piping, and electrical equipment.

C. In addition to the cleaning specified above and the more specific cleaning that may be required in various technical sections of the Specifications, CONTRACTOR shall prepare the Project for occupancy by a thorough cleaning throughout, which shall include the following:

1. 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.
2. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
3. Replace filters of operating equipment.
4. Clean debris from roofs, gutters, downspouts, and drainage systems.
5. Clean site; sweep paved areas, rake clean landscaped surfaces.
6. Remove waste and surplus materials, rubbish, and construction facilities from the Site.

1.04 ADJUSTING

A. CONTRACTOR shall adjust operating products and equipment to ensure smooth and unhindered operation.

1.05 PROJECT RECORD DOCUMENTS

A. CONTRACTOR shall maintain on Site, one set of the following record documents to record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. CONTRACTOR shall ensure entries are complete and accurate, enabling future reference by OWNER.

C. CONTRACTOR shall store record documents separate from documents used for construction.

D. CONTRACTOR shall record information concurrent with construction progress.

E. Specifications: CONTRACTOR shall 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.

F. Record Drawings: CONTRACTOR shall legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish 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.

1.06 WARRANTIES

A. CONTRACTOR shall provide warranties beyond project one year warranty as required by technical sections and as follows.

B. Submit warranty information as follows:
   1. Provide notarized copies.
   2. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers, and provide Table of Contents and assemble in three ring binder with durable cover.
   3. Submit with request for certificate of Substantial Completion.
   4. For items of work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

A. CONTRACTOR shall provide spare parts, maintenance, and extra materials in quantities specified in individual specification sections.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

PERMITS

No Owner Provided Permits

See Section 01060 – 1.04 of
Technical Specification

SECTION 02050

DEMOLITION

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: All demolition, removal, and salvage work as shown on the drawings or specified herein.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 SUBMITTALS

A. CONTRACTOR shall submit permits and notices, if required, authorizing building demolition.

1.03 QUALITY ASSURANCE

A. CONTRACTOR shall perform demolition, removal, and salvage in conformity with applicable federal, state, and local safety practices and code requirements.

B. CONTRACTOR shall contact all public utilities and shall shut off, cut and cap all utility services in accordance with utility requirements, codes, rules and regulations.

C. Obtain and pay for all necessary permits, licenses and certificates required.

1.04 SEQUENCE

A. No demolition, removal, or salvage work shall commence until approval to proceed has been granted by OWNER. Such work shall be completed in accordance with the construction sequence included in Division 1 of these specifications and in accordance with the construction phases of this project and work to be done by other contractors.

PART 2–PRODUCTS

2.01 GENERAL

A. Compacted fill, including degree of compaction, shall meet the requirements of Section 02222–Excavation, Fill, Backfill and Grading.

B. Pipe fittings and materials shall meet the requirements of Section 02600–Buried Piping and Appurtenances and Section 15040–Piping and Accessories.

PART 3–EXECUTION

3.01 ABANDONING AND REMOVING UTILITIES AND UNDERGROUND PROCESS PIPING

A. CONTRACTOR shall be responsible for the turning off or unhooking of all utilities before starting the demolition work. Remove all utility lines, including electrical services that are shown or specified to be removed. Remove utility lines that are to be abandoned as needed to clear new construction.

3.02 The ends of utility lines shown or specified to be abandoned shall be exposed and plugged with concrete to prevent soil infiltration into the pipes. Safe-loading of the abandoned pipe is not required.

3.03 SALVAGE

A. OWNER has first right of refusal to all material, piping, and equipment removed.

3.04 BACKFILL

A. CONTRACTOR shall fill all abandoned structures and excavations resulting from removal of structures and utilities with compacted fill.

B. Prior to filling, CONTRACTOR shall break one opening in the floor or wall near the base of each compartment to allow groundwater to freely migrate through the structure.

END OF SECTION

SECTION 02110

SITE CLEARING AND STRIPPING

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Removal of surface debris.
   2. Removal of paving, curbs, and sidewalks.
   3. Removal of trees, shrubs, and other plant life.
   4. Strip and stockpile topsoil.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

3.01 PREPARATION

A. CONTRACTOR shall identify existing plant life to remain and shall tag accordingly.

3.02 PROTECTION

A. CONTRACTOR shall protect from damage utilities and structures that are to remain.

B. CONTRACTOR shall protect trees, plant growth, and features designated to remain as final landscaping.

C. See Division 1 for protection of survey monumentation.

3.03 CLEARING AND GRUBBING

A. Clearing and grubbing shall consist of cutting and disposing of trees, brush, windfalls, logs, and other vegetation and the removing and disposing of roots, stumps, stubs, grubs, logs, and other timber from within the clearing limits as defined on the drawings designated to be removed on the drawings or in the specifications or fall within the excavation, embankment, or improved areas of the site.

B. All roots and stumps shall be removed to a depth of not less than 12 inches below the original ground surface in embankment areas. In cut areas, such material shall be removed to a depth of not less than 12 inches below the subgrade.

3.04 REMOVALS

A. CONTRACTOR shall remove from the site all trees, brush, and other vegetation, debris, and rocks which fall within the excavation and grading limits, as well as any paving, curb and gutter, and sidewalks shown on the drawings to be removed.

3.05 STRIPPING

A. Excavate topsoil from areas to be built upon, cut or filled, or to have surface improvements, including roadways and walks.

B. Stockpile topsoil on-site and protect from erosion.

C. Excess topsoil, if any, shall be removed from the site and disposed of at CONTRACTOR's expense.

END OF SECTION

SECTION 02222

EXCAVATION, FILL, BACKFILL, AND GRADING

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Excavating, filling, backfilling, and grading for this work includes, but is not necessarily limited to:
   1. Excavating for footings, foundations, roads, and utilities.
   2. Placing and compacting all fill and backfill.
   3. Placement of crushed stone mat below tank slabs and manhole/vault slabs or other structures where required.
   4. Rough and finish grading prior to paving, seeding, etc.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

C. Allowances: CONTRACTOR shall INCLUDE in the Bid the cost of removing, hauling, and disposing of in a licensed landfill 630 tons of excavated solid waste fill material as defined in this section. The cost shall include excavation, any testing required by the landfill, transportation, additional safety considerations, and disposal fees. Payment for fill material excavation and disposal will be adjusted, add or deduct, based upon the actual amount of fill material excavation and disposal (more or less than 630 tons) and the Unit Price for Excavation and Disposal of Solid Waste Fill Materials. Landfill tonnage shall be based on weight tickets. Copies of all weight tickets for landfilled material shall be provided to OWNER for documentation purposes to calculate actual quantities. Weight tickets shall be duly and accurately completed. Weight tickets with incomplete or illegible information shall not be acceptable.

D. Payment:
   1. General excavation shall include all excavation specified, undercutting, fill, backfill, and grading, including rock excavation.
   2. All general excavation shall be included in the Lump Sum Bid. Changes which require additions to or deductions from the excavation will be adjusted on the basis of the unit price for changes contained in the Contract.

1.02 REFERENCES

A. ASTM C33–Standard Specification for Concrete Aggregates.

B. ASTM D698–Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

C. ASTM D1557–Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

D. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the State of Kentucky, Transportation Cabinet, Department of Highways, Standard Specifications for Road and Bridge Construction, current edition, including all issued supplemental specifications. Unless specifically stated otherwise, the Measurement and

Payment sections of the Standard Specifications shall not apply. Measurement and payment will be made in accordance with terms of the Contract Documents.

1.03 SUBMITTALS

A. CONTRACTOR shall submit samples of materials proposed for use as fill to soils testing laboratory for analysis of their suitability and for recommendations on moisture content during compaction, compaction methods, or other appropriate information.

B. CONTRACTOR shall submit sufficient samples of each different type or classification of soil to obtain representative values.

1.04 JOB CONDITIONS

A. The elevations shown for existing work and ground are reasonably correct, but are not guaranteed to be absolutely accurate. No extras will be allowed because of variations between drawings and actual grades.

B. Soil test pits were dug and the soils information is included in an Appendix to these Specifications. The information contained is not guaranteed to be indicative of conditions to be encountered during construction. It is CONTRACTOR's responsibility to make its own investigations to determine physical conditions at the site, which may affect the work.

PART 2–PRODUCTS

2.01 COMPACTED FILL

A. Shot Rock Fill: Durable limestone material with a maximum particle size of 8 inches in any dimension (4 inches for top layer between bottom of foundation and subgrade). Shot rock fill shall contain a blend of particle sizes (OWNER provided, crushed and hauled by CONTRACTOR, see Section 01010).

B. Quarry Screenings: Screenings with the following gradation:

Sieve Size	Percent Passing
3/8 inch	100
No. 4	91 to 95
No. 8	56 to 70
No. 16	35 to 57
No. 30	24 to 45
No. 50	18 to 33
No. 100	15 to 25
No. 200	13 to 20

2.02 CRUSHED STONE MAT

A. Crushed stone mat below foundation slabs and footings shall be 1-inch clear crushed stone and shall meet all requirements for No. 57 of Section 805 of Standard Specifications.

2.03 EMBANKMENT FILL

A. Embankment fill shall contain no stumps, brush, rubbish, or other perishable material. The top 12 inches of the earth embankment shall be earthy material free from large stones.

2.04 CONCRETE FILL

A. Concrete fill shall be Class X concrete as defined in Section 03300–Cast-In-Place Concrete, or flowable fill as defined in this section.

2.05 CLAY FILL

A. Clay fill shall contain at least 25% clay minerals (material finer than 0.002 mm).

PART 3–EXECUTION

3.01 GENERAL

A. Prior to all Work, CONTRACTOR shall become thoroughly familiar with the site and site conditions.

B. Prior to filling site, solid waste fill material shall be removed per allowance.

C. Large rock pieces existing on site shall be crushed to acceptable sizes in accordance with specifications to be used in fill or shall be wasted in nonstructural fill areas on site.

B. Site is to be filled to subgrade per the specifications with OWNER-provided material, surcharged by 4 feet for two to four months. Settlement will be monitored by ENGINEER. After desired settlement is achieved, surcharge is to be removed and reused on site and final grading, excavation, and fill is to take place.

3.02 PROTECTION

A. CONTRACTOR shall provide all necessary sheeting, shoring, or other soil retention systems including all labor, material, equipment, and tools required, or as necessary to maintain the excavation in a condition to provide safe working conditions, to permit the safe and efficient installation of all items of Contract work, and to protect adjacent property. CONTRACTOR shall be held liable for any damage which may result to property from excavation or construction operations. Sheeting, shoring, and other soil retainage systems shall be withdrawn or removed in a manner so as to prevent subsequent settlement of structures, utilities, and other improvements.

B. Design of sheet piling and other soil retaining systems shall be the sole responsibility of CONTRACTOR. Where such systems are shown on the drawings, no parameters such as embedment depth, section profile, presence or lack of whalers, etc., or system type or suitability shall be inferred. CONTRACTOR is responsible for designing and providing a fully functional system compatible with construction and site requirements.

C. Nothing in this specification shall be deemed to allow the use of protective systems less effective than those required by the Occupational Safety and Health Administration (OSHA) and other applicable code requirements.

3.03 UTILITIES

A. Before starting excavations, CONTRACTOR shall locate existing underground utilities in all areas of the work.

B. If utilities are to remain in place, CONTRACTOR shall provide adequate means of protection during earthwork operations.

C. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult utility owner immediately for directions.

D. Cooperate with OWNER and utility companies in keeping respective services and facilities in operation and repair any damaged utilities to satisfaction of utility owner.

E. CONTRACTOR shall not interrupt existing utilities serving facilities occupied and used by OWNER or others, except when permitted in writing by OWNER.

F. CONTRACTOR shall demolish and completely remove from the site existing underground utilities indicated to be removed after utility has been capped and sealed.

G. CONTRACTOR shall accurately locate and record abandoned and active utility lines rerouted or extended on project record drawings.

3.04 FINISH ELEVATIONS AND LINES

A. CONTRACTOR is responsible for setting and establishing finish elevations and lines.

3.05 EXCAVATION

A. After the site has been cleared and stripped, the site shall be cut and filled to the indicated subgrade as shown or specified.

B. All excavated material that does not meet the specification for compacted fill or embankment fill or meets the specification but is not required for backfill or fill shall be classified as excess material and shall be removed from the site and disposed of at CONTRACTOR's expense.

C. All material other than suitable bearing soil or bedrock, as determined by the Project Soils Engineer, shall be removed from under concrete to be poured on ground.

D. Excavation for all footings, foundation walls, pits, etc. shall be large enough to provide adequate clearance for the proper execution for the work within them.

E. No footings or slabs shall bear on the top 2 feet of existing soil. Where planned subgrade is within 2 feet of existing grade, remove soils to 2 feet below existing grade and backfill with compacted fill up to subgrade elevation.

F. When excavations reach subgrade elevations as shown on the drawings, or as specified herein, the Project Soils Engineer will observe the bottom material. Where, in the opinion of the Project Soils Engineer, unsuitable foundation material is found at the level of the subgrade, original material below the excavation necessary for construction according to

grades shown or specified shall be removed and replaced with material and placing methods as specified under compacted fill and backfill.

G. Excavations that are undercut beneath the foundation shall extend beyond the perimeter of the foundation one foot plus a distance at least equal to the depth of undercut below footing grade.

H. CONTRACTOR shall backfill and compact all overexcavated areas.

3.06 PREPARATION OF SUBGRADE

A. After the site has been cleared and stripped, fill site to subgrade elevation in accordance with the requirements specified for compacted fill below. Shot rock or No. 2 stone shall be used to elevation 909.5 or the first 2 feet above existing grade, whichever is higher. The remainder can be either shot rock fill or quarry screenings.

B. An additional 4 feet of fill material shall be placed to surcharge the site at the following locations:
   1. Salt barn building location: Five feet beyond the exterior of the foundation, approximately 107 feet by 179 feet (to be confirmed with building shop drawings).
   2. Brine tanks: 93 feet 4 inches by 32 feet.

C. Once the surcharge material is placed, ENGINEER will monitor settlement for one to four months.

D. After desired consolidation has occurred, the additional 4 feet of material shall be removed and used on-site as fill.

E. All slab-on-grade and road subgrades shall be proofrolled with a heavy rubber-tired construction vehicle (such as a fully loaded tandem-axle dump truck) in the presence of the Project Soils Engineer after completed surcharging.

3.07 COMPACTED FILL AND BACKFILL

A. All fill and backfill, except as otherwise specified, shall be compacted fill placed to within 12 inches of the bottom of the topsoil or 4 inches to the bottom of the structure or other improvement.

B. Unless otherwise noted, structures with a top slab shall not be backfilled until the slab is in place and has reached its specified 28-day strength.

C. In fill areas above existing grade around structures, compacted fill shall be placed within a minimum of 10 feet from the structure.

D. No fill shall be placed under water or over unsuitable subgrade conditions.

E. All fill and backfill except embankment fill and clay fill shall be compacted as follows:
   1. Shot Rock Compaction: All compacted material shall be placed in uniform layers not exceeding 16 inches in loose thickness prior to compaction. Each layer shall be uniformly compacted with a compactor and finish-rolled with a loaded scraper or haul trucks. Compaction shall be obtained by compaction equipment appropriate for the conditions as recommended by the Project Soils Engineer.

2. Quarry Screenings Compaction: All compacted material shall be placed in uniform layers not exceeding 8 inches in loose thickness prior to compaction. Each layer shall be uniformly compacted to a dry density of at least 98% of the maximum dry density as determined by a laboratory compaction test within ±2% of the optimum moisture content (ASTM Designation D698). Compaction shall be obtained by compaction equipment appropriate for the conditions.

F. No frozen material shall be placed nor shall any material be placed on frozen ground.

G. Twelve inches of clay fill shall be placed and compacted to at least a firm consistency in areas to be seeded or sodded prior to placement of topsoil.

3.08 EMBANKMENT FILL

A. Embankment fill may be placed in fill areas to be seeded or sodded if no piping exists in the fill and the areas are at least 10 feet from any structure.

B. Embankment fill shall be deposited, spread, and leveled in layers generally not exceeding 12 inches in thickness before compaction. Each layer shall be compacted to the degree that no further appreciable consolidation is evidenced under the action of the compaction equipment. The required compaction shall be obtained for each layer before any material for a succeeding layer is placed thereon. Compaction shall be obtained using the hauling and leveling equipment and, in addition, tamping rollers, pneumatic-tired rollers, vibratory rollers, or other types of equipment required to produce the desired results.

3.09 CONCRETE FILL

A. In areas where there is inadequate room for compaction equipment and in other areas as shown or specified, Class X concrete shall be used as fill material.

3.10 GRADING

A. CONTRACTOR shall perform all rough and finish grading required to attain the elevations shown on the drawings.

B. Grading Tolerances:
1. Rough grade: Buildings, parking areas, and sidewalks ±0.1 feet.
2. Finish grade: Granular cushion or crushed stone mat under concrete slabs ±0.03 feet.
3. Lawn areas away from buildings, parking areas, and sidewalks ±0.25 feet.

3.11 PLACING CRUSHED STONE AND GEOTEXTILE FABRIC

A. The same day that the subgrade is exposed, place geotextile fabric on subgrade, and place 12 inches of crushed stone mat below tank slabs and manholes. Compact in place.

B. Geotechnical fabric shall extend up the side edge of the stone mat and extend across the top of the stone to a minimum of 12 inches past the edge of base slab.

3.12 COMPACTION TESTING

A. Compaction tests shall be done by the Project Soils Engineer. Location and frequency of the tests shall be as recommended by the Project Soils Engineer and paid for by OWNER.

3.13 EXCAVATED SOLID WASTE FILL MATERIALS TO BE LANDFILLED

A. If any solid waste fill materials are encountered, they shall be excavated and removed to a licensed sanitary landfill. Solid waste fill material is defined as any construction or demolition debris, household refuse, glass, metal, plastic, or similar material not native to the site but having been placed on-site during past filling operations and mixed with soil. Allowance as specified shall apply.

END OF SECTION

SECTION 02240

GEOTEXTILES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Geotextiles for areas below structures, at perforated drain pipe trenches, below base course, and below riprap.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

PART 2–PRODUCTS

2.01 MATERIALS

A. Geotextile for use at perforated drain pipe trenches shall be Mirafi 140N, or equal.

B. Geotextile below riprap shall be Mirafi 180N, or equal.

C. Geotextile below base course shall be Mirafi 500X, or equal.

PART 3–EXECUTION

3.01 INSTALLATION

A. Geotextile shall be installed in accordance with manufacturer's recommendations.

B. Geotextile shall be lapped a minimum of 24 inches.

C. CONTRACTOR shall protect the construction fabric from exposure to the sun until installation. Construction fabric shall be covered with stone or soil immediately upon placement.

