

**SECTION 01450**  
**QUALITY CONTROL**

**PART 1 - GENERAL**

**1.01 QUALITY CONTROL**

A. Work of all crafts and trades shall be laid out to lines and elevations as established by the Contractor from the Drawings or from instructions by the Engineer.

B. Unless otherwise shown, all work shall be plumb and level, in straight lines and true planes, parallel or square to the established lines and levels. The Work shall be accurately measured and fitted to tolerance as established by the best practices of the crafts and trades involved, and shall be as required to fit all parts of the Work carefully and neatly together.

C. All equipment, materials and articles incorporated into the Work shall be new and of comparable quality as specified. All workmanship shall be first-class and shall be performed by mechanics skilled and regularly employed in their respective trades.

**1.02 TESTS, INSPECTIONS, AND CERTIFICATIONS OF MATERIALS**

A. Tests, inspections and certifications of materials, equipment, subcontractors or completed work, as required by the various sections of the Specifications shall be obtained by the Contractor and all costs shall be included in the Contract Price.

B. The Contractor shall submit to the Engineer the name of testing laboratory to be used.

C. Contractor shall deliver written notice to the Engineer at least 24 hours in advance of any inspections or tests to be made at the Project site. All inspections or tests to be conducted in the field shall be done in the presence of the Engineer or the Engineer's representative.

D. Certifications by independent testing laboratories may be by copy of the attestation(s) and shall give scientific procedures and results of tests. Certifications by persons having interest in the matter shall be by original attest properly sworn to and notarized.

**1.03 MANUFACTURERS' FIELD SERVICES**

A. For proper installation and operation of the equipment specified in this project, the Contractor shall arrange for the services of qualified service representatives from the companies manufacturing or supplying each type of equipment.

B. The manufacturer or supplier shall provide sufficient engineering and technician manhours to satisfactorily complete Supervision of Installation; Equipment Check-out; and Field Acceptance Tests.

- END OF SECTION -

## SECTION 01500

### TEMPORARY FACILITIES AND CONTROLS

#### PART 1 -GENERAL

##### 1.01 DESCRIPTION

A. The General Contractor shall be totally responsible for the installation, maintenance, and cost of all temporary utility services with the exception of the temporary electric service which shall be the responsibility of the Electrical Contractor. Strict supervision of the use of temporary utility services shall be maintained by the respective Contractors as follows:

1. Enforce compliance with applicable standards.
2. Enforce safety practices
3. Prevent abuse of services.
4. Pay all utility charges required.

##### 1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. Each Contractor shall obtain and pay for all permits as required by governing authorities for his work.

B. Each Contractor shall obtain and pay for temporary easements required across property (other than easements furnished by the Owner).

C. Each Contractor shall comply with applicable codes.

##### 1.03 REMOVAL

A. Each Contractor shall completely remove his temporary materials, equipment, and offices upon completion of construction.

B. Each Contractor shall repair damage caused by his construction operations and restore to specified or original condition. This shall include resurfacing driveways and parking areas.

##### 1.04 TEMPORARY LIGHTING

A. The General Contractor shall furnish and install temporary lighting required for:

1. Construction needs.
2. Safe and adequate working conditions.
3. Public Safety.
4. Security lighting.

5. Temporary office and storage area lighting.

B. Service periods for safety lighting within the construction area shall be at all times that authorized personnel are present.

C. Costs of Installation and Preparation: The General Contractor shall pay all installation, maintenance and removal costs of temporary lighting.

D. Maintenance of temporary lighting service (replacement of bulbs, etc.) shall be the sole responsibility of the General Contractor.

#### **1.05 SANITARY FACILITIES**

The General Contractor shall provide temporary sanitary facilities secluded from public observation, for the use of all personnel on the work, whether or not in the General Contractor's employ. They shall be kept in a clean and sanitary condition and shall comply with the requirements and regulations of the public authorities having jurisdiction. The Contractor shall commit no public nuisance. Temporary sanitary facilities shall be removed upon completion of the work and the premises shall be left clean.

#### **1.06 PROTECTION OF INSTALLED WORK**

Contractor installing product shall protect it and control traffic in the area to prevent damage from subsequent operations. Protective coverings shall be provided at walls, projections, corners, jambs, sills, and soffits of openings in and adjacent to traffic areas.

#### **1.07 MAINTENANCE OF SERVICE IN EXISTING UTILITIES**

A. Where the existing utilities must be disturbed during construction under this Contract, their operation and function shall be maintained by the Contractor disturbing the utility to such a degree that service will be interrupted for minimum time periods only. Such disturbances and any maintenance use of these lines shall constitute no cost to the Owner. The Owner shall be notified of interruptions in sufficient time to prepare for them.

B. Should shutdowns in service be in excess of the time of duration agreed upon, and such excessive shutdown time be due to any Contractor's negligence, faulty Work and/or inability to perform, then and in that event, the Contractor shall be held liable to the Owner for any and all damages that may accrue to the Owner, by reason of such excessive shutdown periods.

C. Digging through services with trenching machines will not be permitted. Upon damage to utility services, such services shall be repaired immediately and tested to the satisfaction of the Engineer. The Contractor disturbing the utility shall notify all utility users of impending interruption of service and shall be responsible for all damage resulting from same. Payment for any disconnection and reconnection of utility services shall be included as a part of the Contractor's bid and no extra compensation will be made for same.

D. Each Contractor shall at all times maintain on hand an adequate supply of repair materials and tools with which to make repair to damaged utility lines. Should any Contractor inadvertently damage existing utilities, he shall make immediate repair thereto and in no event shall he leave the site before such repair has been made and approved.

E. As far as possible, the locations and sizes of existing mains are indicated on the Drawings; however, exact locations, pipe materials and sizes cannot be guaranteed. It shall be the responsibility of each

Contractor to locate and uncover existing lines, to which new mains are to be connected, and provide all connecting fittings of the correct size and type for each connection.