END OF SECTION

SECTION 02270

SLOPE PROTECTION AND EROSION CONTROL

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Erosion control devices.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 PAYMENT

A. All costs associated with slope protection and erosion control shall be included in CONTRACTOR's Bid. This work shall include, but is not limited to, erecting fence, excavation, placing posts, backfilling, attaching woven wire and geotextile fabric; placing ditch checks; installing sediment traps; for removing the fence at completion of project; for cleaning and repairing; for removing or spreading accumulated sediment to form a surface suitable for seeding; for replacing silt fence and damages caused by overloading of sediment material or ponding of water adjacent to silt fence; and for furnishing labor, tools, equipment, and incidentals necessary to complete the work in accordance with the Contract.

1.03 REFERENCES

A. Kentucky Best Management Practices for Construction Activity (Ky BMP).

1.04 REGULATORY REQUIREMENTS

A. CONTRACTOR is required to obtain any necessary federal, state, or local permits for erosion control. The permit requirements are CONTRACTOR's responsibility and shall be included in the prices Bid.

B. Comply with laws prohibiting pollution of any lake, stream, river, or wetland.

1.05 QUALITY CONTROL

A. Construct and maintain erosion sediment control measures in accordance with Ky BMP.

B. Check facilities weekly and after any rainfall event and make needed repairs within 24 hours.

PART 2–PRODUCTS

2.01 EROSION MATS

A. Uniform web of interlocking wood excelsior fibers with a net backing on one side. The wood from which the blanket is produced shall have been properly cured to achieve adequately curled and barbed fibers. The blanket shall be of uniform thickness with the

wood fibers evenly distributed over the entire area of the blanket. The blanket shall be furnished in rolled strips. The width of the strips shall be 48 inches ±1 inch. Weight of blanket measured under average atmospheric conditions shall be 78 pounds per 80 square yards ±10%. Net backing shall have mesh size not exceeding 1 1/2 by 3 inches and may be woven from twisted paper, cotton cord, a biodegradable plastic, or other alternate method. The blanket shall be nontoxic to vegetation.

2.02 SILT FENCE

A. Conform to Kentucky BMP as supplemented herein.

B. Use geotextile fabric consisting of either woven or nonwoven polyester, polypropylene, stabilized nylon, polyethylene, or polyvinylidene chloride with the following requirements. Fabric shall have the minimum strength values in the weakest principal direction. Nonwoven fabric may be needle-punched, heat-bonded, resin-bonded, or combination thereof.

VALUE MINIMUM REQUIREMENTS (1)

Test	Method	Silty Soils(4)	Sandy Soils(5)
Grab Tensile-Strength/ Strip-Breaking Force	ASTM D-5034, D5035(2)	100	100
Mullen Burst Strength (psi)	ASTM D-3786	200	200
Equivalent Opening Size	CW-02215-77	50-140	20-50
U.S. Standard Sieve	Corps of Engineers		
Water Flow Rate (gal/min/ft.^{2} at 50 MM Constant Head	ASTM D-4491(3)	10	10
Ultraviolet Radiation Stability (percent)	ASTM D-4355	90	90

(1) All numerical values represent minimum average roll values (i.e., the average of test results on any roll in a lot should meet or exceed the minimum values in the table.)
(2) ASTM D-5034 Grab Test and ASTM D-5035 Breakout Force and Elongation Strip Method, Method 16, using a 4-inch by 8-inch sample, 3-inch gauge length clamped in 1-inch by 2-inch long grip, tested at a strain rate of 12 inches/min.
(3) Water Flow Rate in gal/min/ft shall be determined by multiplying Permittivity in sec. as determined by ASTM D-4491 by a conversion factor of 74.
(4) Silty Soil: More than 15% by weight passing No. 200 sieve.
(5) Sandy Soil: Less than 15% by weight passing No. 200 sieve.

C. Furnish geotextile fabric in a wrapping which will protect the fabric from ultraviolet radiation and from abrasion because of shipping and handling. Keep geotextile dry until installed.

D. Provide posts, stakes, and wire reinforcement per Kentucky BMP standards.

2.03 GEOTEXTILE FABRIC–TYPE R

A. For subgrade reinforcement under riprap: Either woven or nonwoven polyester, polypropylene, stabilized nylon, polyethylene, or polyvinlidene chloride. Fabric shall have

the minimum strength values in the weakest principle direction. Nonwoven fabric may be needle-punched, heat-bonded, resin-bonded, or combination thereof.

B. Insect, rodent, mildew, and rot resistant.

C. Furnish in a wrapping which will protect fabric from ultraviolet radiation and from abrasion because of shipping and hauling. Keep geotextile dry until installed.

D. Clearly mark fabric rolls showing fabric type.

E. If sewn seams are used, furnish a field-sewn seam sample produced from the geotextile fabric and thread and with the equipment to be used on the project prior to installation.

F. Comply with the following physical properties:

Test	Method	Value
Grab Tensile Strength (lbs) Puncture Strength (lbs) using 5/16-inch Flat-tipped Rod	ASTM D-4632 Modified ASTM D-3787	200 min. 80 min.
Mullen Burst (lbs/in^2)	ASTM D-3786	250 min.
Elongation at Required Strength (percent)	ASTM D-4632	20 min.
Equivalent Opening Size (U.S. Standard Sieve)	ASTM D-4751	30 to140 min.
Water Flow Rate (gal/min/ft^2) at 50 mm Constant Head	ASTM D-4491	10 min.

2.04 STRAW BALE BARRIERS

A. Provide per Kentucky BMP standards.

PART 3–EXECUTION

3.01 GENERAL

A. Install devices before construction activities begin.

B. Proceed carefully with construction adjacent to stream channels to avoid washing, sloughing, or deposition of materials into the stream. If possible, the work area should be diked off and the volume and velocity of water that crosses disturbed areas be reduced by means of planned engineering works (diversion, detention basins, berms).

C. Unless noted on drawings, do not remove trees and surface vegetation.

D. Expose the smallest practical area of soil at any given time through construction scheduling. Make the duration of such exposure before application of temporary erosion control measures or final revegetation as short as practicable.

3.02 EROSION MAT INSTALLATION

A. Place erosion mat immediately after seeding or sodding operations have been completed. Before mat placement, remove all material or clods over 1 1/2 inches in diameter and all organic material or other foreign material which interfere with the mat bearing completely on the soil or sod.

B. Any small stones or clods which prevent contact of the mats with the soil shall be pressed in the soil with a small lawn-type roller or by other effective means. The mat shall have its lateral edge so impressed in the soil as to permit runoff water to flow over it.

C. The matting strips shall be rolled on or laid in direction of flow. Spread mat evenly, smoothly, in a natural position without stretching and with all parts bearing on soil and place blanket with netting on top. Overlap adjacent strips at least 4 inches. Overlap strip ends at least 10 inches. Make overlaps with the upgrade section on top.

D. Bury upgrade end of each strip of fabric or blanket at least 6 inches in a vertical slot cut in the soil and press soil firmly against the embedded fabric or blanket.

E. Anchor mats in place with vertically driven staples driven until their tops are flush with the soil. Space staples at 3-foot centers along mat edges and stagger space at 3-foot centers through the center. Place staples at 10-inch centers at end or junction slots.

F. Reseed areas damaged or destroyed during erosion mat placing operations as specified for original seeding.

G. Dispose of surplus excavated materials, and all stones, clods or other foreign material removed in the preparation of the seeded soil or sodded surface before placing mat.

H. Following mat placement, uniformly apply water to the area to moisten seedbed to 2-inch depth and in a manner to avoid erosion.

I. Maintain erosion mat and make satisfactory repairs of damage from erosion, traffic, fires or other causes until work acceptance.

3.03 GEOTEXTILE FABRIC–TYPE R

A. Before placing fabric, grade area smooth and remove stones, organic matter, or other foreign material which would interfere with fabric being completely in contact with soil.

B. Place fabric loosely and lay parallel to direction of water movement. Pinning or stapling is acceptable to hold geotextile in place. Overlap or sew together separate pieces of fabric. Overlap joints a minimum 24 inches in the flow direction. After placement, do not expose fabric more than 48 hours before covering.

C. Cover damaged areas with a patch of fabric using a 3-foot overlap in all directions.

3.04 SILT FENCE INSTALLATION

A. Erect silt fence before starting construction operations which might cause sedimentation or siltation at site of proposed silt fence.

B. Construct silt fence in an arc or horseshoe shape with ends pointing up slope. Construct silt fence to the dimensions and details shown on drawings. Remove silt fences after slopes and ditches have been stabilized and turf developed to the extent that future erosion is unlikely. Dispose of materials remaining after removal.

C. Inspect all silt fences immediately after each rainfall and at least daily. Correct deficiencies immediately. Where construction activity changes the earth contour and drainage runoff, make a daily review to ensure that silt fences are properly located for effectiveness. Where deficiencies exist, install additional silt fences.

D. Remove and dispose of sediment deposits. Sediment deposits remaining in place after the silt fence is no longer required shall be dressed to conform with the existing grade and the area topsoiled, fertilized, and seeded as required.

3.05 STRAW BALE BARRIERS

A. Provide as shown on the drawings and as necessary on ditch lines and other drainageways to minimize construction sediment laden runoff to downstream ditches and channels and into streams.

B. Inspect all barriers immediately after each rainfall and at least daily. Correct deficiencies immediately. Where construction activity changes the earth contour and drainage runoff, make a daily review to ensure that barriers are properly located for effectiveness. Where deficiencies exist, install additional straw bales.

C. Remove and dispose of sediment deposits. Sediment deposits remaining in place after the barrier is no longer required shall be dressed to conform with the existing grade and the area topsoiled, fertilized, and seeded as required.

END OF SECTION

SECTION 02510

ASPHALTIC CONCRETE PAVING

PART 1–GENERAL

1.01 SUMMARY

A. Work includes asphaltic concrete paving and tack coat.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

C. Payment: Payment for asphaltic concrete paving shall be considered incidental to the project and included in the lump sum bid.

1.02 REFERENCES

A. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the State of Kentucky Department of Transportation Construction and Material Specifications.

1.03 DEFINITIONS

A. Street or road shall include streets, roads, driveways, and parking lots.

1.04 SUBMITTALS

A. Prior to the commencement of paving, mix designs and aggregate sieve analysis shall be submitted to ENGINEER for approval in accordance with Section 01300–Submittals.

PART 2–PRODUCTS

2.01 ASPHALTIC CONCRETE PAVEMENT

A. Asphaltic material for surface course shall conform to the requirements of the Standard Specifications. The mixtures shall have been approved recently by the Kentucky Transportation Cabinet. Lift thickness, class, and polish-resistant aggregate designation shall be in accordance with the Kentucky Transportation Cabinet's Pavement Design Guide, unless otherwise stated.

B. Aggregate shall conform to the requirements of the Standard Specifications.

C. Materials for prime coat shall conform to the requirements of the Standard Specifications and shall be Primer L.

D. Material for tack coat shall conform to the requirements of Section 806 of the Standard Specifications.

E. Replacement of paved surfaces shall be in conformance with the plans, particularly Section B-B, in replacing excavated paved surfaces. Replaced concrete surfaces should be 6 inches in thickness or existing thickness, whichever is greater. Surface course shall be 1 1/2 inches minimum.

PART 3–EXECUTION

3.01 ALLOWABLE REMOVAL OF PAVEMENT

A. CONTRACTOR shall remove surface, as shown on the plans, as a part of the general excavation. The width of surface removed shall be the minimum possible and acceptable for convenient and safe installation of the barn foundations.

B. All bituminous and concrete pavement shall be cut on neat, straight lines and shall not be damaged beyond the limits of the excavation. Should the cut edge be damaged, a new cut shall be made in neat, straight lines parallel to the original cut encompassing all damaged areas. Pavement removal shall be extended to a seam or joint if seam or joint is within 3 feet of damaged pavement.

3.02 TACK COAT

A. All work shall be in accordance with the Standard Specifications.

B. If asphaltic surface course is applied to an existing street, the existing street surface shall be tack coated prior to surface paving. Prior to placement of tack coat, the streets shall be thoroughly cleaned and broomed. Tack coat shall be applied at a rate of 0.10 gallons per square yard immediately prior to placement of asphaltic surface course.

3.03 JOINTS

A. Joints between old and new pavements or between successive days' work shall be constructed and treated to ensure thorough and continuous bond between the old and new mixtures. Transverse construction joints shall be constructed by cutting the material back for its full depth to expose the full depth of the course. Where a header is used, the cutting may be omitted provided the joint conforms to the specified thickness. These joints shall be treated with tack coat material applied with a hose and spray nozzle attachment to fully coat the joint surface.

B. The longitudinal joint shall be made by overlapping the screed on the previously laid material for a width of not more than 2 inches and depositing a sufficient amount of asphaltic mixture so that the finished joint will be smooth and tight. Longitudinal joints in the surface course shall at no time be placed immediately over similar joints in the binder

course beneath. A minimum distance of 12 inches shall be permitted between the location of the joints in the binder course and the location of similar joints in the surface course above.

C. All costs for furnishing and applying tack coat to butt joints as specified above shall be considered incidental.

3.04 TESTING ASPHALTIC CONCRETE

A. ENGINEER may require samples of asphaltic concrete for testing. CONTRACTOR shall cut samples from the finished pavement where marked by ENGINEER and patch the sample area. Samples for sieve analysis and asphalt content will be taken by ENGINEER prior to placement.

3.05 ASPHALTIC PAVING

A. Asphaltic paving work shall include the construction of plant-mixed asphaltic concrete pavement in the areas shown on the drawings. All work shall be performed in accordance with the Standard Specifications.

B. Prior to commencement of paving operations, CONTRACTOR shall examine the finished road bed. CONTRACTOR shall notify ENGINEER of any areas of suspected instability.

C. The pavement structure for new roads shall be determined from the standard cross sections provided on the drawings.

END OF SECTION

SECTION 02521

CONCRETE CURB

PART 1–GENERAL

1.01 SUMMARY

A. Work includes concrete curb and gutter, sidewalks, and driveway aprons as shown on the drawings.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 REFERENCES

A. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the State of Kentucky Department of Highways, Standard Specifications for Road and Bridge Construction, current edition, including all issued supplemental specifications. Unless specifically stated otherwise, the Measurement and Payment sections of the Standard Specifications shall not apply. Measurement and payment will be made in accordance with terms of the Contract Documents.

B. AASHTO M148 Standard Specifications for Liquid Membrane–Forming Compounds for Curing Concrete.

1.03 QUALITY ASSURANCE

A. Unless otherwise specified, all curb and gutter, sidewalks, and driveway apron construction shall meet the requirements of the Standard Specifications.

PART 2–PRODUCTS

2.01 CONCRETE

A. Concrete for curb and gutter shall be Class A conforming to Section 601 of the Standard Specifications.

2.02 CURING COMPOUND

A. Liquid curing compounds shall conform to the requirements for Liquid Membrane-Forming Compounds for Curing Concrete, AASHTO Designation M148, Type 2, White Pigmented.

PART 3–EXECUTION

3.01 BASE PREPARATION–CURB AND GUTTER

A. The base course beneath the curb and gutter shall be trimmed or filled as necessary to provide a full depth of curb and gutter. Prior to placement of concrete, the base shall be thoroughly compacted and moistened.

3.02 BASE PREPARATION–SIDEWALKS AND DRIVEWAYS

A. The subgrade shall be thoroughly compacted and finished to a trim, firm surface. All soft or unsuitable material shall be removed and replaced with suitable material.

B. A minimum 4-inch-thick layer of sand, sand and gravel, or base course shall be placed under all sidewalks. This material shall be thoroughly moistened and compacted before the concrete is placed.

3.03 FORMS

A. Forms shall be of metal and of sufficient strength to resist distortion or displacement. Metal forms shall be used to construct a curb and gutter cross section as shown on LFUCG Standard Drawing 301. Forms shall be full depth of the required work. Facing boards, if used, shall be built so as to obtain the cross section called for on the drawings. Forms shall be securely staked and held firmly to line and grade. Forms shall be cleaned thoroughly and oiled before reuse.

B. All curved curb and gutter shall form smooth curves and shall not be a series of chords. Radius forms shall be used for all curved curb and gutter where the radius of curvature is 100 linear feet or less.

3.04 PLACING AND FINISHING CONCRETE

A. Unless otherwise specified, concrete shall be placed in accordance with Section 03300-Cast-in-Place Concrete.

B. Concrete shall be thoroughly tamped to remove all voids. The exposed surfaces of the curb and gutter shall be thoroughly troweled and finished with a brush at right angles to the line of the curb and gutter. The back edge of the curb, the edge of the gutter adjacent to the pavements, and edges adjacent to expansion joints shall be rounded with a 1/4-inch-radius edger. Honeycombed areas along the back of the curb shall be pointed with mortar.

C. Before final finishing of curb and gutter, a 10-foot straight edge shall be used to check the surface. Any areas showing a variation of more than 1/4 inch from the straight edge shall be corrected. Final finishing shall be delayed a sufficient time so that excess water and grout will not be brought to the surface.

D. Concrete for sidewalk shall be placed to a minimum thickness of 5 inches except at driveways and alleys which shall have a minimum thickness equal to the driveway. Driveways shall have a minimum thickness of 6 inches. The concrete shall be thoroughly spaded and tamped to remove all voids. The surface of the driveway or sidewalk shall be thoroughly troweled and finished with a brush at right angles to the driveways or sidewalk line.

3.05 MACHINE FORMED CURB AND GUTTER

A. CONTRACTOR may elect to use a machine for placing, forming, and consolidating concrete curb and gutter. If a machine is used, the resulting curb and gutter shall be of such a quality as to equal or exceed that produced by the method described above.

3.06 DRIVEWAY OPENINGS

A. Driveway openings will be staked by ENGINEER or OWNER in the field. The details for curb and gutter through a driveway is shown on LFUCG Standard Drawing 307-1.

3.07 REJECT SECTIONS

A. At locations shown on the drawings, the curb and gutter shall be warped so as to reject the flow of water. The transition from a standard section to a reject section shall not be abrupt but shall be a minimum of 10 feet in length. The reject section shall conform to the detail shown on the Drawings.

3.08 JOINTING–CURB AND GUTTER

A. A 3/4-inch expansion joint filler shall be placed through the curb and gutter at the radius points of all intersection curbs. This expansion joint filler shall extend through the entire thickness of concrete and shall be perpendicular to the surface and at right angles to the line of the curb and gutter.

B. At intervals of not more than 10 feet, a contraction joint shall be tooled to a depth of one-fifth of the total concrete thickness with a 1/4-inch radius jointer. The contraction joint shall be at right angles to the line of the curb and gutter.

C. If machine-formed curb and gutter is provided by CONTRACTOR, CONTRACTOR shall create a plane of weakness at all joints that is sufficient to cause contraction cracking at the joints.

D. CONTRACTOR may saw contraction joints. The depth of cut shall be a minimum of one-fifth of the total concrete thickness. Sawing shall be done as soon as practicable after the concrete has set sufficiently to preclude raveling during the sawing and before any shrinkage cracking takes place in the concrete. If this method results in random cracking, CONTRACTOR will be required to tool the contraction joints as specified above.

E. The use of steel separator plates will not be allowed.

F. Jointing shall be included in the price bid for curb and gutter.

3.09 JOINTING–SIDEWALKS AND DRIVEWAYS

A. Concrete sidewalk shall be cut into rectangular blocks approximately 5 feet long. The cut must extend at least one-fifth of the total thickness of concrete. The edges of the sidewalk along forms and joints shall be rounded with an edging tool of 1/4-inch radius. All joints shall be at right angles to the centerline of the sidewalk.

B. Concrete driveways shall be jointed in approximately square sections. The depth of the joint and the finishing of the edges shall be the same as for concrete sidewalk.

3.10 EXPANSION JOINTS

A. A 1-inch-thick expansion joint filler shall be placed between curb ramps and back of curb.

B. A 3/4-inch-thick expansion joint shall be placed at all sidewalk corners, between sidewalks and buildings, and between back of curb and sidewalk.

3.11 SLOPE

A. Sidewalk cross slope shall be 1/4 inch per foot unless otherwise noted in the drawings or requested by ENGINEER.

3.12 CURB RAMP

A. Curb ramps shall be constructed in accordance with the Drawings.

3.13 INLET CASTING ADJUSTMENT

A. Inlet casting shall be adjusted to grade as required for the installation of the new curb and gutter. Inlet casting backs shall be adjusted for a depressed flow line at all inlets in the low points (0.72 feet). All other inlets shall be adjusted for a normal flow line (0.50 feet).

3.14 UTILITY MARKINGS

A. The ends of utility service lines (sewer, water, and electrical conduits) shall be marked during installation. The curb top shall be marked immediately adjacent to these utility markers. Curb markers shall be 2 inches in height and shall consist of a "W" for water, "S" for sewer, and "E" for electric and blank conduits. Markings shall be embossed a minimum of 1/4 inch deep and be 3/8 inches thick. Utility markings shall be considered incidental work to curb and gutter.

3.15 CURING

A. As soon after finishing operations as the free water has disappeared, the concrete surface shall be sealed by spraying on it a uniform coating of curing material in such a manner as to provide a continuous water impermeable film on the entire concrete surface.

B. The material shall be applied to form a uniform coverage at the rate of not less than one-half gallon per 100 square feet of surface area.

C. Within 30 minutes after the forms have been removed, the edges of the concrete shall be coated with the curing compound applied at the same rate as on the finished surface.

3.16 PROTECTION OF CONCRETE

A. CONTRACTOR shall erect and maintain suitable barricades to protect the new concrete. Where it is necessary to provide for pedestrian traffic, CONTRACTOR shall, at his own cost, construct adequate crossings. Crossing construction shall be such that no load is transmitted to the new concrete.

B. Any part of the work damaged or vandalized prior to final acceptance shall be repaired or replaced at the expense of CONTRACTOR in a manner satisfactory to ENGINEER.

C. Pedestrian traffic shall not be permitted over new concrete prior to 72 hours after application of curing material. Vehicular traffic shall not be permitted over newly placed concrete within seven days after completion when temperatures are 70°F or higher,

10 days when temperatures are not lower than 60°F, and up to a maximum of 21 days when the temperatures are generally lower than 60°F.

END OF SECTION

SECTION 02600

BURIED PIPING AND APPURTENANCES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. All underground piping and valves of every description.
   2. Excavation, dewatering, and backfilling for all work under this section unless otherwise noted.
   3. Underground piping connections to all equipment, whether furnished under this section or not.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern Work in this section.

1.02 REFERENCES

A. Standard Specifications: Unless otherwise indicated, Standard Specifications within this section shall refer to the Kentucky Transportation Cabinet, Department of Highways, *Standard Specifications for Road and Bridge Construction*.

B. Plumbing Code: Unless otherwise indicated, plumbing code within this section shall refer to the Kentucky State Plumbing Law, Regulations and Code.

C. Ten State Standards.

D. Kentucky Division of Water Code.

E. LFUCG technical manuals, including standard detail drawings.

1.03 SUBMITTALS

A. Shop Drawings:
   1. See Section 01300–Submittals for shop drawing submittal procedures.
   2. General arrangement drawings of belowground piping shall be submitted to ENGINEER for approval. Drawings shall include proposed materials, length, location, and elevation of pipe, fittings, pipe restraint, valves, and appurtenances.

PART 2–PRODUCTS

2.01 MATERIALS OF CONSTRUCTION

A. All materials used in the manufacture, assembly, and painting of piping and valves in contact with water shall be compatible with potable water supplies. All glues, solvents, solders, etc., shall likewise be compatible. For instance, no lead-base solders shall be used. All materials in contact with water to be used for potable water supplies shall be National Sanitation Foundation (NSF)-approved.

B. Size and Type:
   1. All materials shall conform to the size and type shown on the drawings or called for in the specifications.
   2. In joining two dissimilar types of pipe, standard fittings shall be used when available. In the event standard fittings are not available, the method of joining shall be standard selected by CONTRACTOR and submitted for review by ENGINEER.

C. Piping appurtenances shall be made of the materials specified. All appurtenances not designated as to type shall be selected by CONTRACTOR and submitted for review by ENGINEER.

2.02 MANHOLES AND UNDERGROUND UTILITY STRUCTURES

A. General: All provisions of LFUCG standard details referred to in Drawings shall apply to manholes.

B. Unless otherwise specified or shown on the drawings for special manholes, all manholes shall be reinforced concrete precast manholes. Reinforced concrete manhole base sections, riser sections, cones, and flat slabs shall conform to the requirements of ASTM C478. Solid precast manhole bottoms shall be provided. Manholes shall be provided with minimum diameters as shown in the Drawings. Diameters shall be increased from the minimum for the following:
   1. To provide between adjacent pipe a minimum distance equal to one-half the outside diameter of the largest pipe measured circumferentially along the inside face of the manhole.
   2. To accommodate flexible manhole connections used.
   3. To accommodate multiple valves or valve assemblies.

C. Manhole top sections shall be precast reinforced eccentric cones unless precast reinforced flat slabs are specifically required or shown on the drawings or are necessary because of shallow depth. Flat slabs shall have opening offset unless otherwise required or shown. Flat slabs shall be designed for HS20 loadings.

D. Unless otherwise specified or shown on the drawings, all underground utility structures shall be precast, reinforced concrete. Reinforced concrete base sections, riser sections, and flat slabs shall conform to the requirements of ASTM C858. Flat slabs shall be designed for HS20 loadings. Solid precast bottoms shall be provided unless otherwise shown on the drawings. If CONTRACTOR chooses to provide cast-in-place structures, provisions of Division 3 shall apply. CONTRACTOR shall be responsible for design by professional engineer.

E. Manhole and underground utility structure sections shall be provided in such combinations as to conveniently make up the required depth of the manholes or structure. A maximum of two handling holes per manhole section and four handling holes per utility structure section will be permitted. All joints shall be tongue and groove and shall be sealed with rubber O-ring gaskets of circular cross section or mastic compounds. Gaskets shall conform to ASTM C443. Mastic compounds shall be Ram-nek, Kent-Seal, Mas-stik, or equal.

F. Except as otherwise specified, connection of pipes to manholes and underground utility structure shall be with Kor-N-Seal, A LOK, Interpace, PS-X, or equal joint. The joint shall provide a flexible, watertight connection between pipe and manhole. Manhole connections for storm sewer mains and leads may be made with poured-in-place concrete during completion of manhole interior in lieu of above.

G. Steps:
   1. Manhole and underground utility structure steps shall be provided as shown in the LFUCG standard details referenced in the drawings and shown by manhole manufacturer. Manhole steps shall be M.A. Industries, Inc. PS1-PF with 1/2-inch-diameter steel reinforcing rod, conforming to ASTM A615, Grade 60, with molded copolymer polypropylene covering conforming to ASTM D4101, Type PP200B33450Z02, or equal.
   2. Steps shall be inserted in manhole riser, cone, and flat slab sections prior to the initial set of the concrete in accordance with ASTM C478 and shall have maximum embedment and pullout resistance in accordance with ASTM C478.
   3. The top step shall be located 18 inches or less from the top of the manhole cone section or uppermost underground utility structure section. Steps shall be a maximum 16 inches apart.

H. Frames and Covers:
   1. Frames and covers shall be provided for the openings indicated on the drawings.
   2. For standard manholes, frames shall be Neenah R-1550, or equal, with Type B lid, as shown on LFUCG Standard Drawing 220.

I. Storm sewer manholes, drop box inlets and curb inlets shall be constructed as shown on the Drawings. Except as otherwise specified, manhole covers shall be as shown on LFUCG Standard Drawing 103 with self-sealing gaskets.

J. Curb inlets in standard curb and gutter sections shall be Neenah R-3067, or equal, with Type C reversible grate. Manhole connections for storm sewer mains shall be made with poured-in-place concrete during completion of the manhole.

2.03 BURIED PIPING

A. Reinforced Concrete Sewer Pipe:
   1. Reinforced concrete pipe for storm sewer (STS) shall meet the requirements of ASTM C76 for circular pipe. Strength and class of the pipe shall conform to the drawings and as specified herein. All reinforced concrete pipe used in the work shall be of adequate strength to support the trench loads applied. Unless otherwise shown or specified, all reinforced concrete pipe shall be Class IV minimum.
   2. Standard and special fittings shall be of approved manufacturer and shall conform to requirements of the trade and these specifications. All fittings shall be of a strength at least equal to that of the sewer main and shall be jointed with the same type of joint as used in the sewer main.
   3. Not more than one lift hole per length of pipe shall be used in storm sewer.

4. Reinforced concrete pipe and fittings shall be joined with joints and gaskets that meet the requirements of ASTM C443. Gaskets for storm sewer shall be Tylox, or equal. All pipe shall be specifically built to fit the gasket used. Provide precast concrete endwalls on all storm sewers.

B. Perforated Pipe: Foundation drain piping shall be perforated corrugated polyethylene tubing with integral filter fabric. Size shall be as shown on drawings, minimum 6-inch diameter. Piping shall meet requirements of ASTM F405. Provide all required bends, adapters, couplings, risers, cleanout covers, etc. See detail on drawings for laying conditions. Fabric shall be installed in accordance with manufacturer's instructions. Minimum lap shall be 18 inches. All laps shall be tacked or pinned to prevent separation during installation.

2.04 CONCRETE

A. All concrete poured under this Contract, unless shown or specified otherwise, shall conform to the requirements of Division 3.

PART 3–EXECUTION

3.01 INSTALLATION

A. Underground Piping:

1. Except where noted or specified, reinforced concrete pipe shall be installed in accordance with ASTM C12.
2. Plumbing system shall be installed and tested in accordance with local and state plumbing code requirements and applicable portions of the Kentucky Building Code. Where requirements conflict, the stricter standard shall apply.
3. CONTRACTOR shall excavate and lay all pipe to the line and grade shown on the drawings with bell ends uphill wherever possible. If not possible, CONTRACTOR shall excavate and lay pipe to the line and grade shown on the drawings with bell ends in the direction of laying. Grade stakes will be required for all lines. Water piping shall have a minimum of 3 feet of cover. Unless shown otherwise, drainage piping shall clear floor slabs or footings by a minimum of 6 inches.
4. Where piping is laid in native soil, the width of trench below the top of the pipe shall not exceed the nominal diameter of the pipe plus 2 feet for all pipelines. Where the maximum trench width is exceeded, the pipe shall be placed in a concrete cradle or a stronger pipe used. If the maximum trench width is exceeded for any reason other than as otherwise specified, the concrete cradle or the stronger pipe shall be placed at CONTRACTOR's expense, unless CONTRACTOR can demonstrate that the pipe to be used is compatible with the resulting load applied.
5. Except as otherwise specified, all underground pipe shall be bedded in crushed stone or crushed gravel aggregate. PVC or other thermoplastic pressure piping may be bedded in compacted sand. Perforated piping shall be bedded with #57 stone material as shown on the drawings. Piping shall be placed using bedding details referenced in the Drawings. CONTRACTOR shall perform all necessary excavation and shall provide all required materials to provide this bedding. Bedding material shall conform to the requirements of ASTM C33. The material shall be hard, tough, and durable and shall meet the following gradation requirements:

PERCENTAGE BY WEIGHT PASSING

	Crushed Stone Aggregate	Crushed Stone Chips	Crushed Gravel Aggregate	Bedding Sand
1 inch	100	---	100	---
3/4 inch	90 to 100	---	90 to 100	---
1/2 inch	---	100	---	---
3/8 inch	20 to 55	90 to 100	20 to 55	100
No. 4	0 to 10	---	0 to 10	95 to 100
No. 8	0 to 5	0 to 15	0 to 5	80 to 100
No. 30	---	0 to 5	---	25 to 60
No. 100	---	---	---	5 to 20
Passing No. 200	---	---	---	2 to 10

6. Gradation No. 9, 68, or 57 conforming to the Standard Specifications for rigid pipe such as ductile iron or concrete.
7. Gradation No. 9 conforming to the Standard Specifications for flexible pipe such as PVC.
8. Sand, as required, shall conform to Section 804.07 of the Standard Specifications.
9. CONTRACTOR shall furnish ENGINEER with a sieve analysis of the bedding material for approval prior to construction.
10. No materials native to the trench shall be used as bedding material unless they meet the above specifications.
11. Immediately before placing the pipe, bedding shall be shaped by hand to fit the entire bottom quadrant of the pipe between bell holes. Bell holes shall be large enough to permit proper making of the joint but not larger than necessary to make the joint. All adjustments to line and grade must be done by scraping away or filling in bedding under the body of the pipe. Bedding must be tamped into place. If necessary to obtain uniform contact of the pipe with the bedding, a template shall be used.
12. Any pipe or fittings cracked in cutting or handling or otherwise not free from defects shall not be used. Pipe must be kept clean of mortar, cement, clay, sand, or other material. When PVC piping is installed during hot weather, it shall be laid in the trench with slack or permitted to cool to ground temperature before it is cut to length for making final connections. PVC expansion joints shall be provided where needed.
13. Trenches shall be kept water-free and dry during bedding, laying, and jointing. CONTRACTOR shall provide, operate, and maintain all pumps or other equipment necessary to drain and keep all excavation pits and trenches and the entire subgrade area free from water under any and all circumstances that may arise.
14. Material that is to be placed from the bedding material around and to 1 foot above the top of all pipes shall be termed cover material. Except as otherwise specified, (a) cover material shall consist of durable granular particles ranging in size from fine to coarse in a substantially uniform combination, (b) unwashed bank-run sand and crushed bank-run gravel will be considered generally acceptable for cover material, (c) no stones larger than 3/4 inch in their greatest dimension shall be allowed in the cover material, and (d) native materials may be used if they conform to the above specifications. Cover material for PVC pressure or other thermoplastic piping may be sand. Cover material for perforated piping shall be washed stone material as shown on the drawings.
15. Cover material shall be deposited in the trench for its full width on each side of the pipe, fittings, and appurtenances simultaneously. Cover material shall be placed over the top of the pipe to the height required by the details referenced in the Drawings. This backfill shall be placed by hand in 6-inch layers and shall be compacted using hand tamping bars and/or mechanical tampers. If bedding material conforming to any of the above three crushed stone or crushed gravel gradations is used as cover material, it need not

be tamped. The remaining 6 inches to make up the required 1 foot of select cover material shall be granular material specified previously with no stones larger than 3/4 inch.

16. All cover material shall be placed in maximum 6-inch layers and compacted by hand tamping. Compaction shall be equivalent to that described under "Compacted Fill and Backfill" as specified in Section 02222–Excavation, Fill, Backfill and Grading.
17. Except as otherwise specified, all backfill above 1 foot above the pipe shall be "Compacted Fill and Backfill" as specified in Section 02222–Excavation, Fill, Backfill and Grading. In areas underneath concrete, asphalt, or other hard surface pavement, the cover material shall extend from the bedding material up to the final subgrade elevation.
18. The locations and elevations of existing piping and manholes are approximate. Where necessary, existing piping shall be exposed by CONTRACTOR to confirm location and elevation before installing new piping. Any changes in pipe location or elevation shall be approved by OWNER.
19. General Excavation:
    a. CONTRACTOR shall do all excavation, undercutting, dewatering, and backfilling necessary for work under this contract unless otherwise noted. All trees, shrubs, and improved areas outside the excavation shall be protected from damage.
    b. Work shall conform to other sections of Division 2, except where modified by this section.
    c. Pipe shall be placed only on dry foundations. No extra payment will be made to CONTRACTOR for dewatering.
    d. Excavation shall include all necessary clearing of excavated areas, tree removal, all grubbing, all wet, dry, fill, and rock excavation, the removal of pavement, filling, and all incidental work such as tunneling, sheet piling, shoring, underpinning, pumping, bailing, transportation, and all fill and backfilling. All above work shall be included in the Lump Sum Bid.
    e. CONTRACTOR shall excavate whatever materials are encountered as required to place at the elevations shown, all pipe, manholes, and other work as required to complete the project as shown. The bottom of the excavation shall be leveled off, all loose and disturbed soil shall be removed, and it shall be hand-tamped prior to pipe, manhole, etc., installation. Where requested by ENGINEER, original material below the excavation necessary for construction according to grades shown or specified shall be removed and replaced in accordance with Section 02222–Excavation, Fill, Backfill and Grading. Payment will also be in accordance with Section 02222–Excavation, Fill, Backfill and Grading.
    f. The excavation at the crossing of all underground utility services in place shall be as narrow as practicable. All underground services shall be protected from damage and maintained in service at their original location and grade during the process of the work. Any damage to underground services shall be replaced or repaired at no cost to OWNER or to the owner of the service. The present underground services shown on the drawings are located in accordance with available data. Encountering these services at a different location or encountering services not shown shall not release CONTRACTOR from the above-stated conditions.
    g. Excavated native material that is unsuitable or not required for filling shall be removed from the site. Materials to be used for fill and suitable for this purpose shall be deposited where required except that no fill shall be placed where trenches for sewers, water lines, or other services will be located until after the trench work is completed.
    h. CONTRACTOR shall provide adequate shoring, sheet piling, and bracing to prevent earth from caving or washing into the excavation and shall do all shoring and underpinning necessary to properly support adjacent or adjoining structures. All shoring, sheet piling, and underpinning must be maintained until permanent support

is provided.

i. Any water, drainage, gas, sewer, or electric lines encountered in the excavation that are not to be disturbed shall be properly underpinned and supported. Any service connections encountered that are to be removed shall be cut off at limits of the excavation and capped in accordance with the requirements of or permits governing such removals. Any permits required for this work will be obtained by OWNER upon request of CONTRACTOR.