#### **1.08 PROPERTY PROTECTION**

A. Care is to be exercised by each Contractor in all phases of construction, to prevent damage and/or injury to the Owner's and/or other property.

B. All exposed existing piping must be immediately supported to prevent damage. Prior to completion of each day's work, such piping must be adequately covered by the Contractor and approved by the Owner's representative.

C. Each Contractor shall avoid unnecessary injury to trees and shall remove only those authorized to be removed by written consent of the Owner. Lawns, landscaping, crops, livestock, vegetation, fences, gates, and terrain damaged or disarranged by the Contractor's forces shall be immediately restored to their original condition or better.

#### **1.09 CONSTRUCTION WARNING SIGNS/SECURITY MEASURES**

A. Each Contractor shall provide construction warning signs for each location where he is working. He will further provide flagmen when required and shall abide by all applicable safety rules, including size, type and placement of construction signs.

B. Each Contractor shall provide barricades, lanterns and other such signs and signals as may be necessary to warn of the dangers in connection with open excavation and obstructions. Temporary railing shall be provided around open pits and other locations where needed to prevent accidents or injury to persons.

C. All Contractors shall work together in providing an adequate and approved system to secure the project area at all times, especially during non-construction periods; however, each Contractor shall be solely responsible for taking proper security measures for his work.

D. Each Contractor shall pay all costs for protection and security measures related to his contract work.

#### **1.10 TEMPORARY TELEPHONE SERVICES**

A. The General Contractor shall furnish, install, maintain, remove upon completion and pay all costs for temporary telephone service for construction needs throughout the construction period, including a separate service in the Resident Project Representative office, except as stated below.

B. The General Contractor shall only be responsible for the cost of local calls made by the Resident Project Representative.

C. The HVAC, Plumbing, and Electrical and Instrumentation Contractors are responsible for their own temporary services.

#### **1.11 ACCESS ROADWAYS/PARKING AREAS**

A. The General Contractor shall construct all access roadways needed during construction, and the planned access roadways for the completed project.

1. The General Contractor shall maintain access roadways in a passable condition continuously during the construction period.

2. Temporary all-weather access roads shall be of a width and load-bearing capacity to provide unimpeded traffic for construction purposes.

B. The General Contractor shall maintain all existing roadways within the project site which are used for any purpose by the construction operations. The degree and frequency of maintenance shall be adequate to keep existing roadways in a condition at least equal to their condition prior to construction. Road maintenance shall include daily dust control and grading as necessary on all roads and sweeping of paved roads every other day.

C. The General Contractor shall construct temporary parking areas to accommodate construction personnel in the area of construction.

1. Parking shall be controlled to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.
2. Parking on or adjacent to access roads, or in non-designated areas shall be prevented.

D. The General Contractor shall remove all temporary materials after construction is complete and reconstruct existing driveways and parking areas, if applicable.

#### **1.12 RESPONSIBILITY FOR TRENCH SETTLEMENT**

Each Contractor shall be responsible for any settlement caused by his construction that occurs within one (1) year after the final acceptance of this contract by the Owner. Repair of any damage caused by settlement shall meet the approval of the Owner.

#### **1.13 WASTE DISPOSAL**

Each Contractor shall dispose of waste, including hazardous waste, off-site in accordance with all applicable laws and regulations.

#### **1.14 TEMPORARY PUMPING**

A. The General Contractor shall provide temporary pumping facilities as necessary to maintain services during the construction period. A minimum of two pumps shall be provided for each circumstance, one to be a standby for the other in case of mechanical failure. Each pump shall be sized to handle peak flows for each application.

B. The General Contractor shall provide portable generators or temporary electrical connections to operate the temporary pumps.

C. The General Contractor shall maintain the temporary pumping facilities at the site until the replacement is accepted by the Owner.

#### **1.15 DUST CONTROL**

All Contractors shall execute work by methods to minimize raising dust from construction operations and provide a positive means to prevent air-borne dust from dispersing into atmosphere. Work areas inside the Project site shall be broom cleaned and debris removed at the end of each working day. Damp mopping shall be performed if required to collect dust. Floors and equipment shall be protected from foot traffic as required with walkway protection.

## **1.16 TEMPORARY ENCLOSURES**

The General Contractor shall furnish and install temporary enclosures at doorways, windows and other openings in exterior walls, as necessitated by weather and other conditions, and when required for the progress of the Work. Temporary doors shall be substantially built and hung, equipped with proper hinges, locks and other necessary hardware and shall be removed and reset whenever required to accommodate the work of other trades requiring their removal. All enclosures shall be maintained in good repair and removed when no longer needed. Door and window frames and sills shall be protected as necessary to prevent damage to items during construction.

## **1.17 CONTRACTOR'S FIELD OFFICE**

Each Contractor shall establish and maintain a field office on this Project and have available at the office a responsible representative who can officially receive communications from the Engineer. The Contractor shall have one complete, up-to-date set of Drawings, Specifications and Contract Documents (including all Addenda and Change Orders) in this office at all times, available for reference at any time. The office shall be provided with telephone service, facsimile machine, copy machine, light, air conditioning and heat; the cost of which shall be borne by the Contractor. Notices, instructions, orders, directions or other communications from the Engineer, left at this office, shall be considered as received by the Contractor.

## **1.18 RESIDENT PROJECT REPRESENTATIVE'S FIELD OFFICE (Not applicable to this project)**

The Contractor shall establish and maintain a single field office for use by the Resident Project Representative on this project. The office shall be provided with telephone service, light, air conditioning and heat, the cost of which shall be borne by the Contractor. Telephone service shall be a separate private line. The field office for the Resident Project Representative may be located within the Contractor's field office; however, it shall be separate from the Contractor's office. The Contractor shall furnish or provide access to the following:

- A. One plan table approximately 3'x 5' with smooth top and appropriate swivel chair.
- B. Electric lights and outlets as directed.
- C. One desk for general office use with appropriate chair.
- D. One four-drawer legal size metal filing cabinet with a lock.
- E. Private telephone with local service paid by the Contractor.
- F. Facsimile machine.
- G. Copy machine.
- H. Calculating machine with tape output.
- I. Supply of drinking water in a suitable cooler or other approved container.

## **1.19 TRAFFIC CONTROL**

A. Whenever and wherever traffic is sufficiently congested or public safety is endangered, Contractor shall furnish uniformed officers to direct traffic and to keep traffic off the highway area affected by construction operations.

B. Trained and equipped flagmen shall be provided to regulate traffic when construction operations or traffic encroach on public traffic lanes.

C. Flares and lights shall be used during hours of low visibility to delineate traffic lanes and to guide traffic.

D. At approaches to site and on-site, install appropriate signs at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

E. Contractor shall abide by regulations governing utility construction work.

F. Traffic control shall be provided according to the Ohio Department of Highways Manual on Uniform Traffic Control Devices for Streets and Highways.

G. Contractor shall remove equipment and devices when no longer required and repair damage caused by installation. Post settings shall be removed to a depth of two feet.

#### **1.20 HAUL ROUTES**

A. Consult with authorities and local schools, establish public thoroughfares to be used for haul routes and site access.

B. Confine construction traffic to designated haul routes.

C. Provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.

#### **1.21 STORAGE OF MATERIALS AND EQUIPMENT**

A. All excavated materials and equipment to be incorporated in the work shall be placed so as not to injure any part of the work or the existing facilities and so that free access can be had at all times to all parts of the work and to all public utility installations in the vicinity of the work. Materials and equipment shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining owners, tenants, and occupants.

B. Contractor shall provide suitable and adequate storage room for materials and equipment during the progress of the work, and be responsible for the protection, loss of, or damage to materials and equipment furnished by him, until the final completion and acceptance of the work.

C. Storage and demurrage charges by transportation companies and vendors shall be borne by Contractor.

**- END OF SECTION -**



## SECTION 01700

### PROJECT CLOSEOUT DOCUMENTS

#### 1.01 WORK INCLUDED

A. When Engineer considers that Work is finally complete in accordance with requirements of the Contract Documents, the Contractor shall be requested to make Project Closeout submittals as follows:

1. Project Record Documents: In accordance with Section 01720.
2. Guarantees, Warranties and Bonds: As required herein.
3. Final Application for Payment: In accordance with General Conditions.

B. The Work will not be considered complete and final payment made until all O&M Manuals have been submitted and approved, and Owner's personnel have been properly instructed in operation of all equipment.

C. The Work will not be considered complete and final payment made until all final clean-up has been done by the Contractor in a manner satisfactory to the Engineer.

#### 1.02 GUARANTEES, WARRANTIES, AND BONDS

A. Furnish two (2) original signed copies of warranties, bonds, and service and maintenance contracts executed by each of the respective manufacturers, suppliers and Subcontractors.

1. Accompanying guarantees, warranties and bonds shall be a typed reference sheet containing the following information:
  - a. Product, equipment or work item.
  - b. Manufacturer's name, address, and telephone number.
  - c. Specification section number.
  - d. Date of beginning of warranty, bond, or service and maintenance contract.
  - e. Duration of warranty, bond, or service and maintenance contract.
  - f. Proper procedure in case of failure.
  - g. Instances which might affect the validity of warranty or bond.
  - h. Contractor's name, address, and telephone number.
2. Submittals shall be on 8-1/2-inch x 11-inch punched sheets for insertion into a 3-ring binder. Larger sheets shall be folded to fit into binders.

3. Contractor shall provide a 3-ring binder to accommodate all submittals required herein. Binder shall be 3-ring, durable, commercial quality with a cleanable plastic cover.

B. General Warranty of Construction: Each Contractor shall warrant the entire contract equipment to be free from defects in design and installation for one year from the date of startup. In the event a component fails to perform as specified or is proven defective in service during the warranty period, the Contractor shall repair the defect without cost to the Owner.

### **1.03 FINAL PAYMENT**

Final Payment will not be made until all project closeout submittals have been received in accordance with this Section.

**-END OF SECTION-**

## SECTION 01720

### PROJECT RECORD DOCUMENTS

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED

The Contractor shall obtain from the Engineer one (1) set of blueline prints of the Contract Drawings. These prints shall be kept and maintained in good condition at the project site and a qualified representative of the Contractor shall enter upon these prints, from day-to-day, the actual "as-built" record of the construction progress. Entries and notations shall be made in a neat and legible manner and these prints shall be delivered to the Engineer upon completion of the construction. APPROVAL FOR FINAL PAYMENT WILL BE CONTINGENT UPON COMPLIANCE WITH THIS PROVISION.

##### 1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE:

- A. Section 01300 - Submittals.
- B. General Conditions.

##### 1.03 MAINTENANCE OF DOCUMENTS

- A. Maintain at job site, one copy of:
  - 1. Contract Drawings
  - 2. Specifications
  - 3. Addenda
  - 4. Reviewed Shop Drawings
  - 5. Change Orders
  - 6. Other Modifications to Contract
- B. Store documents in approved location, apart from documents used for construction.
- C. Provide files and racks for storage of documents.
- D. Maintain documents in clean, dry legible condition.
- E. Do not use record documents for construction purposes.
- F. Make documents available at all times for inspection by Engineer and Owner.

##### 1.04 MARKING DEVICES

Provide colored pencil or felt-tip marking pen for all marking.

## 1.05 RECORDING

- A. Label each document "PROJECT RECORD" in 2-inch high printed letters.
- B. Keep record documents current.
- C. Do not permanently conceal any work until required information has been recorded.
- D. Contract Drawings: Legibly mark to record actual construction as follows.
  - 1. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
  - 2. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
  - 3. Field changes of dimension and detail.
  - 4. Changes made by Change Order or Field Order.
  - 5. Details not on original Contract Drawings.
- E. Specifications and Addenda: Legibly mark up each Section to record:
  - 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
  - 2. Changes made by Change Order or Field Order.
  - 3. Other matters not originally specified.
- F. Shop Drawings: Maintain as record documents; legibly annotate Shop Drawings to record changes made after review.