3.02 FIELD QUALITY CONTROL

A. CONTRACTOR shall include the cost of all testing, cleaning, and disinfection in the price bid.

B. All work shall be inspected, tested, and approved in accordance with federal, state, and local rules and regulations. All work shall also be tested as specified in this section. Unless indicated in writing before testing begins, all tests shall be witnessed by ENGINEER and others as necessary. Test results shall be recorded and reports or appropriate certificates shall be submitted to ENGINEER in triplicate.

C. All new piping shall be tested. All underground piping shall be backfilled or properly secured to avoid damage during testing. Should underground piping fail test, CONTRACTOR shall be responsible for removal and replacement of backfill. All piping, interior or exposed, shall be subject to test before being covered with insulation or paint. All piping and appurtenances shall be watertight or airtight and free from visible leaks. Manholes and appurtenances shall be free of any visible leaks. Any leakage shall be sealed by methods approved by OWNER, from the exterior of the manhole or structure. Precast reinforced concrete manhole risers and tops shall be tested in accordance with ASTM C497.

D. All piping shall be flushed or blown out after installation prior to testing. CONTRACTOR shall provide all necessary piping connections, water, air, test pumping equipment, water meter, bulkheads, valves, pressure gauge and other equipment, materials, and facilities necessary to complete the specified tests. CONTRACTOR shall provide all temporary sectionalizing devices and vents for testing.

E. Prior to making final connection between new and existing piping, new piping shall be tested as specified above and in accordance with the LFUCG Construction Inspection Manual.

3.03 REPAIR AND RESTORATION

A. Pavement Repair: Unless otherwise specified, CONTRACTOR shall replace all bituminous and concrete pavement removed or damaged during performance of the work. Concrete pavement replacement shall conform to Division 3. Bituminous pavement replacement shall conform to Division 2.

B. Cleanup:
   1. Upon completion of the work, all improvements disturbed by CONTRACTOR's operations shall be repaired or replaced. Broken concrete, rubble fill, and other excess material shall be removed from the site and wasted.
   2. All areas used for the storage of materials or the temporary deposit of excavated earth shall be leveled off and cleaned up. All surplus material, tools, and equipment shall be removed, and the premises shall be left free of everything of the kind.
   3. All pipes and manholes shall be flushed until clean, and all debris and mud shall be removed.

3.04 DEMOLITION

A. All exterior piping removals, including manholes and appurtenances and abandonment, shall be by CONTRACTOR. The locations and elevations of existing piping are approximate. Where necessary, existing piping shall be exposed before installing new piping. Any changes in pipe location or elevation shall be reviewed by ENGINEER.

B. CONTRACTOR shall remove or abandon all existing piping and appurtenances as noted. Unless otherwise shown or specified, piping and appurtenances to be removed shall become the property of CONTRACTOR and shall be removed from the site for salvage or disposal. Unless otherwise shown or specified, piping shown or specified to be abandoned shall have each end plugged with nonshrink grout. Nonshrink grout shall be as specified in Division 3. Wherever excavations cross piping to be abandoned, piping shall be removed to the limits of the excavation and the ends shall be filled as specified above.

C. Valve boxes and exposed valves and operators on piping to be abandoned shall be removed. All concrete surfaces to remain shall be patched as required to provide a smooth surface. Repiping and connections to new piping shall be as specified for new piping.

D. It is the responsibility of CONTRACTOR to remove piping and appurtenances, as specified, and patch all holes resulting therefrom unless specified or shown otherwise. The intent of these specifications is to require that the removal of materials, patching of all existing holes, and repiping be done in a workmanlike manner. All costs shall be included in the Lump Sum Bid.

END OF SECTION

SECTION 03100

CONCRETE FORMWORK

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Forms for cast-in-place concrete.
   2. Form accessories.
   3. Openings for other work.
   4. Form stripping.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 REFERENCES

A. ACI 117–Tolerances for Concrete Construction.

B. ACI 301–Structural Concrete for Buildings.

C. ACI 318–Building Code Requirements for Reinforced Concrete.

D. ACI 347–Recommended Practice for Concrete Formwork.

E. PS1–Construction and Industrial Plywood.

1.03 DESIGN

A. All formwork shall comply with ACI 347 and ACI 301.

B. CONTRACTOR shall assume the responsibility for the complete design and construction of the formwork.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300–Submittals for form ties, form coatings, form liners (if any), and any other form accessories.

B. Submit geometry of forms for circular structures.

PART 2–PRODUCTS

2.01 FORMS

A. Forms shall be of wood, plywood, steel, fiberboard lined, or other approved materials which will produce concrete which meets the specified requirements. The type, size,

quality, and shape of all materials of which the forms are made are subject to the review of ENGINEER.

B. Caution shall be exercised in the use of wood or composition forms or form liner to be certain that no chemical reaction will take place which causes a damaging effect on the concrete surface.

2.02 FORM TIES–NONREMOVABLE

A. Internal wall ties shall contain positive stops at the required wall thickness. The exterior clamp portions of the tie shall be adjustable in length. Ties shall have cones on the water side of water-containing structures. Ties shall also have cones on the exterior side of all structures which have PVC water-stopped construction joints. Ties shall provide a positive disconnection on both ends 1 to 1 1/2 inches inside the finished face of the concrete.

B. All wall ties used in the placement of structures which have PVC or hydrophilic water-stopped construction joints shall contain integral waterstops. All such ties shall be crimped or deformed in such a manner that the bond between concrete and tie cannot be broken in removal of the outer units. This portion of the tie shall not be removed prior to 24 hours after completion of the concrete placement.

C. The use of wood spacers and wire ties will not be approved.

2.03 FORM TIES–REMOVABLE

A. Taper ties which are designed to be removed entirely from the wall may be used with forms designed for this tie type and spacing.

B. Tie holes shall be plugged with either a neoprene plug, Sure-Plug by Dayton Superior, Inc., or an EPDM rubber plug, X-Plug by Sika Greenstreak, or equal.

C. Cementitious waterproofing material for patching taper tie holes shall be Hey Di K-11, Xypex Patch-N-Plug, or equal. Taper tie holes above the normal operating water surface shall be patched with mortar mix as specified in Section 03300–Cast-in-Place Concrete for patching tie holes.

2.04 FORM COATINGS

A. Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.

2.05 CHAMFER STRIPS

A. Provide 3/4-inch by 3/4-inch wood or plastic chamfer strips at all exposed corners, except as noted.

2.06 KEYWAYS

A. Keyways shall be formed with wood inserts.

PART 3–EXECUTION

3.01 CONSTRUCTION

A. Forms shall conform to the shape, line, grade, and dimensions as shown on the drawings. They shall be mortar-tight and sufficiently rigid to prevent displacement or sagging between supports and shall support the loads and pressures without deflection from the prescribed lines. They shall be properly braced or tied together so as to maintain position and shape. Spacing of ties shall be recommended by the tie manufacturer.

B. Formwork and finished concrete construction shall meet the tolerances specified in ACI 117.

C. All exposed curved surfaces shall be formed to the continuous surface of the radius specified. Where segmented forms are proposed, a form system which deviates more than 3/8 inches from a circle through pan edges will not be allowed.

D. Architectural surfaces and surfaces to be fitted with equipment shall be formed to match the shape intended. Where indicated on the drawings, the form shall be lined with minimum 3/8-inch masonite and shimmed as required.

E. When forms are placed for successive concrete placement, thoroughly clean concrete surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets.

F. At the request of ENGINEER, temporary openings shall be provided at the base of column forms and wall forms and at other points where necessary to facilitate cleaning and observation immediately before depositing concrete.

G. Provide inserts and provide openings in concrete form work to accommodate work of other trades. Verify size and location of openings, recesses, and chases with the trade requiring such items. Securely support items to be built into forms.

H. Provide top forms for inclined surfaces where the slope is too steep to place and vibrate concrete.

I. Bevel wood inserts for forming keyways (except in expansion joints where inserts shall have square edges), reglets, recesses, and the like to assure ease of removal. Inserts shall be securely held in place prior to concrete placement. Unless otherwise shown, chamfer strips shall be placed in the angles of the forms to provide 3/4-inch bevels at exterior edges and corners of all exposed concrete.

J. The forms shall be oiled with a field-applied commercial form oil or a factory-applied nonabsorptive liner. Oil shall not stain or impede the wetting of surfaces to be cured with water or curing compounds. The forms shall be coated prior to placing reinforcing steel. Oil on reinforcement will not be permitted.

K. All form surfaces shall be thoroughly cleaned, patched, and repaired before reusing and are subject to review of ENGINEER.

3.02 FORM REMOVAL

A. Supporting forms and shoring shall not be removed until the member has acquired sufficient strength to support its own weight and the construction live loads on it.

B. All form removal shall be accomplished in such a manner that will prevent injury to the concrete.

C. Forms shall not be removed before the expiration of the minimum times as stated below or until the concrete has attained its minimum 28-day design strength as confirmed by concrete cylinder tests, unless specifically authorized by ENGINEER.
   1. Wall and vertical faces: 24 hours.
   2. Columns: 24 hours.
   3. Beams and elevated slabs: 14 days.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1–GENERAL

1.01 SUMMARY

A. Work includes providing complete, in-place, all steel and fibers required for reinforcement of cast-in-place concrete as shown on the drawings.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 REFERENCES

A. Applicable standards listed in this section include, but are not necessarily limited to the following:
   1. ACI 315–Manual of Standard Practice for Detailing Reinforced Concrete Structures.
   2. ACI 318–Building Code Requirements for Reinforced Concrete.
   3. ASTM A1064–Standard Specifications for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
   4. ASTM A615–Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
   5. ASTM A996–Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcing.
   6. ASTM C1116-Standard Specification for Fiber-Reinforced Concrete.
   7. CRSI–Manual of Standard Practice.

1.03 SUBMITTALS

A. Comply with pertinent provisions of Section 01300–Submittals.

B. Provide complete shop drawings of all material to be furnished and installed under this section:
   1. Before fabrication of the reinforcement is begun, CONTRACTOR shall obtain the approval of ENGINEER on reinforcing bar lists and placing drawings.
   2. These drawings and lists shall show in detail the number, size, length, bending, and arrangement of the reinforcing. Reinforcing supports shall also be located on the shop drawings.
   3. Shop drawings shall be in accordance with ACI 315.

1.04 PRODUCT HANDLING

A. Delivery:
   1. Deliver reinforcement to the job site bundled, tagged, and marked.
   2. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.

B. Storage: Store reinforcement at the job site on blocks and in a manner to prevent damage and accumulation of dirt and excessive rust.

PART 2–PRODUCTS

2.01 MATERIALS

A. Reinforcing bars shall comply with ASTM A615 or A996 Type R, Grade 60. Reinforcing bars required to be welded shall be ASTM A706 low alloy.

B. Steel wire and welded wire fabric shall comply with ASTM A1064. Fabric shall be provided in flat sheets. Rolled fabric shall not be used.

C. Reinforcement supports including bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place shall be:
   1. Wire bar-type supports complying with CRSI recommendations, unless otherwise indicated.
   2. For slabs on grade, supports with sand plates, or horizontal runners where base material will not support chair legs.
   3. For exposed-to-view concrete surfaces or where the concrete surface will be exposed to weather or moisture, where legs of supports are in contact with forms, supports with either hot-dipped galvanized or plastic protected legs.
   4. When supports bear directly on the ground and it is not practical to use steel bar supports, precast concrete blocks may be used to support only the bottom lift of reinforcement. The precast blocks must be solid, be of an equal or higher strength than the concrete being placed, must provide adequate support to the reinforcement, and be of proper height to provide specified reinforcing cover. The use of face bricks, hollow concrete blocks, rocks, wood blocks, or other unapproved objects will not be permitted.

D. Fibrous Reinforcing:
   1. Fibrous concrete reinforcement shall be Fibermesh 300, manufactured by Propex Concrete Systems, or equal.
   2. Reinforcement shall be 100% virgin polypropylene fibrillated, multi-length graded fiber containing no reprocessed olefin materials and specifically manufactured for use as concrete secondary reinforcement.
   3. Physical Characteristics:
      a. Specific Gravity: 0.91.
      b. Fiber Length: Multidesign gradation.

2.02 FABRICATION

A. General:
   1. Fabricate reinforcing bars to conform to required shapes and dimensions with fabrication tolerances which comply with CRSI Manual.
   2. In case of fabricating errors, do not rebend or straighten reinforcement in a manner that will injure or weaken the material.
   3. Unless otherwise shown on the drawings, all end hook dimensions shall conform with "ACI Standard Hooks."

B. Reinforcement with any of the following defects shall be deemed unacceptable and will not be permitted in the work:
   1. Bar lengths, depths, and bends exceeding specified fabrication tolerances.

2. Bend or kinks not indicated on drawings or final shop drawings.
3. Bar with reduced cross section because of excessive rusting or other cause.

PART 3–EXECUTION

3.01 INSPECTION

A. Examine the substrate, formwork, and the conditions under which concrete reinforcement is to be placed.

B. Correct conditions detrimental to the proper and timely completion of the work.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General:
1. Comply with the specified standards for details and methods of placing reinforcement and supports.
2. Clean reinforcement to remove loose rust, mill scale, earth, and other materials which reduce or destroy bond with concrete.

B. Placing Reinforcement:
1. All reinforcing shall be placed in accordance with Contract drawings and with shop drawings stamped and approved by ENGINEER.
2. Position, support, and secure reinforcing against displacement by formwork, construction, or concrete placement operations.
3. Support reinforcing by metal chairs, runners, bolsters, spacers, and hangers as needed.
4. Unless otherwise shown on the drawings, the reinforcement is to be so detailed and placed as to allow the following concrete protection:
   a. Three inches of cover where the concrete is placed directly against ground.
   b. Two inches of cover where the concrete is placed in forms but is to be exposed to weather, liquid, or the ground.
   c. One-inch cover in slabs and walls not exposed to weather, liquid, or the ground.
   d. One and one-half-inch cover in beams, girders, and columns not exposed to weather, liquid, or the ground. This cover applies to beam stirrups and column ties where applicable.
5. Reinforcement shall be positioned within ±3/8-inch for members with depth to tension reinforcing from compression face less than or equal to 8 inches. Tolerance shall be ±1/2 inch for members with depth to tension reinforcing from compression face greater than 8 inches. Tolerance on dimension between adjacent bars in slab and wall reinforcing mats shall be 1 inch. Secure against displacement by anchoring at the supports and bar intersections with wire or clips.
6. Bars shall be securely tied at all intersections except where spacing is less than 1 foot in each direction when alternate intersections shall be tied. To avoid interference with embedded items, bar spacing may be varied slightly if acceptable to ENGINEER. Tack welding of reinforcing will not be permitted.
7. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
8. If reinforcing must be cut because of openings or embedded items in the concrete, additional reinforcing must be provided adjacent to the opening at least equal in cross

sectional area to that reinforcing which was cut, and it shall extend a minimum of 36 bars diameters beyond the opening on each side or as shown on the drawings. At sumps or depressions in slabs, bars shall be bent and/or extended under sumps or depressions.

9. Wall reinforcing mats shall be secured in a vertical plane by providing clearance from forms with bar supports and by using Z-shaped bars at ±4 feet on center wired between two mats of steel, spacing and staying both of them. Nails shall not be driven into the forms to support reinforcement and neither shall wire for this purpose come in contact with the forms. Alternate top transverse bars in slab shall be supported by individual bar chairs at approximately 3-foot 0-inch centers. Bottom longitudinal bars shall be supported by continuous bar chairs at approximately 4-foot 0-inch centers.
10. If carrier bars are to be used, CONTRACTOR shall provide reinforcing bars for this purpose in addition to the reinforcing called for by the drawings and specifications.

C. Reinforcement Supports:
   1. Strength and number of supports shall be sufficient to carry reinforcement.
   2. Do not place reinforcing bars more than 2 inches beyond the last leg of any continuous bar support.
   3. Do not use supports as bases for runways for concrete-conveying equipment and similar construction loads.

D. Welded Wire Fabric:
   1. Install welded wire fabric in as long of lengths as practicable.
   2. Lap adjoining pieces at least one full mesh.
   3. Fabric shall be supported with bar supports.

E. Splices:
   1. Provide standard reinforcement splices by lapping ends, placing bars in contact, and tightly wire tying.
   2. Lap splices in reinforcing shall be provided as shown on the drawings. Where lap splice lengths are not shown on the drawings, provide Class B, Category 1 lap splices in accordance with ACI 318.
   3. Adjacent splices of tangential bars in circular slabs and horizontal bars in circular walls shall be staggered a minimum of one full lap splice length or 3 feet, whichever is greater, unless otherwise shown. Stagger dimension shall be measured from center to center of lap splices.
   4. For circular walls, horizontal bar lap splices shall not coincide in vertical arrays more frequently than every third bar.
   5. Mechanical splices and threaded dowel bar inserts may be used where approved by ENGINEER. Splices shall be capable of developing at least 125% of the yield strength of the reinforcing bar.

F. Embedded Items:
   1. Allow other trades to install embedded items as necessary.
   2. Particularly after bottom layer of reinforcing is placed in slabs, allow electrical contractors to install conduit scheduled for encasement in slabs prior to placing upper layer of reinforcing.

G. Minimum Reinforcing: Where reinforcing is not shown, provide a minimum of No. 4 at 8-inch centers each way in members 10 inches or less in thickness and No. 5 at 12-inch centers each way in each face in members greater than 10 inches thick.

H. Fibrous Reinforcing:
   1. Fibrous concrete reinforcing shall be used in all slab-on-grade concrete and all precast concrete topping.
   2. Add fibers at a minimum rate of 1.5 pounds per cubic yard.
   3. Mix concrete in strict accordance with reinforcement manufacturer's recommendations.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1–GENERAL

1.01 GENERAL

A. Related Documents: All work under this section shall be performed in accordance with the Drawings and the provisions of the Contract, including the General Conditions, Supplementary General Conditions and Division 1 – General Requirements of these specifications.

B. Scope of Work: Work under this section shall consist of concrete footings as shown on the drawings.

1.02 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified:

1. ACI-301, "Specification for Structural Concrete for Buildings"
2. ACI-318, "Building Code Requirements for Reinforced Concrete"
3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice"

B. Earth cuts may be used to form concealed vertical surface of footings. Earth forms shall be sharp and true to line and dimension.