## 1.06 SUBMITTAL

- A. At completion of project, deliver record documents to Engineer.
- B. Accompany submittal with transmittal letter, in duplicate, containing:
  - 1. Date.
  - 2. Project Title and Number.
  - 3. Contractor's Name and Address.
  - 4. Title and Number of each Record Document.
  - 5. Certification that each Document as Submitted is Complete and Accurate.
  - 6. Signature of Contractor, or authorized Representative.

- END OF SECTION -

## SECTION 02200

### EARTHWORK, EXCAVATION AND BACKFILL

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION OF WORK

- A. Extent of earthwork is indicated on the Drawings.
  - 1. Preparation of subgrade for slabs, walks, and pavements is included as part of this work.
  - 2. Backfilling of and trenches within the project is included as part of this work.
  - 3. Earthwork for pipelines is included as part of this work.
- B. Definition: "Excavation" consists of removal of all material encountered to subgrade elevations and subsequent disposal or reuse of materials removed.

##### 1.02 RELATED WORK

- A. Pipe Bedding and Backfill – Section 2230
- B. Erosion and Sedimentation Control - Section 02270.
- C. Pipes and Fittings - Section 02610.
- D. Seeding - Section 02930.

##### 1.03 REFERENCES

- A. State of Kentucky Department of Transportation, Standard Specifications for Highway Construction and "Construction and Material Specifications."
- B. ANSI/ASTM D698 - Moisture-Density Relations of Soils and Soil-Aggregate Mixture Using 5.5 lb. Rammer and 12 inch drop.
- C. ANSI/ASTM D1556 - Density of Soil in Place by the Sand-Cone Method.
- D. ASTM 2922 - Density of Soil and Soil-Aggregate in Place by Nuclear Methods.
- E. ASTM 3017 - Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

##### 1.04 QUALITY ASSURANCE

- A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

B. Testing and Inspection Service: Independent testing laboratory and Geotechnical Engineering and inspection services will be provided by the Contractor, and approved by the Owner, for quality control testing during earthwork operations at no additional cost to the Owner.

C. All construction operations involving earthwork are to be monitored by a qualified technician under the direct supervision of a Licensed Geotechnical Engineer.

D. Tests and analysis of fill materials will be performed in accordance with ANSI/ASTM D698 and under provisions of Section 01450.

E. Density tests shall be performed in sufficient number to ensure the specified densities are being obtained.

F. When ASTM D2922 is used, the calibration curves shall be checked and adjusted if necessary by the procedure described in ASTM D2922, paragraph ADJUSTING CALIBRATION CURVE. ASTM D2922 results in a wet unit weight of soil; and when using this method, ASTM D3017 shall be used to determine content of the soil. The calibration checks of both the density and moisture gages shall be made at the beginning of a job on each different type of material encountered and at intervals as directed by the testing laboratory.

#### **1.05 SUBMITTALS**

A. Test Reports-Excavating: Copies of test reports and field reports will be provided to the Owner and/or Engineer in accordance with Section 01300.

B. The Contractor shall provide access to site areas, borrow pits and other areas for testing. The Contractor shall also indicate the need for tests to be performed. The Contractor may prepare any tests necessary for the conduct of his work. Additional tests may be required as per Engineer's request.

#### **1.06 JOB CONDITIONS**

A. Site Information:

Test borings and other exploratory operations may be made by Contractor at no cost to Owner.

B. Existing Utilities: Prior to commencement of work, the Contractor shall locate existing underground utilities in areas of the work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

C. Use of Explosives:

Blasting shall be strictly prohibited.

D. Protection of Persons and Property:

1. Barricade open excavations occurring as part of this work and post with warning lights.

a. Operate warning lights as recommended by authorities having jurisdiction.

- b. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

## **PART 2 - PRODUCTS**

### **2.01 SOIL MATERIALS**

#### **A. Definitions:**

1. Subbase material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand.
2. Drainage fill: Washed, uniformly graded mixture of crushed stone or crushed gravel conforming to No. 57. (AASHTO M43).
3. Backfill and non-structural fill materials: Satisfactory soil materials free of debris, waste, frozen materials, vegetable, and other deleterious matter. No. 57 stone is also used as backfill material at selected structures.
4. Granular structural fill: Granular structural fill shall be used in areas where indicated in this specification. Granular structural fill shall consist of a crushed stone conforming to 610 (AASHTO M43) and having less than 5% passing the No. 200 sieve. Placing and compaction of the granular structural fill shall be in general accordance with KDOH Standard Specification Division 300 and this specification.
5. Flowable backfill required within state highway right-of-way shall be per KDOH specifications.

### **2.02 FILTER FABRIC**

- A. Material shall be non-woven polyester or polypropylene geotextile having an equivalent opening size no finer than U.S. Standard Sieve No. 200 and no coarser than a U.S. Standard Sieve No. 140.
- B. An acceptable product is Typar 3601 manufactured by the Dupont Corporation. Other equivalent products shall be submitted to the engineer for review and approval prior to usage.

## **PART 3 - EXECUTION**

### **3.01 EXCAVATION**

A. Excavation includes excavation to subgrade elevations including excavation of earth, rock, bricks, wood, cinders, and other debris. All excavation of materials shall be included in the unit price of the work and will be UNCLASSIFIED AND NO ADDITIONAL PAYMENT WILL BE MADE REGARDLESS OF TYPE OF MATERIAL ENCOUNTERED.

#### **B. Differing Site Conditions:**

1. The Contractor shall make his own determinations as to soil types, etc. Claims for differing site conditions based upon soil types, stability, bearing pressure, etc. will not be approved.

2. Notify Engineer of unexpected subsurface conditions and discontinue work in affected area until notified to resume.

C. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be at Contractor's expense.

1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to the Engineer.
2. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification.

D. Additional Excavation: When excavation has reached required subgrade elevations, notify the Geotechnical Engineer who will make an inspection of conditions. The surface of the excavated area shall be "proofrolled" with a loaded dump truck or other heavy construction equipment, as directed by the Geotechnical Engineer. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed in writing by the Engineer.

E. Stability of Excavations:

1. Slope sides of excavations to comply with OSHA, local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
2. Maintain sides and slopes of excavations in safe condition until completion of backfilling

F. Protection:

1. Protect excavation by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cave-in or loose soil from falling into excavation.
  - a. Where unstable material is encountered or where the depth of excavation in earth exceeds five (5) feet, the sides of the trench or excavation shall be supported by substantial sheeting, bracing, and shoring, or the sides sloped to the angle of repose. Sloping the sides of the ditch to the angle will not be permitted in streets, roads, narrow rights-of-way or other constricted areas unless otherwise specified. The design and installation of all sheeting, sheet piling, bracing and shoring shall be based on computations of pressure exerted by the materials to be retained under obtaining conditions. Adequate and proper shoring of all excavations shall be the entire responsibility of the Contractor; however, the Engineer may require the submission of shoring plans (accompanied by supporting computations) for approval prior to the Contractor undertaking any portion of the work. The standards of the Federal Occupational Safety and Health Act and the Kentucky Department of Labor shall be followed.



- b. Foundations, adjacent to where the excavation is to be made below the depth of the existing foundation, shall be supported by shoring, bracing or underpinning as long as the excavation shall remain open, or thereafter if required to insure the stability of the structure supported by the foundation, and the Contractor shall be held strictly responsible for any damage to said foundations.
  - c. Solid sheeting will be required for wet or unstable material. It shall consist of continuous vertical sheet piling of timber or steel with suitable wales and braces.
  - d. Where required due to the proximity of structures to deep excavations, sheet piling shall be installed. Sheet piling design is the responsibility of the Contractor.
  - e. Underpin adjacent structures which may be damaged by excavation work, including service utilities and pipe chases.
2. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross-braces, in good serviceable condition.
- a. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.
  - b. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.
  - c. Provide permanent steel piling or pressure creosoted timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops as required and leave permanently in place.
  - d. Whenever possible, sheeting shall be driven ahead of the excavation to avoid loss of material from behind the sheeting. If it is necessary to excavate below the sheeting, care shall be taken to avoid trimming behind the face along which the sheeting will be driven. Care shall be taken to prevent voids outside of the sheeting, but if voids occur, they shall be filled immediately with sand and compacted.
  - e. The Contractor shall leave in place to be embedded in the backfill, or concrete, all sheeting, bracing, etc. which is indicated on the Drawings to be so left in place. He also shall leave in place any and all other sheeting, bracing, etc. which the Engineer may direct him in writing to leave in place at any time during the progress of the work for the purpose of preventing injury to structures or property.
  - f. The Engineer may direct that sheeting and bracing be cut off at any specified elevation.
  - g. All sheeting and bracing not to be left in place shall be carefully removed in such manner as not to endanger the construction or other structures. All

voids left or caused by the withdrawal of sheeting shall be backfilled immediately using suitable materials and compaction methods.

- h. Trench sheeting shall not be removed until sufficient backfill has been placed to protect the pipe.
- i. All sheeting, planking, timbering, bracing and bridging shall be placed, renewed and maintained as long as is necessary.

G. Dewatering:

- 1. Dewatering of construction excavations may be required to provide a dry work environment.
- 2. To ensure proper conditions at all times during construction, the Contractor shall provide and maintain ample means and devices (including spare units kept ready for immediate use in case of breakdowns) with which to intercept and/or remove promptly and dispose properly of all water entering trenches and other excavations. Such excavation shall be kept dry until the structures, pipes, and appurtenances to be built therein have been completed to such extent that they will not be floated or otherwise damaged.
- 3. All water pumped or drained from the work shall be disposed of in a suitable manner without undue interference with other work, damage to pavements, other surfaces, or property. Suitable temporary pipes, flumes, or channels shall be provided for water that may flow along or across the site of the work. All dewatering and wash water flows shall be treated by filtration, a settling basin or other means sufficient to remove silt, sediment, and other debris. Following this, the flows shall only be released directly into storm sewers, stream channels or other stabilized drainage courses, and not onto exposed soils, steep slopes, or any other site where the flows could cause further erosion.

H. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage. Dispose of excess soil material and waste materials as herein specified.

I. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations, and grades as shown on the plans and State/Local Highway Department permit requirements.

J. Trench Excavation:

- 1. Each Contractor shall include in his bid all trenching and backfill necessary for installation of his piping or conduits as planned and specified. Trenching shall include clearing and grubbing of all trash, and debris encountered in the trenching. Each Contractor shall dispose of such material off-site at no extra cost to the Owner.
- 2. All existing facilities shall be protected from danger or damage while pipelines are being constructed and backfilled, and from damage due to settlement of the backfill.
- 3. In the event any existing structure is damaged, repair and restoration shall be made at once and backfill shall not be replaced until this is done. Restoration and repair shall be such that the damaged structure is equal to or better than its original condition and

can serve its purpose as completely as before. All such restoration and repair shall be done without extra cost to the Owner.