1.03 SUBMITTALS

A. Refer to Division I, Section 01300, Submittals.

B. Material Certificate: submit certificate from concrete supplier, showing compliance with design requirements for strength.

C. Product Data: submit data for proprietary materials and items, including reinforcement and forming accessories, admixtures, and others as requested by Engineer or Owner's designated representative.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Provide cold weather and/or hot weather protection as recommended in ACI-305 and ACI-306.

B. Unless adequate protection is provided, concrete shall not be placed during rain, sleet, or snow. Protect concrete from rain water, maintain cement:water ratio, and protect concrete surface.

C. All concrete shall be adequately protected after pouring to prevent damage from freezing, by the use of suitable covers and adequate heating equipment. Frozen and damaged concrete must be removed and replaced at the Contractor's expense. Do not place concrete on frozen earth.

PART 2 - PRODUCTS

2.1 REINFORCING MATERIALS

A. Reinforcing bars shall conform to "Specifications for Deformed Billet—Steel Bars for Concrete Reinforcement," ASTM A-615 Grade No. 60, having a minimum yield strength of 60,000 psi.

B. Tie wire shall be black annealed wire, 16 gauge minimum.

C. Bar supports shall conform to the "Bar Support Specification" contained in the "Manual of Standard Practice" as published by CRSI and WCRSI. Bar and accessories within 1/2" of the surface of concrete exposed to weather shall be non-corrosive.

D. Epoxy coating: all reinforcing bars shall be epoxy coated.

2.2 CONCRETE MATERIAL

A. Cement shall be grey Portland Cement, Type I or II, conforming to ASTM C-150. Use same brand for all exposed work.

B. Concrete aggregates shall conform to ASTM C-33. Fine and coarse aggregates shall be regarded as separate ingredients, and each shall conform to the appropriate grading requirements of ASTM C-33.

C. Water shall be potable, clean, and free from impurities affecting the strength of the concrete, in accordance with ACI and ASTM requirements.

2.3 PROPORTIONING AND DESIGN OF MIXES

A. All concrete shall be of normal weight, consisting of a proportioned mixture of Portland Cement, coarse aggregate, fine aggregate, and water. Concrete proportions shall be selected on the basis of trial mixes conforming to ACI 211.1.

B. All concrete, unless otherwise noted, shall have a minimum compressive strength of 3,000 psi at 28 days.
   1. For fill, 2,000 psi concrete may be used.

C. All concrete, unless otherwise noted, shall be proportioned to have a slump of 3" minimum to 4" maximum. Tolerance in slump shall not exceed ACI recommendation.
   1. Slump for concrete fill may be 6" maximum.

D. Admixtures to retard or accelerate setting, to reduce water ratio, or to prevent freezing shall not be used without prior approval from the Engineer or the Owner's designated representative. No admixtures containing calcium chloride may be used.

E. Maximum aggregate size shall conform to the following, and shall not exceed tolerances on oversize as per ASTM C-33.
   1. Footings, grade beams, and foundation - 3/4"
   2. Concrete fill -1/2"

2.4 CONCRETE PRODUCTION

A. Ready-mixed concrete shall conform to ASTM C-94 and the National Ready Mix Concrete Association. Use of non-agitating trucks is not permitted.

B. Use of retempered concrete is not permitted.

C. The addition of water at the job site is permitted providing that only sufficient water is used to provide a workable mix, and that neither the design water:cement ratio nor the maximum slump is exceeded. The addition of cement at the job site to maintain the water:cement ratio is not permitted.

PART 3 – EXECUTION

3.1 PLACING REINFORCEMENT

A. Comply with CRSI's recommended practice for "Placing Reinforcing Bars" for details and methods of reinforcement placement and supports, and as herein specified.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement by framework, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

D. Coverage: all reinforcing bars below ground shall have minimum 3" concrete cover.

E. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so that ends are directed into concrete, and not toward exposed concrete surfaces.

F. Heating of reinforcement for bending will not be permitted.

3.2 PLACEMENT OF CONCRETE

A. Consolidate all concrete in accordance with provisions of ACI-309.

B. Consolidate each layer of concrete immediately after placing, by use of internal concrete vibrators supplemented by hand-spading, rodding, or tamping.

C. Limit duration of vibration to time necessary to produce satisfactory consolidation without causing segregation of aggregate.

END OF SECTION

SECTION 05500

MISCELLANEOUS METALS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

All Work under this Section shall be performed in accordance with the Drawings and the provisions of the Contract, including General Conditions, Supplementary General Conditions, and Division I—General Requirements of these Specifications.

1.2 SCOPE OF WORK

Work under this section shall include truss bearing plates, truss connector plates, joist hangers, angles, bolts, washers, nails, structural steel fasteners, and bollards.

1.3 SUBMITTALS

A. Refer to Section 01300, Submittals.

B. Truss Bearing Plate Assembly: submit shop drawings for approval.

C. Structural steel fasteners: submit manufacturer's specifications and technical information.

PART 2 – PRODUCTS

2.1 TRUSS BEARING PLATE ASSEMBLY

Truss bearing plate assembly, bolts, and washers shall be AISI Type 304 stainless steel as detailed on Drawings.

2.2 TRUSS CONNECTOR PLATES

A. Truss connector plates shall be galvanized steel, epoxy coated as described in Section 09900.

2.3 JOIST HANGERS

A. Joist hangers shall be JUS26 18 gauge slant nail joist hangers with triple zinc coating by USP Structural Connectors (www.USPconnectors.com, 1-800-328-5934).

2.4 ANGLES

Angles connecting endwall knee braces to the top and bottom chords of trusses shall be USP Structural Connectors field adjustable framing angles, MP series, JA5-HDG, 14 gauge hot-dip galvanized steel, 2.5 x 2.5 x 5 inches.

2.5 BOLTS AND WASHERS

All bolts (other than those used for the truss bearing plates) and washers shall be made of ASTM A-307 steel, and shall be galvanized.

2.6 NAILS

A. Materials: All nails, other than roofing nails, shall be ring-shank, double hot dipped, galvanized coated steel.

B. Sizes

Location	Size	Remarks
stress skin panel frames and blocking	16d	
plywood skins to panels	8d	
interior liner to panels	8d	
battens to exterior panels	8d	
fasteners for trusses	5/16″	GRK fasteners (see below)
upper hip purlins (joist hangers)	8d	
x-bracing, lateral bracing, lower hip purlins, and girts, and jambs	16d	
angles fastening endwall knee braces to trusses	*	*as per manufacturer
overhead door header	60d	
exterior siding	6d	do not use power nails
roofing nails	*	*as per manufacturer
roof deck	8d	

2.7 STRUCTURAL STEEL FASTENERS

Structural steel screws shall be 5/16″ RSS™ LTF Timber Frame Fasteners with washer type heads and reinforced shoulders of case-hardened steel with Climatek™ coating by GRK Fasteners, Thunder Bay, ON, Canada, 800-263-0463, 807-474-4300, grk@grkfasteners.com, or approved equal.

2.8 BOLLARDS

Bollards (door jamb guard posts) shall consist of minimum 6" OD standard weight steel structural pipe, filled with concrete. Form concrete crown at top of bollard.

PART 3 – EXECUTION

3.1 NAILING

A. Do not use power nails to apply Duratemp exterior siding.

B. Endwall siding shall be attached to girts with nails 6″ on center.

C. Roof sheathing shall be attached to purlins with galvanized 8d nails 6" on center.

D. Splice members shall be attached to endwall columns with nails 6″ on center, staggered.

3.2 STRUCTURAL STEEL FASTENERS

Size, number, and location shall be as shown on Drawings.

3.3 BOLLARDS

Locations, dimensions, and depth of footings and bollards shall be as shown on Drawings.

END OF SECTION

SECTION 05560

ANCHOR BOLTS AND POST-INSTALLED ANCHORS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Anchor bolts, expansion bolts, adhesive anchors, and screw anchors.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 REFERENCES

A. ASTM A36/A36M–Standard Specification for Carbon Structural Steel.

B. ASTM F1554–Anchor Bolts, Steel, 36, 55, and 105-ksi yield strength.

C. ICC-ES International Code Council–Evaluation Service.

D. AC 193–Acceptance Criteria for Mechanical Anchors in Concrete Elements.

E. AC 308–Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete.

F. ACI 355.2–Qualification of Post-Installed Mechanical Anchors in Concrete and Commentary.

G. ACI 355.4–Qualification of Post-Installed Adhesive Anchors in Concrete and Commentary.

PART 2–PRODUCTS

2.01 ANCHOR BOLTS

A. Anchor bolts complete with washers and nuts shall be fabricated as shown or as specified by the equipment manufacturer and unless otherwise indicated shall be hot-dip galvanized carbon steel or 316 stainless steel. Anchor bolts shall, as a minimum, conform to the requirements of ASTM F1554-Grade 36.

B. Stainless steel anchor bolts shall be used in all submerged locations, below final grade, and in contact with aluminum and other items not to be painted. Galvanized anchor bolts shall be used elsewhere.

2.02 EXPANSION BOLTS

A. Expansion bolts shall be KWIK Bolt TZ by Hilti, Inc., TruBolt+ by ITW Red Head, Power-Stud + SD2, SD4, or SD6, by Powers Fastening Systems, Strong-Bolt, or Strong-Bolt 2, by Simpson Strong-Tie Anchor Systems, or approved equal.

B. All expansion bolts shall comply with the Kentucky Building Code, AC 193, and ACI 355.2. They shall be ICC-ES approved for use in cracked and uncracked concrete.

C. Expansion bolts will not be permitted as substitutes for embedded anchor bolts except with the prior written acceptance of ENGINEER or where otherwise specifically called for.

D. Unless indicated otherwise on the drawings or specified, use the following bolt material for the various installation situations:
   1. Stainless Steel: For all submerged locations, below final grade, and in contact with aluminum appurtenances and other items not to be painted. Also for anchoring equipment, unless otherwise specified.
   2. Steel: In other locations in contact with items to be painted or encased in concrete.

2.03 ADHESIVE ANCHORS

A. Adhesive anchors shall be HIT HY 200 by Hilti, Inc., Red Head Epcon C6+ or Red Head Epcon S7 by ITW, PE 1000+ by Powers Fastening Systems, Set-XP by Simpson Strong-Tie Anchor Systems, or approved equal.

B. All adhesive anchors shall comply with the Kentucky Building Code, AC 308, and ACI 355.4. They shall be ICC-ES approved for use in cracked and uncracked concrete.

2.04 SCREW ANCHORS

A. Screw anchors shall be KWIK HUS-EZ by Hilti, Inc., Wedge-Bolt+ by Powers Fastening Systems, Titen-HD by Simpson Strong-Tie Anchor Systems, or approved equal.

B. All screw anchors shall comply with the Kentucky Building Code. They shall be ICC-ES approved for use in cracked and uncracked concrete.

PART 3–EXECUTION

3.01 ANCHOR BOLTS

A. Anchor bolts for structural members shall be located as shown and specified.

B. Anchor bolts for mechanical equipment shall have embedment length, edge distances, and spacing as required by the equipment manufacturer.

C. All dirt or foreign materials shall be removed prior to embedding into concrete. After anchor bolts have been embedded, their threads shall be protected by grease and by installing the nuts or by other means until the time of installation of the equipment or metal work.

3.02 EXPANSION BOLTS

A. Unless otherwise noted on the drawings, expansion bolt edge distance and spacing shall be in accordance with manufacturer's printed installation instructions.

B. Bolt embedment shall at least equal 6-bolt diameters.

C. Installation procedures shall be in accordance with the manufacturer's printed installation instructions.

D. Where location of bolts is adjustable, reinforcing steel shall be located prior to drilling holes and bolts shall be located to clear reinforcing steel.

3.03 ADHESIVE ANCHORS

A. At locations shown on the drawings, reinforcing bars or threaded rod shall be provided in existing concrete by drilling holes, injecting epoxy adhesive, and inserting the reinforcing bar.

B. All existing surfaces to receive adhesive anchors, including the entire area in contact with the new concrete, shall be cleaned and roughened to amplitude of 1/4 inch.

C. Installation procedures shall be in accordance with the manufacturer's printed installation instructions.

D. Where location of anchors is adjustable, reinforcing steel shall be located prior to drilling holes and anchors shall be located to clear reinforcing steel.

E. CONTRACTOR shall arrange an anchor manufacturer's representative to provide on-site installation training for installation of their adhesive anchor system products. Submit documentation that all CONTRACTOR's personnel or subcontractors who install adhesive anchors have been trained prior to the announcement of anchor installation.

F. Adhesive anchors in horizontal and upwardly inclined orientations to resist sustained tension loads are subject to the following requirements:
1. They shall be installed by personnel certified by an applicable certification program. Certification shall include written and performance tests in accordance with the ACI/CRSI Adhesive Anchor Installer Certification program, or equivalent, as approved by ENGINEER.
2. They require continuous special inspection during installation. CONTRACTOR shall notify ENGINEER and Special Inspector of the schedule for these anchor installations to permit coordination of inspections.

3.04 SCREW ANCHORS

A. Unless otherwise noted on the drawings, screw anchor edge distance and spacing shall be in accordance with manufacturer's recommendations.

B. Anchor embedment shall at least equal 6-bolt diameters.

C. Installation procedures shall be in accordance with the manufacturer's printed installation instructions.

D. Where location of anchors is adjustable, reinforcing steel shall be located prior to drilling holes and anchors shall be located to clear reinforcing steel.

END OF SECTION

SECTION 06100

CARPENTRY

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

All Work under this Section shall be performed in accordance with the Drawings and the provisions of the Contract, including General Conditions, Supplementary General Conditions, and Division I—General Requirements of these Specifications.

1.2 SCOPE OF WORK

A. This section shall cover the labor and material necessary to furnish and install the following:

1. Wood barrier wall and liner
2. Rough framing and sheathing
3. Prefabricated wood trusses
4. Hi-Arch Gambrel™ frames
5. Exterior wood siding and wood trim

1.3 QUALITY ASSURANCE

All lumber shall be grade-marked with the Association stamp, showing species, grade, and mill number; lumber shall be kiln-dried and marked as such. For southern pine, the term "Association" refers to the Southern Pine Inspection Bureau.

1.4 SUBMITTALS

A. Refer to Section 01300, Submittals.

B. Pressure Treated Members: submit certificate of treatment from lumber supplier, showing sizes of members and treatment for each.

C. Plywood: American Plywood Association (APA) stamp should be visible on all plywood to verify grade.

D. Trusses:

1. Submit stamped truss design drawings and design calculations, provided by the truss manufacturer, and stamped by an engineer licensed in the State of Kentucky.

2. Trusses shall be designed for loading requirements as shown on Drawings.

3. The increase in unit stress for short term loading shall be a maximum of 15%, or in accordance with state and local regulations.

4. Submittals must show the following:

a. Space diagram with panel point loading
b. Force diagram
c. Truss configuration, showing slope and span
d. All joint details indicating connector plate size and position

e. Size and grade of lumber (to be southern pine)
f. Camber to allow for dead load deflection and connector construction.
g. Design calculations for truss member sizes. In no case shall members of smaller size than those shown on the drawings be used.

PART 2 – PRODUCTS

2.1 TREATED WOOD BARRIER WALL

A. Description

The barrier wall, as detailed on the Drawings, shall be a composite retaining wall consisting of 4' x 16' (or sized as required) wood stress-skin panels, spanning between wood columns and braces located 8'-0" on center which support the roof trusses. A wood liner shall be applied to the interior surface of the barrier wall.

B. Materials

1. General

a. Pressure treatment for all applicable wood panel members (studs, beams, battens, plywood skins and liner) shall be water-borne CCA 0.40 treatment in accordance with AWPA Standard U1 to the requirements of Use Category UC4A.
b. Pressure treatment for wood columns and braces, and for 6x6 members at base of crib wall, shall receive water-borne CCA 0.60 treatment in accordance with AWPA Standard U1 to the requirements of Use Category UC4B.
c. Moisture Content: Any wood components with a nominal thickness of 2" or less shall have a moisture content not to exceed 19% when installed.
d. Cut ends of all members required to be pressure treated shall be painted with Sherwin Williams WoodScapes® Exterior Polyurethane Semi-transparent Stain, A15T00005, tinted #3535 Foliage, or approved equal. Product is available through Sherwin-Williams, 1-800-424-5837, http://www.sherwin-williams.com.

2. Wood Columns and Braces shall be pressure-treated kiln-dried #2 or better southern pine.

3. Shop Fabricated Stress Skin Panels

a. Exterior (perimeter) panel studs shall be 2x6 pressure treated wood studs, #2 southern pine.
b. Interior panel studs shall be 2x6 non-pressure treated wood studs, #2 southern pine, 8" o.c.
c. Blocking: 4x6 solid wood blocking at points of attachment to columns, 8' o. c.; see Drawings for details.
d. Exterior panel skin: 1/2" pressure treated exterior structural plywood, grade APA-AC or APA-BC, sanded.
e. Interior panel skin: 3/4" pressure treated CDX plywood.
f. Nails fastening the exterior and interior plywood skins to the panels shall be galvanized 8d nails as called for on Drawings.
g. Adhesive (glue) shall be Titebond GREENchoice heavy duty construction adhesive by Franklin International, Columbus, OH, 1-800-877-4583.
h. Bolts fastening the panels to the columns shall be galvanized lag bolts, recessed as shown on Drawings.

4. Interior Plywood Liner

   a. Liner shall consist of 3/4" pressure treated CDX plywood.
   b. Nails fastening the interior liner to the panels shall be galvanized 8d nails, as shown on Drawings.

5. Battens

   a. Battens for application over exterior horizontal panel joints shall be 1x2 pressure treated #2 southern pine. Top edges of battens shall chamfered at a 45-degree angle to provide drainage away from the panel face.
   b. Nails for battens shall be galvanized 8d nails.

2.2 ROUGH FRAMING AND SHEATHING

A. Rough framing includes such lumber as joists, rafters, studs, plates, furring, backing, copings, fascias, curbs, framing, grounds, sleepers, blocking, etc.

B. All lumber for rough carpentry shall be construction-grade lumber, with extreme fiber stress of not less than 1,200 psi.

C. Wood columns installed above the crib wall shall be 6x6 members of #1 or better southern pine.

2.3 PREFABRICATED WOOD TRUSSES

A. Trusses shall be fabricated from lumber as designated by truss manufacturer (grade and size of members).

B. All load bearing lumber and all components of roof trusses shall have 1,200-psi minimum working stress at 19% maximum moisture content.