4. Trenches must be dug to lines and grades shown on the Drawings. Hand trenching may be required in areas where machine trenching would result in undue damage to existing structures and facilities.
  - a. Where pipe is to be laid in gravel bedding or concrete cradle, the trench may be excavated by machinery to, or just below, the designated subgrade, provided that the material remaining at the bottom of the trench is no more than slightly disturbed.
  - b. Where pipe is to be laid directly on the trench bottom, the lower part of trenches in earth shall not be excavated to subgrade by machinery. Just before the pipe is to be placed, the last of the material to be excavated shall be removed by means of hand tools to form a flat or shaped bottom, true to grade, so that the pipe will have a uniform and continuous bearing and support on firm and undisturbed material between joints except for limited areas where the use of pipe slings may have disturbed the bottom.
5. The location of the pipelines and their appurtenances as shown are those intended for the final construction. However, conditions may present themselves before construction on any line is started that would indicate desirable changes in location. The Owner reserves the right to make reasonable changes in line and structure locations without extra cost, except as may be determined by extra units of materials and construction actually involved.
6. The Contractor shall only have sufficient trench open ahead of the pipe laying work as necessary for the prosecution of the work, that day. Dig trenches to the uniform width required for the particular item to be installed, sufficiently wide to provide ample working room. Provide a minimum of 9" clearance on both sides of pipe or conduit.
  - a. Excavate trenches to depth indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations. Beyond building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups.
  - b. Where rock is encountered, carry excavation 6-inches below required elevation.
  - c. Except as otherwise indicated, excavate for piping so top of piping is no less than 4 feet below finish grade.
  - d. Encase pipe with concrete (full encasement) where trench excavations is within a stream crossing.
  - e. Concrete is specified in Division 3.
  - f. Do not backfill trenches until tests and inspections have been made and backfilling authorized by the Engineer. Use care in backfilling to avoid damage or displacement of pipe systems.

- g. For piping or conduit less than 3 feet, 6 inches below surface of roadways, furnish and install steel casing pipe, minimum wall thickness of 5/16", of sufficient diameter to carry the pipe or conduit to at least two feet beyond the outside edge of pavement.

### 3.02 BACKFILL AND FILL

#### A. General:

1. All material to be used as backfill material shall be tested and approved by the Geotechnical Engineer prior to backfilling excavations.
2. With the exception of the organic and inorganic debris and topsoil, the on-site soil removed from the excavations could be used as non-structural fill or backfill material provided the moisture content of the soil is within acceptable limits. However, off-site borrow material may be required for use as non-structural fill. The use of off-site borrow material shall not result in additional compensation for the Contractor.
  - a. Borrow material used as fill shall be approved by the Geotechnical Engineer. Contractor shall identify the source and provide samples for tests.
  - b. Unless otherwise permitted by the Geotechnical Engineer, borrow shall not be comprised of soils represented by the following classifications as determined in accordance with ASTM D 2487: MH, CH, OL, OH, PT.
  - c. The borrow material shall be free from rubbish, organic matter, frozen soil, muck or other perishable, compressible debris, which prevent compaction to a dense, uniform state. Rock and other hard, durable fragments shall be limited to particles displaying a maximum dimension of 6 inches, shall not exceed 10 percent of the total volume, and shall be uniformly distributed throughout the material.
  - d. The maximum dry density of the borrow material shall meet or exceed 98 pounds per cubic foot in accordance with ASTM D 698, Standard Specification for Test Methods for Moisture-Density Relations for Soils and Soil-Aggregate Mixtures, using a 5.5 lb. Rammer and a 12-inch Drop.
3. Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below:
  - a. Under grassed areas, use satisfactory excavated or borrow material.
  - b. Under pavements, use satisfactory excavated or borrow material.
  - c. Under walks or steps, use subbase material.
  - d. Under slabs, use a minimum depth of 6-inches (12-inches for structures equipped with pressure relief valves (PRV's)) of compacted No. 57 stone. A polyethylene liner shall be installed between building floor slabs and stone as a water-proofing membrane.

B. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, damproofing, waterproofing, and perimeter insulation.
2. Inspection, testing, approval, and recording locations of underground utilities.
3. Removal of concrete formwork.
4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.
5. Removal of trash and debris.
6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

C. Ground Surface Preparation:

1. Strip the site as discussed in Section 02110. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
2. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture condition to optimum moisture content, and compact to required depth and percentage of maximum density.

D. Backfilling Trenches:

1. As soon as practicable after the pipes have been laid and the joints have acquired a suitable degree of hardness, if applicable, or the structures have been built and are structurally adequate to support the loads, including construction loads to which they will be subjected, the backfilling shall be started and thereafter it shall proceed until its completion.
2. With the exception mentioned below in this paragraph, trenches shall not be backfilled at pipe joints until after that section of the pipeline has successfully passed any specified tests required. Should the Contractor wish to minimize the maintenance of lights and barricades and the obstruction of traffic, he may at his own risk backfill the entire trench, omitting or including backfill at joints as soon as practicable after the joints have acquired a suitable degree of hardness, if applicable, and the related structures have acquired a suitable degree of strength. He shall, however, be responsible for removing and later replacing such backfill, at his own expense, should he be ordered to do so in order to locate and repair or replace leaking or defective joints or pipe.
3. Bedding and backfilling of pipe shall be as follows:
  - a. Bedding and Initial Backfill - DIP

1. Provide a bedding surface for the pipe with a firm foundation of uniform density throughout the entire length of the pipe.
2. Bed the pipe carefully in a soil foundation accurately shaped and rounded to conform to the lower 1/4 of the outside perimeter of circular pipe, or set the pipe in a bed of sand.
3. Tamp bedding where necessary
4. Provide bell holes and depressions for pipe joints of only the length, depth, and width required for making the particular pipe joint properly.
5. Backfill the pipe trench with suitable backfill materials carefully deposited in uniform layers of 6" maximum around the pipe and compacted by tampers until the backfill reaches 6" above the top of pipe.

b. Backfill:

- (1) Backfilling in Non-Traffic Areas: The trench shall be backfilled from 6" above the top of the pipe to a point 6" below the proposed surface of the ground with suitable backfill, acceptable to the Engineer. The remainder of the trench shall be backfilled with topsoil and lightly compacted.
  - (2) Backfilling in Traffic Areas: The remainder of the trench shall be backfilled to the existing grade with Controlled Low Strength Material (CLSM – flowable fill) until the bituminous pavement replacement can be constructed. Extreme care shall be exercised to prevent damage to the pipe during the backfilling operation.
4. In case maximum permissible trench widths (as designated by the pipe manufacturer) are exceeded, the Contractor shall furnish crushed stone backfill to a minimum of 12-inches over the top of pipe at no extra cost to the Owner.
  5. If additional earth is required for backfilling, it must be obtained and placed by the Contractor.
  6. In the case of street, highway, railroad, sidewalk and driveway crossings; or within any roadway paving; or about manholes, valve and meter boxes; the backfill must be mechanically tamped in not over 6 inch layers, measured loose.
  7. In all cases, walking or working on the completed pipelines except as may be necessary in backfilling will not be permitted until the trench has been backfilled to a point 6" above the top of the pipe.
  8. The Contractor shall protect all sewer, gas, electric, telephone, water, and drain pipes or conduits from damage while pipelines are being constructed and backfilled, and from danger due to settlement of trench backfill.