C. Toothed truss connector plates shall be Alpine or approved equal, galvanized steel, treated as specified under Section 09900, Painting.

D. The net area of connector plate shall not include the area within 1/2" from the edge or end of the connected member.

E. The plate at the peak must be capable of carrying one half the design stress in the member.

F. All other plates must carry the full design stress across the joint.

2.4 HI-ARCH GAMBREL™ FRAMES

A. The Hi-Arch Gambrel™ truss frames are to be constructed of prefabricated wood trusses tied together with structural steel fasteners as shown on the drawings.

   1. Prefabricated wood trusses are specified in Paragraph 2.3 above.
   2. Structural steel fasteners are specified in Section 05500, Miscellaneous Metals.

2.5 EXTERIOR WOOD SIDING AND WOOD TRIM

A. Furnish and install where shown on Drawings 19/32" exterior grade rough-sawn siding with shiplap vertical edges and grooves 8" o.c., product to be Duratemp by Roseburg Forest Products, Roseburg, OR (800-245-1115, www.roseburg.com), or approved equal.

B. Panels to be 4' x 8' or 4' x 10' as required.

C. Provide Z-molding at all horizontal joints.

D. Wood trim to be 1x6 southern pine as shown on Drawings.

PART 3 – EXECUTION

3.1 TREATED WOOD BARRIER WALL

A. Fabrication of Panels

1. Panels, including studs, beams, and plywood skins, shall be shop manufactured.
2. Reinforcement: panels shall be reinforced with solid wood blocking as shown on Drawings.
3. Both the exterior and interior plywood skins shall be glued and nailed to the panel frame as shown on Drawings.
4. A continuous bead of adhesive shall be applied to the entire perimeter frame and to the face of each stud, to which panel skins are to be attached. Spot application is not adequate.

B. Installation

1. Stress Skin Panels: The panels shall be fastened to the columns with galvanized lag bolts, recessed as shown on Drawings.
2. Interior Liner: The interior liner shall be field applied to the interior surface of the barrier wall and shall be nailed only as shown on Drawings. Carefully follow Drawings for liner layout (staggering panel joints) and for nailing pattern.

C. Painting of Cut Ends of Pressure-Treated Members: for number of coats and other application directions, follow recommendations in manufacturer's literature.

3.2 ROUGH FRAMING AND SHEATHING

A. All framing shall be carefully and accurately laid out, shall be erected and secured in accordance with best building practice, and shall be of size and spacing indicated on the drawings.

3.3 PREFABRICATED WOOD TRUSSES

A. Trusses to be shop assembled; all wood members shall have full bearing.

B. Plates shall be positioned as shown on approved shop drawings, and pressed into wood members so full penetration of the teeth is obtained without crushing surfaces of wood.

C. All connections shall be made with connectors as required to transmit the stresses fully. Connectors shall conform to Truss Plate Institute "Design Specifications for Light Metal Connected Wood Trusses-TP-166".

D. Wood members shall be designed in accordance with National Design Specifications for wood construction by the NFPA for stress graded lumber.

E. Trusses shall be constructed true to line and dimensions within a tolerance of 1/4" for length and 1/8" for height.

F. All trusses to be stored at the job site in a manner to prevent warping or twisting of trusses.

3.4 RIGID HI-ARCH GAMBREL™ FRAMES

A. Designate an area adjacent to the building as a staging area. The truss frames will then be laid out in that area.

B. Fabricate the trusses into frames as follows:

1. The top truss or trusses (as applicable), having a horizontal bottom chord, are to be sandwiched between two trusses setting diagonally on each side.
2. The trusses are to be bolted into a frame and made rigid by the use of structural steel fasteners, installed where shown on the drawings, in accordance with manufacturer's instructions, and using equipment as recommended or mandated by connector manufacturer. For truss-to-truss connections, bolts alone are not acceptable.
3. Where the side trusses are separated by 1-1/2", 2x4 spacers shall be installed intermittently or continuously. Where the side trusses are separated by 3", two 2x4 spacers shall be installed intermittently or continuously.
4. After Hi-Arch Gambrel truss frames have been assembled, any truss connector plates which remain exposed on the exterior faces of the trusses shall be painted with epoxy coating as specified in Section 09900.

C. Furnish and install temporary bracing and stiffeners as needed during erection process, in accordance with the most current version of Bracing Wood Trusses published by the Truss Plate Institute.

D. Trusses shall be erected in locations and at spacings shown on Drawings. Provide complete lateral bracing during erection, and permanent lateral bracing as shown on Drawings, or as required by truss manufacturer.

E. See Section 05500, Miscellaneous Metals, and Drawings for base plate details.

F. Any trusses that are damaged during delivery or erection shall be replaced at no extra cost to the Owner.

3.5 EXTERIOR WOOD SIDING AND WOOD TRIM

A. Use 6d galvanized casing nails for application.

B. Power nails are not to be used on exterior siding.

END OF SECTION

SECTION 07610

METAL ROOFING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

All Work under this Section shall be performed in accordance with the Drawings and the provisions of the Contract, including General Conditions, Supplementary General Conditions, and Division I—General Requirements of these Specifications.

1.2 SCOPE OF WORK

The Work under this Section shall include all materials and labor required to install an uninsulated roofing system consisting of metal panels installed upon a plywood deck, attached to the truss frame system specified under Section 06100.

1.3 SUBMITTALS

A. Refer to Section 01300, Submittals.
B. Submit manufacturer's warranty certificate for metal roof panels.
C. Submit manufacturer's specifications and instructions for the following items:

1. Metal roof panels
2. Profiled gasketing
3. Color matched fasteners
4. Ridge vent
5. Fiberglass skylight panels

D. Submit color samples or chips for the following items:

1. Metal roof panels
2. Color matched fasteners
3. Ridge vent

1.4 DELIVERY, STORAGE AND HANDLING OF METAL PANELS

A. Panels and flashings shall be protected and properly packaged to protect against transportation damage in transit to the jobsite.

B. Deliver panels and all other components in manufacturer's original and unbroken packaging. Any materials damaged during shipment or delivery shall be rejected and replaced.

C. Panels and flashings shall be handled during unloading, stacking, moving, storing, and erection so as to prevent twisting, bending, warping, and surface damage.

D. Stack materials in a safe, dry environment on platforms or pallets, covered with tarpaulins or other suitable weathertight ventilated covering, to prevent water damage and condensation. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage. Panels and flashings with strippable film shall not be stored in direct sunlight.

E. Upon installation immediately remove strippable film from panels and flashings. Protect panels and flashings from foot traffic and from all other trades.

PART 2 – PRODUCTS

2.1 METAL ROOFING PANELS

Roof panels shall be 29 gauge galvanized coated steel, GrandRib 3® PLUS profile, with Enduracote® paint finish. Panels to be by Fabral (3449 Hempland Road, Lancaster, PA 17601, Tel. 717-397-2741, Fax 717-397-1040, www.fabral.com), or approved equal. Color as selected by Owner.

2.2 ROOFING UNDERLAYMENT

Roofing underlayment shall be Titanium UDL-30 by InterWrap, Inc. (Roof Products Division, Head Office, 32923 Mission Way, Mission, British Columbia, Canada, V2V 6E4, 640-820-5400, www.interwrap.com/titanium).

2.3 FASTENERS

Screws shall be #14 standard galvanized roofing screws, 1-1/2" and 2" long, with sealing washers colored to match material being fastened and as recommended by the roofing manufacturer.

2.4 FLASHINGS AND ACCESSORIES

A. Flashings shall be shop fabricated of galvanized sheet metal.

B. Other accessories such as rake edges and J-channels shall be as provided or recommended by manufacturer for use with specified roofing panels.

2.5 SHEATHING

Sheathing shall be 5/8" thick four-ply CDX plywood, or approved equal, where called for on drawings, approved by the American Plywood Association, and fastened with galvanized 8d nails 6" on center.

2.6 RIDGE VENT

Ridge vent shall be RR-1 Ridge Cap with CoraVent by Fabral or approved equal, color selected by Owner, as manufactured for use with specified roofing panels.

2.7 SKYLIGHTS

A. Skylights shall be Marlon CS Longlife polycarbonate rooflights, Profile P1434 nine-inch (9") opal tinted panels, manufactured by Brett Martin Ltd. (distributed by MWI Components, 1015 32nd Avenue West, Spencer, Iowa 51301, tel. 800-360-6467, fax 800-361-3452, email mwicomponents@hotmail.com, www.mwicomponents.com), or approved equal.

B. At the top edge of the skylight panels, install a galvanized steel J-channel, Fabral AJ3 or approved equal. Install tightly against upper roof deck.

C. At the bottom edge of skylight panels, install a closure strip as per manufacturer's recommendation.

PART 3 – EXECUTION

3.1 GENERAL

All materials shall be installed where shown on Drawings and in complete accordance with manufacturer's instructions, which hereby become a part of this Specification.

3.2 INSTALLATION OF SHEATHING

Roof sheathing shall be attached to purlins with galvanized 8d nails 6" on center.

3.3 INSPECTION OF SUBSTRATE

Contractor shall inspect the structure to insure that the plywood deck is securely anchored and properly aligned to provide a flat plane for the roof panels.

3.4 INSTALLATION OF METAL ROOFING PANELS

A. Fastener selection and installation shall be as recommended by metal roofing manufacturer and in accordance with the manufacturer's fastening schedule.

B. Screws into wood framing or decking shall penetrate the supporting member by a minimum 1".

3.5 GUARANTEE

The Contractor shall guarantee the installation of the roof for a period of two years after substantial completion.

END OF SECTION

SECTION 07631

GUTTERS AND DOWNSPOUTS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Aluminum gutters and downspouts.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 REFERENCES

A. ASTM B209–Aluminum and Aluminum Alloy Sheet and Plate.

B. SMACNA–Architectural Sheet Metal Manual.

1.03 DESIGN REQUIREMENTS

A. Conform to SMACNA manual for sizing components for a 10-year storm event.

1.04 REGULATORY REQUIREMENTS

A. Conform to the Kentucky Building Code or governing local building code for size and method of rainwater discharge.

PART 2–PRODUCTS

2.01 GUTTERS AND DOWNSPOUTS

A. Gutters and downspouts shall be constructed of 0.032-inch-thick aluminum sheet conforming to ASTM B209 and shall be made from the same manufacturer as the fascia and soffit system.

2.02 ACCESSORIES

A. Anchorage devices shall meet SMACNA or manufacturer's requirements.

B. Gutter supports shall be straps and fasteners at maximum 3 feet 0 inches on center.

C. Downspout supports shall be brackets of the appropriate size and spacing.

D. Fasteners shall be aluminum or stainless steel.

2.04 FABRICATION

A. Form gutters and downspouts to SMACNA requirements.

B. Fabricate with required connection pieces.

C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion of defects detrimental to appearance or performance. Allow for expansion by providing expansion joints as required.

D. Hem exposed edges of metal.

E. Fabricate gutter and downspout accessories; seal watertight.

2.05 FINISHES

A. Finish on gutters and downspouts shall match finish on fascia system. All components, including fasteners and supports, shall be prefinished to match gutters and downspouts.

PART 3–EXECUTION

3.01 INSTALLATION

A. Install gutters, downspouts, and accessories with manufacturer's instructions.

B. Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.

C. Install gutters level.

D. Seal metal joints watertight.

E. Termination of downspouts shall be located to direct water away from the building, including the wall braces.

END OF SECTION

SECTION 07900

CAULKING AND SEALANTS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Caulking and sealants on the project, including primers and backer rod material.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 REFERENCES

A. ASTM C920–Elastomeric Joint Sealants.

1.03 SUBMITTALS

A. Submittals shall comply with provisions of Section 01300–Submittals.

B. Submit color chart for each sealant used on project. Colors will be selected by ENGINEER.

C. Submit copies of warranty.

1.04 WARRANTY

A. Caulked joints shall be weathertight and guaranteed watertight by installer for 2 years from the earlier of either the date established for partial utilization in accordance with GC14.04 and 14.05, as modified in the Supplementary Conditions or Substantial Completion of the project. Deliver original guarantee to OWNER with copies to ENGINEER.

B. Provide manufacturer's standard 5-year product warranty.

PART 2–PRODUCTS

2.01 CAULK–NONSUBMERGED APPLICATIONS–GENERAL

A. Caulk for nonsubmerged applications in all locations except floor joints shall be a one-part polyurethane sealant.

B. Acceptable products include the following, or equal:
1. Masterseal NP1 by BASF Construction Chemicals, LLC.
2. Vulkem 116 by Tremco, Inc. (exterior applications only).
3. Dymonic 100 by Tremco, Inc.

2.02 CAULK–NONSUBMERGED APPLICATIONS–FLOOR JOINTS

A. Caulk for floor joints in nonsubmerged applications shall be a one-part, self-leveling, polyurethane sealant.

B. Acceptable products include the following, or equal:
   1. SL1 by BASF Construction Chemicals, LLC.
   2. Vulkem 45 SSL by Tremco, Inc.

2.03 CAULK–SUBMERGED APPLICATIONS–GENERAL

A. Caulk in all submerged applications except at potable water contact shall be a two-part, polysulfide base synthetic rubber sealant.

B. Acceptable products include the following, or equal:
   1. Sonolastic Polysulfide Sealant by BASF Construction Chemicals, LLC.
   2. Thiokol 2235M by PolySpec.

2.04 CAULK-SUBMERGED APPLICATIONS-POTABLE WATER CONTACT

A. Caulk in all submerged potable water contact applications shall be an NSF-approved, two-part polysulfide base synthetic rubber sealant, or an NSF-approved, one-part polyurethane sealant recommended by the sealant manufacturer for potable water contact.

B. Acceptable products include the following, or equal: Sika Duoflex NS, or Thiokol 2235M by PolySpec.

2.05 ACCESSORIES

A. Backer rod shall be flexible, closed-cell polyethylene rod stock sized to be under at least 25% compression when positioned in the joint. In shallow joints and where backer rod is not used, polyethylene bond breaker tape shall be used. It is essential that the caulk bond to the side of the joint but not to the base of the joint.

B. Primer(s) shall be used where required by the manufacturer for the specific product(s) used and the specific application(s) intended. Specific product(s) shall be as recommended by the manufacturer.

C. Cleaning fluid shall be methyl ethyl ketone (MEK), methyl isopropyl ketone (MIK), or similar solvent material which will not etch or mar metal finishes and shall be the product of a nationally recognized manufacturer, of type expressly recommended for use with the caulking or sealant compound used.

PART 3–EXECUTION

3.01 INSTALLATION

A. Seal completely all joints around entire perimeter of all openings in all exterior walls (inside and outside faces), including joints at all exterior doors, windows, louvers, sills, and elsewhere as noted on the drawings and as necessary to seal all open joints in the building in a complete manner. Joints in exterior walls shall be caulked in a completely weathertight

manner. Joints between interior walls and concrete ceilings and other interior joints shall be caulked as indicated on the drawings. Caulking not specified in other sections shall be performed under this heading.

B. All caulking shall be done in accordance with manufacturer's specifications. Allow minimum 28-day curing period for concrete, grout, or mortar prior to caulking unless requested otherwise. Caulking work shall be done before the final coat of paint is applied except at moving joints which shall be finish painted before caulking or caulking shall be protected during painting. All caulking shall occur only when the temperature is above 40°F.

C. Joints shall be thoroughly cleaned and primed before caulking in accordance with manufacturer's instructions. Unless otherwise shown, joints shall be square in cross section 1/2-inch by 1/2-inch and shall comply with manufacturer's joint width/depth ratio limitations.

D. Backer rod shall be used in all openings 3/4 inches or more in depth and shall be tightly packed to completely fill the space to 1/2-inch back of face. The 1/2-inch shall then be filled with caulking compound.

E. Caulking shall be done by hand gun. Compound shall be driven into joint grooves with sufficient pressure to force out all air and fill joint grooves solidly. Caulking where exposed shall be free of wrinkles and shall be uniformly smooth.

F. At completion of caulking, clean off all excess material from adjoining surfaces and material. Entire installation shall be left in a perfect appearing weathertight condition.

END OF SECTION

SECTION 08300

DOORS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

All Work under this Section shall be performed in accordance with the Drawings and the provisions of the Contract, including General Conditions, Supplementary General Conditions, and Division I—General Requirements of these Specifications.

1.2 SCOPE OF WORK

The Work under this Section shall include all materials and labor required to furnish and install an upward acting overhead sectional door (Alternate #1) as called for below.

1.3 SUBMITTALS

A. Refer to Section 01300, Submittals.

B. Submit manufacturer's instructions and standard specifications, as predicated by size of door, for:

1. Door
2. Electric operator

Upon approval, such specifications hereby become part of this specification.

PART 2 – PRODUCTS

2.1 OVERHEAD DOOR – Alternate #1

A. Overhead door shall be a Haas-Therm Model CHT-750 heavy duty aluminum unit, 1.75" thick, by Haas Door, a Nofziger Company, 320 Sycamore, Wauseon, OH 43567 (tel. 866-637-3667, toll-free fax 800-874-4227, email: info@haasdoor.com), or approved equal, dimensions as shown on Drawings.

1. Color shall be as selected by Owner.
2. Doors shall be constructed to meet or exceed standards established under National Association of Garage Door Manufacturers' specifications and designed for 20-psf minimum wind load.

B. Track and Hardware

1. All tracks shall be 3" heavy gauge galvanized steel, standard lift, with adjustable vertical tracks bracket mounted on wood jambs.
2. Counterbalance shall be torsion springs engineered to comply with requirements of NAGDM specifications. All hardware shall be as recommended by manufacturer for door size, weight, and usage conditions.
3. A hand chain hoist shall be included to provide capability for manual operation of door.
4. Supply and install all wood jamb framing and blocking as called for by door manufacturer.

C. Electric door operators shall be jack shaft, side mounted, model as recommended by door manufacturer for door size and lift condition, with standard hardware operable both from inside and outside of building as shown on Drawings.

D. Overhead Door Accessories: in all cases, pusher springs must be supplied for operation of the overhead door.

PART 3 – EXECUTION

3.1 GENERAL

All materials shall be installed in complete accordance with manufacturer's recommendations and instructions, which hereby become a part of this Specification.

3.2 ELECTRIC DOOR OPERATORS – Alternate #1

Salt barn door operator shall be side mounted.

END OF SECTION

SECTION 09900

PAINTING **(revised spec)**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

All Work under this Section shall be performed in accordance with the Drawings and the provisions of the Contract, including General Conditions, Supplementary General Conditions, and Division I—General Requirements of these Specifications.

1.2 SCOPE OF WORK

A. The work covered in this section will include all painting and staining of exterior wood surfaces, painting of bollards and pile height line, and treatment of any truss connector plates that remain exposed after fabrication of 6-ply truss units.

1.3 DEFINITION

For purposes of this specification, the terms "paint" and "painting" refer to the application of any paint or stain materials specified in these documents.

1.4 SUBMITTALS

A. Refer to Section 01300, Submittals.

B. Submit manufacturer's specifications and instructions for all paint, stain, and epoxy coating products used.

C. Submit color samples or chips for paint and stain.

PART 2 – PRODUCTS

2.1 PAINTING OF EXTERIOR WOOD SIDING AND TRIM

A. Primer shall be exterior grade latex wood primer, Sherwin Williams B42W08041, or approved equal.

B. Stain shall be exterior grade solid color acrylic latex stain, Sherwin Williams WoodScapes® A15 series, or approved equal; colors to be selected by the Owner. PLEASE NOTE: vinyl acrylic stain or paint may not be used on Duratemp siding.

2.2 PAINTING OF BOLLARDS

All bollards shall be painted with two coats of rust inhibitive paint equal to Rustoleum, color to be Federal yellow.

2.3 TREATMENT OF INTERIOR METAL SURFACES

All exposed truss connector plates within the salt storage structure shall be treated with Sherwin Williams Macropoxy® 646 fast-cure epoxy coating, or approved equa

2.4 PAINTING OF INTERIOR PILE HEIGHT LINE

Paint shall be Federal yellow traffic marking paint for exterior use as manufactured by Devoe or equal.

PART 3 – EXECUTION

3.1 PAINTING OF EXTERIOR WOOD SURFACES

A. Refer to and follow manufacturer's instructions for surface preparation and application.

B. All surfaces to be painted shall be dry and clean (Thruway adds: as per manufacturer's instructions). Before painting, all surfaces shall be thoroughly cleaned of all dust, dirt, oil, grease, rust, scale, and other foreign matter. The cleaning shall be done with sandpaper, steel scraper, or wire brushes, as necessary.

C. Follow manufacturer's instructions regarding air, surface and material temperatures, other weather conditions, and time between coats and touchups or recoats.

D. Apply materials as follows:

1. Primer: one coat.
2. Paint: two coats, or as recommended by the manufacturer.

3.2 PAINTING OF BOLLARDS

A. Surfaces to be dry and clean, as per manufacturer's instructions.

B. Apply paint to entire length of pipe, including the joint between pipe and footing, prior to backfilling.

3.3 TREATMENT OF INTERIOR METAL SURFACES

A. For surface preparation, mixing, and application, follow manufacturer's instructions for use on galvanized steel surfaces.

B. After fabrication of 6-ply truss units, those truss connector plates that remain exposed shall be painted as above; damaged surfaces shall be touched up after installation.

3.4 PAINTING OF INTERIOR PILE HEIGHT LINE

A. A 4" wide line will be painted as shown on Drawings around the perimeter of the interior of the crib wall. The line shall be located 2'-0" below the top of the wall. At the entranceway, this line shall extend from the bottom of the door jamb, upward at an angle of 45°, until reaching a height of 10'-0" above finished floor (2' below top of wall).

END OF SECTION

SECTION 13130

SALT STORAGE BUILDING

PART 1–GENERAL

1.01 SUMMARY

A. Work included:
   1. Constructing a pre-engineered wood building suitable for the bulk storage of salt. CONTRACTOR is responsible for constructing footers, drainage, site work, structure and electrical work as shown on the plans.
   2. Framing and other building components are specified in Sections 05500, 06100, 07610, 08300 and 09900 of the specifications. CONTRACTOR shall provide all necessary components for a complete, weather-tight installation.

B. The building has been designed of a manufacturer who is regularly engaged in the fabrication of pre-engineered structures. All materials shall be new, unused, and free from defects.

1.02 REFERENCES – Bidders are required to a reference list as contained in Part III.5, Statement of Bidder's qualifications. Failure to complete the qualification sheet may be cause for rejection of bid.

END OF SECTION

SECTION 15000

GENERAL REQUIREMENTS FOR MECHANICAL WORK

PART 1–GENERAL

1.01 SUMMARY

A. Work includes general requirements for all mechanical and plumbing work.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

C. Work of Other Divisions: CONTRACTOR for this work shall coordinate its work with that of any other contractors working in the same construction area. The contractors shall make a mutual agreement as to when piping and appurtenances shall be installed so as to minimize interference with each other's work.

D. Finishes: Unless otherwise specified, preparation and painting shall conform to all requirements and provisions specified in Division 9.

E. Electrical Controls: All electrical controls shall be furnished and installed under Division 16, except for those items specified to be furnished with the equipment. Where electrical controls are specified to be furnished with the equipment, electrical controls shall be in accordance with Division 16 unless otherwise specified.

F. Equipment Foundations: CONTRACTOR shall construct concrete foundations for all equipment and control panels under this Contract unless noted otherwise. Foundations shall generally be at least 4 inches high, shall consist of six-bag mix concrete, anchor bolts, reinforcing rod dowels into building concrete, and grouting with nonshrink element (containing no iron filings) where required. More specifically, concrete and grout shall meet the requirements found in Division 3.

G. Concrete: All concrete poured under this Contract, unless shown or specified otherwise, shall conform to the requirements of Division 3.

1.02 CONTRACT DOCUMENTS

A. The drawings are generally diagrammatic, and CONTRACTOR shall coordinate the work so that interferences are avoided. Provide all offsets in ductwork, piping, etc., necessary to properly install the work. All offsets, fittings, etc., shall be provided without additional expense to OWNER.

B. Any device or equipment installed improperly and/or positioned without prior coordination shall be repositioned at no cost to OWNER.

1.03 CODES AND ORDINANCES

A. CONTRACTOR is expected to know or to ascertain, in general and in detail, the requirements of all codes and ordinances applicable to the construction and operation of systems covered by this Contract. CONTRACTOR shall know or ascertain the rulings and interpretations of code requirements being made by all authorities having jurisdiction over the work to be performed by them.

B. In preparing Bid, CONTRACTOR shall include the cost of all items and procedures necessary to satisfy the requirements of all applicable codes, ordinances, and authorities, whether or not these are specifically covered by the drawings and specifications. All cases of serious conflict or omission between the drawings, specifications, and codes shall be brought to ENGINEER's attention as herein before specified. CONTRACTOR shall carry out work and complete construction as required by applicable codes and ordinances and in such a manner as to obtain approval of all authorities whose approval is required.

1.04 SUBMITTALS

A. See Section 01300–Submittals for shop drawing submittal procedures.

B. Applicable provisions of Section 01300–Submittals cover requirements for Operation and Maintenance Manuals.

C. Applicable provisions of Section 01700–Contract Closeout govern requirements for record drawings, operation and maintenance data, and warranty information.

1.05 DELIVERY STORAGE AND HANDLING

A. Applicable provisions of Section 01600–Materials and Equipment govern the handling, storage, and protection of materials and equipment.

1.06 MAINTENANCE MANUAL

A. Prior to 50% completion of the Contract, CONTRACTOR shall furnish to ENGINEER four complete copies of a maintenance manual for all equipment furnished.

B. The manuals shall include manufacturer's instructions for maintenance and operation for each item of mechanical and electrical equipment. Manuals shall be specific for the equipment as installed; provide project specific inserts as required. Manuals shall contain: operation instructions, lubrication schedules, types and quantities, preventive maintenance program, spare parts list, parts lists, I.D. No. and exploded views, assembly instructions,

parts supplier location, trouble shooting and start-up procedures and, where applicable, test data and curves.

C. All sheets have reduced dimensions as described for shop drawings, and shall be furnished in 3-ring binders or 3-tab report covers.

D. CONTRACTOR shall deliver products in undamaged, dry condition, in original unopened containers or packaging with identifying labels intact and legible.

E. Immediately on delivery, CONTRACTOR shall inspect shipment to assure:
   1. Product complies with requirements of Contract Documents and reviewed submittals.
   2. Quantities are correct.
   3. Accessories, and installation hardware are correct.
   4. Containers and packages are intact and labels legible.
   5. Products are protected and undamaged.

1.07 SEQUENCING

A. Applicable provisions of Section 01010–Summary of Work govern construction sequencing.

1.08 WARRANTY

A. Applicable provisions of Section 01700–Contract Closeout govern product warranties.

1.09 SYSTEM START-UP

A. Applicable provisions of Section 01650–Starting of Systems govern start-up and testing.

B. Installation of all equipment furnished under this Contract shall be supervised by a qualified representative of the equipment manufacturer. All equipment shall be placed in operation, and plant operators shall be trained to the satisfaction of OWNER by a qualified representative of the equipment manufacturer. OWNER may videotape training presentations given by manufacturer's representatives. Final payment for various items of equipment will not be made by OWNER until the equipment is operating to their satisfaction.

C. Equipment manufacturer shall provide a written report covering checkout, testing, inspections, and start-up and shall identify any deficiencies noted. Report shall be submitted to ENGINEER. CONTRACTOR shall be responsible for correcting all deficiencies noted in report.

D. For equipment or systems requiring seasonal operation, perform demonstration for noncurrent season at start of noncurrent season.

E. Where items of equipment are placed into service at different times or sequence, manufacturer's services for start-up, field testing, and supervision shall be provided for each time or sequence. Training shall be provided prior to or at the time the first similar item of equipment is placed in service.

F. All costs of supervision, operator training, and start-up shall be included in the Bid.

1.10 MAINTENANCE

A. CONTRACTOR shall furnish a 1-year supply of grease and oils for all items of equipment requiring lubrication. Lubricants for all items of equipment shall be the same brand, when available, as recommended by the manufacturer to meet both warm and cold weather requirements.

PART 2–PRODUCTS

2.01 STANDARD PRODUCTS

A. All equipment shall be UL and NEMA approved.

B. Unless specified otherwise, all similar equipment such as fans, heaters, rooftop units, air handling units, split systems, boilers, pumps, makeup air units, etc., shall each be by the same manufacturer.

C. All equipment, ductwork, piping, and accessories shall be selected and installed for conditions in which it will perform (e.g., general purpose, weatherproof, raintight, explosion proof, dustproof, or any other special type).

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 16000 - ELECTRICAL

1. SECTION INCLUDES
2. SUMMARY OF WORK
3. GENERAL
4. SUBMITTALS
5. DELIVERY, STORAGE, AND HANDLING
6. PROJECT CONDITIONS
7. MATERIALS
8. EXAMINATION/PREPARATION
9. INSTALLATION - GENERAL
10. CONDUIT INSTALLATION
11. WIRE & CABLE INSTALLATION
12. SECONDARY GROUNDING INSTALLATION
13. BOX INSTALLATION
14. DISCONNECT AND STARTER INSTALLATION
15. RECEPTACLE AND SWITCH INSTALLATION
16. PANEL BOARD INSTALLATION
17. LIGHTING INSTALLATION
18. FUSE INSTALLATION
19. TESTING
20. CLEAN UP
21. BASIS OF PAYMENT

1. SECTION INCLUDES

Wiring shown or specified including electrical power distribution system and lighting systems.

Feeders and branch circuits to all electrical circuits to all electrically powered or controlled equipment including disconnects.

Fuses for all fusible equipment including disconnects.

2. SUMMARY OF WORK

Furnish all labor, materials, equipment, excavation, backfill, and other necessary item to install the electrical system as shown on the Drawings and specified herein to construct a complete workable system. Work includes purchase and utilization of portable generator for temporary facilities as described in Section 01500.

Includes installation and connection of all electrical utilization equipment included in this Contract.

It is the general intent of these specifications that all motors shall be furnished with the particular object of equipment it drives.

3. GENERAL

Electrical CONTRACTORS performing work under this Contract shall read and understand the Instructions to Bidders, General Conditions, Supplemental General Conditions, and Special Conditions. If any discrepancies are discovered between this Section and the above mentioned Contract Documents, the above mentioned Contract Documents shall overrule this Section. This Section is intended as a supplement to the above mentioned documents.

All electrical work shall be performed by a licensed electrician familiar with codes and industry standard methods.

The symbols and abbreviations generally follow standard electrical and architectural practice.

Work under this section shall be coordinated with that of other trades to ensure proper final location of all electrical equipment and/or connections.

The minimum standard for all work shall be the latest revision of the Kentucky Building Code (KBC) and the National Electrical Code (NEC). Whenever and wherever state laws and/or regulations and/or the ENGINEERS design require higher standards than the current NEC, then these laws and/or regulations and/or the design shall be followed.

Inspection of the electrical system shall be required. The inspection shall be performed by a state or local government appointed, state licensed inspector or, if not applicable, the CONTRACTOR shall select a state licensed inspector and shall submit credentials to the ENGINEER for approval.

Should a piece of electrically driven equipment be supplied of a different size or horsepower than indicated on the plans, the CONTRACTOR shall be responsible for installing the proper size wiring, conduit, starters, circuit breakers, etc. for proper operation of that unit and complete electrical system.

It is the intent of these specifications to provide for an electrical system installation complete in every respect, to operate in the manner and under conditions as shown on the Drawings and in these specifications. The CONTRACTOR shall notify the ENGINEER, in writing, of any omission or error prior to the opening of bids. In the event of the CONTRACTOR's failure to give such notice, he/she shall be required to correct the work and/or furnish items omitted at no additional cost.

Necessary changes or revisions in electrical work to meet any code or power company requirements shall be made by the CONTRACTOR at no additional cost.

Installation of equipment that has not been specifically detailed in the Drawings or in these Specifications shall be installed per that equipment manufacture's recommendations and industry standard methods. All hardware, labor, and materials required for said equipment installation shall be considered an incidental item.

4. SUBMITTALS

Submit layout drawing, complete schematic and composite wiring diagrams, control direct wiring diagrams, and descriptive literature in accordance with Section 01300.

Service manuals shall be submitted on all equipment and shall be bound in 3 ring binders. The manual shall include information on accessories such as timers, etc..

5. DELIVERY, STORAGE, AND HANDLING

Materials shall be suitably packaged be manufacturer to prevent damage during shipment. Damaged materials will not acceptable for use.

Store materials on site in clean, dry storage area; when outside, elevated above grade and enclosed with durable watertight wrapping.

Handle all materials carefully to prevent damage. Minor scratches, marks or blemishes to finish shall be repaired to satisfaction of the ENGINEER.

6. PROJECT CONDITIONS

If the existing conditions prohibit proper installation or installation as shown on the Drawings the CONTRACTOR shall notify the ENGINEER.

The CONTRACTOR shall protect all electrical items and shall replace items which are damaged during construction.

7. MATERIALS

7.1 CONDUIT

A. Rigid Metal

1. All rigid conduit shall be aluminum.

B. PVC

1. Shall be schedule 40, manufactured to conform with UL standards for exposed work inside building.

2. Shall be schedule 40 direct burial with expansion joints in accordance with manufactures recommendation for underground installations.

3. Sharp bends where cable pulling could cut, conduit shall be aluminum.

7.2 WIRE AND CABLE

A. Shall be soft drawn copper with type THHN insulation.

B. Conductor size shall be AWG (American Wire Gauge) standard with 12 AWG being the minimum power conductor size with a minimum voltage rating of 600 volts. Minimum control conductor size shall be #14 AWG unless furnished otherwise by device manufacturer.

C. All conductors shall be stranded.

D. Other insulation's with higher temperature rating shall be used when connecting to light fixtures or appliances that have special requirements.

7.3 WIRE SPLICING AND TERMINALS

A. Terminals and Splice Connectors (#22 to #4 AWG)

1. Shall be compression type with barrel to provide maximum conductor contact and tensile strength.

2. Performance, construction, and material shall be in accordance with UL standards for wire connectors and rated for 600 volts and 105ø Celsius.

3. Shall be manufactured from high conductivity copper and entirely tin plated.

B. Lugs and Connectors (#6 AWG to 1000 MCM)

1. Shall be compression types with barrels to provide maximum conductor contact and tensile strength.

2. Shall be manufactured for high conductivity copper and entirely tin plated.

3. Lugs and connectors must nave a current carrying capacity equal to the conductors for which they are connecting and also meet all UL requirements.

4. Lugs shall be rated for operation through 35 kv.

C. Twist on Wire Connectors (#22 to #10 AWG)

1. Must have a corrosion resistant spring that is free to expand within a steel jacket.

2. The steel jacket shall be insulated with a flexible vinyl jacket capable of withstanding 105° Celsius and of sufficient length of cover overstripped wires.

7.4 BOXES

A. Pull Boxes and Junction Boxes

1. Shall meet all NEC and UL requirements.

2. Pull boxes for exterior work are shown on the Drawings and are the minimum number required.

3. The type of pull boxes shall be as shown on the Drawings.

B. Receptacles

1. Shall be duplex type, rated to 20 amps, 125 volts, and be ivory colored unless otherwise noted.

2. Mounting height shall be 4 feet above finished floor.

3. All receptacles shall be of the grounding type.

C. Ground Fault Interrupter Receptacles

1. Ground fault interrupter Receptacles shall be required where shown on the Drawings, and shall be indicated by the abbreviation "GFI" beside the circuit symbol.

2. They shall be rated to 20 amps (125 volts with 20 amp face plates) and shall be of the duplex, feed through type, capable of protecting downstream Receptacles on the same circuit.

3. They shall be UL listed and interrupt the current between 4-6 milliamps of ground fault leakage.

4. Appropriate plates shall be furnished.

D. Switches

1. All switches for general lighting shall be rated to 20 amps, 125 volts and be ivory colored unless otherwise noted

2. All switches shall be mounted 48 inches above the finished floor.

E. Outlet Boxes

1. Shall be hot-dipped galvanized and meet all NEC and UL requirements.

2. For exterior use or for those located in wet/damp areas boxes shall be cast aluminum, deep type, with corrosion proof fasteners, watertight, gasketed, with thread hubs.

3. Provide corrosion resistant steel knockout closure for unused openings.

7.5 SAFETY SWITCHES

A. Shall be of heavy duty industrial, quick-make, quick-break type. The ratings shall correspond to that of the equipment in which the circuit is being used, fuses sized as shown on the Drawings.

B. Shall have mechanical door interlock top prevent the door from opening with switch in the "on" position and facilities for locking it in the "on" or "off" position.

C. Shall be UL listed and shall conform to NEMA standards.

D. Enclosures for outside installation shall be NEMA 3R.

E. Enclosures for inside installation shall be NEMA 1.

7.6 PANEL BOARDS

A. Three phase panel boards shall be of the distribution type, 208 volts AC, with mains and breakers as shown on the Drawings.