E. Compaction

1. General: Control soil compaction during construction providing minimum percentage of maximum dry density specified for each area classification indicated below.

PLACEMENT OF BACKFILL OR FILL MATERIAL

Location	Minimum Compaction	Maximum Lift Thickness (Loose) (In.)	Moisture Content Relative To Optimum Moisture
Subgrade for Footings	100%	8	-2% to +2%
Subgrade for Floor Slabs and Steps	100%	8	-2% to +2%
Subgrade for Slabs on Grade	98%	8	-2% to +3%
Subgrade for Pavements and Walkways	98%	8	-2% to +2%
Backfill for Walls	98%	8	-2% to +2%
Landscape Areas	90%	8	-2% to +2%

NOTE: Minimum compaction refers to percent of Maximum Dry Density as Determined by ASTM D-698.

2. Moisture Control:

- a. Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface or subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations
- b. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
- c. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by dicing, harrowing, or pulverizing until moisture content is reduced to the optimum moisture for compaction.

F. Placement:

Place backfill and fill materials in layers as indicated in paragraph 3.02 E.1. for material compacted by heavy compaction equipment, and not more than 4-inches in loose depth for material compacted by hand-operated tampers.

1. Before compaction, add moisture or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

2. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.
3. Backfill shall not be placed against or on structures until they have attained sufficient strength to support all loads to which subjected without distortion, cracking, or damage. Material shall be compacted to 98 percent.

### **3.03 GRADING**

#### **A. General:**

1. Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.
2. Maintain site grading during construction to promote positive drainage at all times.

#### **B. Grading Outside Building Lines**

1. All materials used for backfill around structures shall be of a quality acceptable to the Engineer and shall be free from large or frozen lumps, wood and other extraneous material. All spaces excavated and not occupied by footing, foundations, walls or other permanent work shall be refilled with earth up to the surface of the surrounding ground, unless otherwise specified, or shown on the drawings, with sufficient allowance for settlement. In making the fills and terraces around the structures, the fill shall be placed in layers not exceeding 8-inches in depth and shall be kept smooth as the work progresses. Each layer of the fill shall be rolled with an approved type roller and/or be compacted. When it is not practicable to compact sections of the fill immediately adjacent to buildings or structures by rolling, then such sections shall be thoroughly compacted by means of mechanical tamping or hand tamping as may be required by the conditions encountered. All fills shall be placed so as to load structures symmetrically.
2. As set out hereinbefore, rough grading shall be held below finished grade and then the topsoil which has been stockpiled shall be evenly spread over the surface. The grading shall be brought to the levels shown on the Drawings. Final dressing shall be accomplished by hand work or machine work, or a combination of these methods as may be necessary to produce a uniform and smooth finish to all parts of the regrade. The surface shall be free from clods greater than 2-inches in diameter. Excavated rock may be placed in the fills, but it shall be thoroughly covered. Rock placed in fills shall not be closer than 12-inches from finished grade.
3. Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregularities, changes, and as follows:
  - a. Lawn or unpaved areas: Finish areas to receive topsoil to within not more than 0.10 ft. above or below required subgrade elevation.



- b. Walks: Shape surface of areas under walks to line, grade, and cross-section, with finish surface at or 1.0 inch below required subgrade elevation.
- c. Pavements: Shape surface of areas under pavement to line, grade, and cross-section with finish surface not more than 1.0 in. above or 1.0 in. below required subgrade elevation.

C. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1.0 in. above or 1.0 in. below required subgrade elevation when tested with a 10 ft. straightedge.

D. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or standard proctor density for each area classification.

### **3.04 FIELD QUALITY CONTROL**

A. Quality Control Testing During Construction: Allow the Geotechnical Engineer to inspect and report to the Engineer on findings and approve subgrades and fill layers before further construction work is performed. Perform field density tests in accordance with ASTM D 1556 (sand cone method), ASTM D 2167 (rubber balloon method), or ASTM D 2992 (nuclear density method), as applicable and at a frequency necessary to be reasonably assured that adequate compaction is achieved.

B. If in the opinion of the Engineer, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense to the Owner.

### **3.05 MAINTENANCE**

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

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

C. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

### **3.06 DISPOSAL OF EXCESS NON-ORGANIC SOIL AND ROCK**

General: All excess excavated material shall become the property of the Contractor and shall be disposed of by the Contractor in a legal manner, outside the project limits. It is the Contractor's responsibility to locate a suitable waste area off-site, obtain necessary permits for use of the waste area and be in compliance with applicable laws, and regulations.

**APPENDIX "A"**  
**CEMENT CONCRETE FOR STREET, CURB AND GUTTER, SIDEWALK AND DRIVEWAY  
CONSTRUCTION.**

The work covered by these specifications consists of furnishing all labor equipment and materials, and performing all operations in connection with the construction of air-entrained Portland Cement concrete pavement in accordance with these specifications and the applicable improvement drawings.

The cement concrete pavement work shall consist of a single course of cement concrete, including reinforcement and longitudinal and transverse joints, where required, constructed on a prepared subgrade in general conformity with the lines, grades and cross-sections shown on the plans.