B. Lighting panel boards shall be of the type, size, and ratings as shown on the Drawings.

C. Panel boards shall be manufactured by General Electric, Square D, Westinghouse, or equal.

7.7 CIRCUIT BREAKERS

A. Shall be of the molded case type, bolt on, with thermal magnetic trip.

B. Trip elements of multi-pole breakers shall be effectively insulated from one another.

C. Multi-pole breakers shall be designated so that an overload on any pole shall open all poles simultaneously.

D. Breaker operating mechanism shall be the quick-make, quick-break type and shall be entirely trip free to prevent the contacts from being held in a closed position against a short circuit.

E. Breakers shall have a thermal bi-metallic element for the delayed overload protection and a magnetic element for short circuit protection.

F. Breakers shall trip indicating with the trip position midway between the "on" and "off" positions.

G. Breakers for power distribution panels shall be F frame or larger. All breakers rated above 225 amps shall have interchangeable magnetic trip elements.

H. All elements shall be UL listed, conform to requirements of NEMA standards and shall be General Electric, Westinghouse ITE, Square D or equal.

7.8 LIGHTING

A. Lighting fixtures, lighting equipment, components, mangers, etc. shall be furnished and installed as indicated on the Drawings.

B. Lamps shall be furnished and installed for all fixtures.

C. All fixtures shall be delivered complete with suspension and mounting accessories, ballasts, diffusers, reflectors, etc., all wired and assembled. All accessory wiring shall be furnished and installed.

D. All outside luminaries shall be of the type that will prevent insect accumulation inside the luminaries.

E. The manufacturers standard finish shall be acceptable.

F. Conduits between fixtures shall be rigid metallic type. The use of flexible conduit for connection to fixtures is prohibited.

7.9 FUSES

A. Shall have 200,000 AMP interrupting capacity at rated AC voltage.

B. Shall have maximum operating temperature of 300°F.

8. EXAMINATION/PREPARATION

Verify existing conditions.

Locate all existing underground cables and verify the size and type of wire.

Notify utility company of work to be performed.

Obtain all necessary permits prior to commencing work.

9. INSTALLATION - GENERAL

Cooperate with other CONTRACTORS engaged in project. Execute work in a manner not to interfere with other CONTRACTORS or OWNER's operations.

Coordinate work with other CONTRACTORS regarding location, size of pipes, openings, switches, outlets, so there is no interference between installation or progress of any CONTRACTORS.

Install all equipment to allow for removal, repair, or changes to equipment.

Provide sleeves for all electrical conduit passing through walls, ceilings, floors and foundations. Provide sleeves of sufficient lengths to extend through full thickness of wall construction with ends flush. Extend floor sleeves one inch above finished floor.

Where cutting is required to facilitate construction, patch and repair, cut items to original state. Do not cut structural work without prior written approval of ENGINEER.

Cut holes through concrete and masonry with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by ENGINEER because of limited work space.

Layout holes in advance. Notify ENGINEER prior to drilling through structural sections, for determination of proper layout.

Where electrical equipment is located on damp or wet walls or locations as direct, it shall be "stand-off" mounted 1/2" from the wall in a manner so that the rear of the equipment is freely exposed to the surrounding air.

Make floor, exterior wall and roof seals watertight. Sleeve walls and floors which are cored for installation of conduit with steel tubing, grouted and space between the conduit and sleeve fill as specified herein.

Paint conduit and other electrical equipment where specified in accordance with Section 09900. Provide touch-up painting of all equipment marred in any way during shipment or installation.

10. CONDUIT INSTALLATION

10.1 All interior conduit shall be exposed.

10.2 Exterior underground conduits shall be degreased and pre-treated with Koppers 40 Passivator or Koppers 30 metal conditioner and painted with 2 coats of Koppers Bituminastic 300-M. Other finishes which are equivalent may be used.

10.3 All conduit shall be marked with the manufacturer's name or trade mark as well as type of conduit and size. The markings shall appear at least once every 10 feet.

10.4 The minimum sized conduit shall be 3/4". The following table shows the minimum burial depth required for all exterior conduit:

Rigid Aluminum Conduit	18"
Schedule 40 Burial PVC	30"

10.5 Wire pulling shall be facilitated by the use of a UL approved pulling compound in pulls over 30 feet in length or where there are 2 or more 90ø bends.

10.6 Only polypropylene, nylon, or manila pulling ropes will be permitted. Standard Industry recognized wire pulling equipment shall be used.

10.7 All conduits entering and leaving instrument enclosures shall be sealed around the wires with silicone.

10.8 Should the elevation of the stubbed up end of an underground conduit be below the 100 year flood elevation where it enters the building, conduit sealing bushings shall be utilized. If a conduit contains more wires than can be sealed with standard sealing bushings, silicone rubber may be used.

10.9 WORKMANSHIP

A. All conduit shall be installed in a first class workmanship manner. It shall be installed in horizontal and vertical runs in such a manner as to ensure against trouble from the collection of trapped condensation and shall be arranged do as to be devoid of traps wherever possible. All conduits entering a structure shall be above the 100 year flood elevation (elev 500) before coming through the wall. Special care shall be used in assuring that exposed conduit runs are parallel or perpendicular to walls, structural members, or intersections of vertical planes and ceilings.

B. Fittings or symmetrical bends shall be required wherever right angle turns are made in exposed work. Bends and offsets shall be avoided wherever possible, but where necessary, they shall be made with an approved conduit bending machine. All conduit joints shall be cut square, reamed smooth and drawn up tight, using couplings intended for the purpose.

C. Conduits shall be securely fastened to all sheet metal outlets, junction and pull boxes with double aluminum locknuts and insulating-grounding bushings as required by the NEC.

D. Runs of exposed conduit shall be supported in accordance with the NEC using cast aluminum one hole pipe straps with spacers to provide an air space behind the conduit.

E. All conduits in walls and slabs shall be securely braced, capped (wooden plugs are prohibited), and fastened to the forms to prevent dislodgment during vibration and pouring of concrete.

F. During construction, all conduit work shall be protected to prevent lodgment of dirt, plaster or trash in conduits, fittings or boxes. Conduits which have been plugged shall be entirely freed of accumulations or be replaced.

G. All conduits in floors or below grade shall be swabbed free of debris and moisture before wires are pulled. Crushed or deformed conduit shall not be permitted.

H. All open conduit work through walls or slabs shall be run through sleeves as shown on the Drawings. (Typical small pipe openings in walls and slabs.) These sleeves shall be PVC of suitable diameter to permit the passage of the conduit used.

I. The final section of conduit connecting each motor or piece of utilization equipment subject to vibration shall be of the flexible type, PVC covered aluminum containing a continuous copper ground built in on sizes up to 1-1/4 inch with fittings to match. On conduit sizes larger than 1-1/4 inch, type "UA" may be used. All flexible sections of conduit larger than 1-1/4 inch in diameter shall be paralleled with a braided copper bonding strap connected between the last section of rigid conduit and the frame of the equipment, to ensure a continuous ground. Samples of the flexible conduit shall be submitted with shop drawings for review. Flexible conduit to space heaters shall be long enough to allow swivel action.

10.10 AREAS OF USE FOR EACH TYPE OF CONDUIT

		PVC	Aluminum
A.	Exterior underground runs	Yes	No
B.	Exterior exposed runs	No	Yes
C.	Interior exposed runs	Yes	No

10.11 Conduit shall be bedded firmly and continuously on sand or pea gravel and provide a minimum of 6 inches of covering of sand or pea gravel on all sides of conduit.

10.12 Maintain all trenches and excavations free of standing water.

10.13 Backfill all trenches in 8 inch layers and compact by tamping and puddling. Backfill material shall be clean dirt, free of solid material (rocks, concrete, brick, or other debris). Installation shall be approved by ARCHITECT/ENGINEER prior to backfilling.

10.14 Provide adequate barricades, signs, lights, etc. while excavations are open.

10.15 Provide warning tape at 12 inch depth.

11. WIRE & CABLE INSTALLATION

Wire shall be in first class condition when installed.

All connections and splices shall be made in accordance with conductor manufacturer's recommendations and as written herein.

No conductors shall be drawn into conduits until all work which may cause wire or cable drainage is completed.

Wire pulling shall be accomplished utilizing machinery and accessories intended for the purpose.

Provide each cable or conductor in panels, pull boxes or troughs with a permanent pressure-sensitive label with suitable numbers of letter for easy identification. Identify control wires at each end and in junction boxes with designated wire numbers corresponding to control schematic drawings.

Provide wires and cables entering equipment or panels with enough slack to eliminate stretched, angular connection. Neatly arrange wiring, bundle and fan out to termination panels. Make minimum bending radius for conductors in accord with National Electrical Code.

Support all conductors in vertical raceways in accord with National Electrical Code.

Leave at least 6 inch loops or ends at each outlet for installation of devices or fixtures. Roll up all wires in outlet boxes not for connection to fixture or device at that outlet, connect together and tape.

Upon completion of cable and wire installation, but before termination to equipment, test each wire for grounds and short circuits. Replace or correct defective wiring.

12. SECONDARY GROUNDING INSTALLATION

12.1 GROUND RODS

A. Installed vertically with top 18 inches below finished grade or as shown on Drawings.

B. Connection to rod shall be with a compression type connector or a molecular weld (exothermic reaction) connection.

C. Connections shall be made in accordance with connector manufacturers installation instructions.

12.2 PROTECTIVE COATING

Connections shall be coated with a protective urethane seal coat after connections are complete. Apply four coats at 15 to 20 minute intervals or in accordance with manufacturer's application instructions.

12.3 CONNECTIONS

A. Made with compression type connectors or a molecular weld connection.

B. Made in accordance with manufacturers installation instruction.

12.4 GROUND STRAPS

Installed on all piping where a meter, expansion joint, or dielectric unions are used in all water and conduit systems or other location where a bonding jumper is required by NEC.

12.5 GROUNDING BUSHINGS

Installed on all conduits which contain a ground wire or conduits used for main feeders or subfeeders and as required by NEC.

Contact services shall be thoroughly cleaned prior to connections being made.

Grounding conductors shall be installed to permit the shortest most direct path to ground.

Ground conductors shall be installed in conduit where not enclosed in a cabinet.

Exterior mounted equipment shall have their enclosures grounded directly to a separate 3/4 inch by 10 foot driven ground rod in addition to a conductor run directly from interior electrical system ground.

Solidly ground all electrical equipment.

A main building ground, bare copper conductor, shall be run in conduit from the main service to a driven ground field outside the building as shown on the drawings. The building ground field shall be constructed using a #2 bare solid tinned copper ground wire. The use of stranded copper or aluminum wire is strictly prohibited. The main building
ground shall be extended to the water service and to a main effectively grounded main structural steel member of the building. Provide a properly sized bonding shunt strap around the meter(s). Multiple ground rods shall be a minimum of 10 feet apart.

Panelboards, Switchboards, Disconnects and Generators:

A. Main Service Disconnect device (panelboard - disconnect switch) and first panelboard or disconnect switch on secondary side of transformer shall have the neutral and equipment ground bonded together. All other electrical equipment shall have the neutral isolated from the equipment ground.

B. Ground bars in panelboards and switchboards shall have sufficient lugs for each overcurrent device and incoming equipment ground conductor. Ground bar shall be bonded to device enclosure.

13. BOX INSTALLATION

The location of all boxes shall be coordinated prior to rough-in.

Recessed unless otherwise noted on the drawings, face of box (or extension ring) shall be flush with wall finish, be plumb, have all unused openings closed with knock-out closures.

Boxes shall be accessible.

Installed per NEC requirements for area in which it is being installed.

Through wall boxes shall not be permitted.

The covers for surface mounted boxes shall be of the same material as the box.

Surface mounted boxes 10 feet above floor or less shall be cast type, unless otherwise noted.

14. DISCONNECT AND STARTER INSTALLATION

Supply motor or load from individual branch circuit in separate branch conduit except where otherwise shown.

Make all final connections to motors with flexible conduit, not less than 18 inch or more than 24 inch long. Provide ground wire to motor frame. Adequately support conduit at each motor.

Verify proper direction of rotation of all motors.

Provide nameplates or legends indicating equipment served or the function of all disconnects, combination starters, and control devices furnished by CONTRACTOR. Size nameplates or legends relative to the device. Make from engraved phenolic compound, and properly secure the device.

Starters and other devices furnished with equipment shall be installed by CONTRACTOR furnishing them, including all power field wiring between
equipment and starters. CONTRACTOR furnishing equipment shall be fully responsible for providing adequate and correct wiring diagrams and instructions.

Motor sizes shown in schedules and their locations may differ from that provided, dependent upon manufacturer. Provide connections of proper capacity at proper locations regardless of those differences.

15. RECEPTACLE AND SWITCH INSTALLATION

15.1 RECEPTACLES

A. Rated 20 AMP 125 volt.

B. Installed in outlet boxes and have cover plates installed so they fit tight to surface without gaps or strain on plates.

C. Install 4 feet above finished floor unless otherwise noted on the electrical drawings.

D. Height may vary slightly to accommodate construction, all receptacles in any one room shall be installed at the same height, unless otherwise noted on the drawings.

E. Furnish matching plugs with non-standard receptacles, one plug for every four devices of same type and rating.

15.2 SWITCHES

A. Installed in boxes.

B. Pulled up tight so switch is secure and rigidly mounted.

C. Have a cover plate installed.

D. If side wired, wire shall be looped in a clockwise direction and shall be fully under head of terminal.

E. If back wired, conductor shall be fully seated, conductor shall not be visible when correctly installed.

F. Have wire terminals tightened to a minimum of 14 inch pounds.

G. Plates shall fit tight to surface without gaps or strain on plate.

H. Install (48) inches above finished floor unless otherwise noted on the Drawings.

I. When more than one switch is shown on the drawings in one location they shall be installed in gang type box of proper size for the number of devices and with one gang type cover plate.

J. Where switches are installed gang mounted and more than one voltage is in the same box or switches are 277 volt, barriers shall be installed between switches.

K. Installed plumb and parallel to adjacent surfaces.

L. Single and double pole switches shall be installed so that they are in the up position where load is on.

15.3 COVER PLATES

A. Plates shall fit tight and flat to surface without placing a strain on plate.

B. Plates shall be of the correct type of the location, box type and device.

C. Exterior location plates shall be mounted correctly for the type plate used, and be of the type which are weathertight while in use.

D. Weatherproof plates shall be installed where noted on the Drawings, exterior and wet locations.

E. Blank plates shall be installed on all boxes which do not have devices installed in them.

F. Use jumbo plates for outlets in masonry walls.

15.4 COLORS

A. Devices shall be ivory and coverplates shall be stainless steel unless otherwise required by these specifications.

16. PANEL BOARD INSTALLATION

Installed plumb and level.

When flush mounted, shall be rigidly secured and set so that flush trim will be flush with finished wall surfaces.

When surface mounted, shall be rigidly secured to walls.

Location and mounting of panelboards shall be coordinated with all trades prior to setting in place.

Wiring shall have rounded corners and be tied off with cable ties.

Wall mounted panels less than 72 inches high shall have top of panel at 6'6" above floor.

17. LIGHTING INSTALLATION

All lighting fixtures shall be surface mounted and rigidly connected to the structure.

18. FUSE INSTALLATION

Fused distribution system is designed to provide selectivity, coordination, and component protection.

Do not install fuses until equipment is ready to be energized. Make all final tests and inspections prior to energizing equipment. Include a thorough cleaning, tightening and examination of all electrical connections, and inspection of all grounding conductors.

Fuse all motor branch disconnects rated 30 a. to 600 a. When fuse size is not shown on Drawings, do not use fuses exceeding 125% of motor full load amperes for 1.15 Service Factor motors, and 115% for 1.00 Service Factor motors. Size fuses above 600 a. rating for motors up to 150% of motor full load amperes. When abnormal motor starting conditions, requiring over-sizing exists, notify the ENGINEER immediately. Confirm notification in writing. Do not proceed without ENGINEER's written instructions.

19. TESTING

After the wiring system is completed, and at such time as the ENGINEER may direct, the CONTRACTOR shall conduct an operating test for acceptance. They equipment shall be demonstrated to operate in accordance with the requirements of these Specifications and the Drawings. The test shall be performed in the presence of the ENGINEER or his authorized representative. The CONTRACTOR shall furnish all instruments and personnel required for the tests, as well as the necessary electrical power.

Before energizing the system, the CONTRACTOR shall check all connections and set all relays and instruments for proper operation. He shall obtain all necessary clearances, approvals, and instructions from the serving utility company prior to placing power on the equipment.

Test shall be performed to confirm integrity of insulation on wiring circuits selected by the ENGINEER at random.

20. CLEAN UP

Cleanup shall be completed as soon as possible after the electrical installation is complete. All light fixtures, outlets, switches, starters, motor control centers, disconnect switches and other electrical equipment shall be free of shipping tags, stickers, etc. All painted equipment shall be left free of scratches or other blemishes, such as splattered or blistered paint, etc. All light fixture diffusers shall be clean and the interior of all motor controls, etc., shall be free of dust, dirt, wire strippings, etc.

21. BASIS OF PAYMENT

No direct payment shall be made for electrical work. All electrical work necessary to construct a complete workable system shall be considered incidental to the project and included within the lump sum cost for the salt barn.

END OF SPECIFICATION

GEOTECHNICAL REPORT

March 26, 2019

Charles Martin, P.E.
Lexington Fayette Urban County Government
Department of Environmental Quality and Public Works
200 E. Main Street
Lexington, KY 40504

RE: West Hickman Salt Barn
Nicholasville, KY
L.E. Gregg Project No. 2019012

Mr. Martin,

L.E. Gregg Associates was tasked with completing a geotechnical field exploration for the proposed Salt Storage Barn at the West Hickman waste water treatment plant in Nicholasville, Kentucky. Sounding locations were placed at the four (4) corners of the proposed building pad. Concrete was generally encountered from the surface to a depth of 8 in. Undocumented rock fill was encountered from below the concrete paving to refusal depths. The rock fill appeared to generally consist of a mix of dense graded aggregate and #57 stone. The refusal depths encountered are listed in the table below.

Location	Concrete Thickness (in.)	Elevation (ft.)	Refusal Depth (ft.)	Refusal Elevation (ft.)
S-1	8	935.6	5.9	929.7
S-2	7.75	936.7	4.0	932.7
S-3	8	936.7	3.0	933.7
S-4	8	935.6	1.9	933.7

A sample of rock core was obtained from location S-4. The core indicated limestone with a thin interbedding of shale. The core had a recovery of 86% and a rock quality designation of 23%. This indicates fairly continuous bedrock of very poor quality.

Due to the shallow bedrock depths encountered and the presence of undocumented rock fill, we would recommend standard spread foundations bearing on the underlying bedrock. The foundations should be placed directly on competent unweathered bedrock. Removal of weathered bedrock material should be expected. **Foundations bearing on competent unweathered bedrock should be designed for an allowable bearing capacity of 10,000 psf.**