The data included herewith is based upon general soil conditions which exist in the area. These general soil conditions, representing approximately 75 percent of the soils in the area, are clayey overburden soils, described as lean to moderately plastic silty clays, classified according to the Unified Soil Classification System as CL soils. Any site which is made up of soils substantially different would be evaluated independently by a qualified Geotechnical Engineer (see Article 5 in Subdivision Regulations - Definitions Section). This work should consist of drilling, testing and an engineering evaluation of all field and laboratory data, in light of the proposed design. Examples of substantially different soil conditions are the very silty clays or clayey silts along the floodplain of the Licking and Ohio Rivers, the clayey sands, the silty fine sands, the fine to medium sands, and the fine to coarse sands and gravel of the floodplain of the Ohio River, such as the Belleview Bottoms in Boone County, the loess type deposits, clayey sands, silty sands and sandy clays of the Fort Wright area and the "fat" waxy looking in Boone County.

**ITEM 1.0 GRADING**

This term shall consist of all grading above or below subgrade elevations of whatever nature required to bring the street to proper subgrade elevations, including necessary excavation for curb, gutter, sidewalk, construction of embankments, excavation and proper sloping of all cuts and other work incidental thereto.

**1.1 EXCAVATIONS:** All excavations shall be made to approximate grade or subgrade elevations consistent with approved plans. Excavations shall not be steeper than a cut slope of 2.5 horizontal to 1 vertical.

**1.2 EXCAVATION BELOW SUBGRADE:** Whenever excavations below subgrade elevation to remove spongy or unstable material, organic matter or other materials is required, the contractor shall remove same and shall replace with compactable soils as per Item 1.3. The excavation can be backfilled with soils that were removed, provided they are clean clayey soils free of organic matter and other deleterious material, aerated and dried to near optimum moisture content or clean clayey borrow soils that have moisture contents near optimum moisture content.

**1.3 CONSTRUCTION OF EMBANKMENT:** All surface vegetation and heavy root system shall be removed to eliminate all vegetation from the area upon which the embankment is to be constructed. Soils so removed shall not be used in construction of embankment. These materials shall be stockpiled and respread across scarified areas after the scarified areas have been brought to within inches of finished grade.

Embankments shall be constructed of approved soils to approximate subgrade elevation in shallow level layers, 6 to 8 inches, within three (3) percent of optimum moisture content on the dry side of the curve or within four (4) percent of optimum moisture content on the wet side of the curve, compacted with an appropriate type of compaction equipment to a density not less than 95 percent of maximum density as determined by the standard Proctor moisture-density test (ASTM D698-78 or AASHTO T-99) or 87 percent

of maximum density as determined by the modified Proctor moisture-density test (ASTM D1557-78 or AASHTO T-180). All soils placed in areas involving public improvements shall be constructed to slopes no steeper than 2.5 horizontal to 1 vertical and flatter where possible for ease of maintenance.

A recognized testing laboratory shall be required to run moisture-density tests (ASTM D698-78 or ASTM D1557-78) and field density tests (ASTM D1556-64 or ASTM D2922-78) to determine the percent compaction. The cost of all such testing shall be at the expense of the developer.

1.4 BACKFILL: Clayey soils or granular soils used to backfill utility excavations within the right-of-way shall be compacted to the densities stated in Item 1.3. When controlled-low-strength-material (CLSM) (flowable fill) is used, no compaction testing is required. Under no conditions shall granular backfill be flushed to obtain compaction.

1.5 SUBGRADE: The subgrade is defined as the top one (1) foot of the soil profile at finished grade prior to placing the pavement. This top one (1) foot of soil will consist of: (a) compacted fill placed for embankments as outlined in Item 1.3; (b) undisturbed soils in the transitional areas from cut to fill immediately below the topsoil; (c) undisturbed soils at depths greater than 3 feet below the original ground surface in cut areas. The top one (1) foot of subgrade shall be compacted to 98 percent of maximum density as determined by the standard Proctor moisture-density test (ASTM D698-78 or AASHTO T-99) or 90 percent of maximum density as determined by the modified Proctor moisture-density test (ASTM D1557-78 or AASHTO T-180) within two (2) percent of optimum moisture content on the dry side of the curve or four (4) percent of optimum moisture content on the wet side of the curve immediately prior to placing the pavement. In transitional areas from cut to fill, the soils have been subject to seasonal changes of freezing and thawing and wetting and drying. These soils will exist at moisture contents well above optimum moisture content and at densities on the order of 60 to 80 percent of maximum density (ASTM D698-78). These soils shall be scarified, aerated and dried in order to obtain the specified percent compaction for subgrade. Soils in cut areas, three (3) feet below original grade, will exist at moisture contents above optimum moisture content and at densities on the order of 90 percent of maximum density (ASTM D698-78). These soils shall be scarified, aerated and dried in order to obtain the specified percent compaction for subgrade.

Any soft or yielding areas, resulting from high moisture content that are encountered at the time of construction shall be scarified, aerated and dried to reduce the moisture content nearer to optimum moisture content, then recompacted to the specified density.

The subgrade shall be shaped to plan elevation and cross section. Immediately prior to placing the concrete, the subgrade shall be checked for conformity with the cross section shown on the plans by means of an approved template on the side forms. If necessary, the materials shall be removed or added as required to bring all portions of the subgrade to correct elevations. The subgrade shall be thoroughly compacted and again checked with the template. Concrete shall not be placed on any part of the subgrade which have not been checked for correct elevation. The subgrade shall be clean of loose or wet material prior to placing concrete.

Prior to placing the concrete the Contractor shall proof roll the compacted subgrade with a piece of heavy rubber tired equipment, such as a road grader, a loaded backhoe or a loaded single axle truck. The Inspector shall observe the proof rolling for consistency. Areas which are subject to excessive pumping or rutting shall be reworked and recompacted as described above. All subgrade testing shall be made not more than 48 hours prior to placement of pavement, unless extreme weather conditions dictate retesting (rain, freezing temperature, excessive temperature, etc.). The appropriate Inspector shall be contacted not less than Twelve Hours (12) prior to placement of materials.

1.6 EQUIPMENT FOR COMPACTION OF BACKFILL, EMBANKMENT AND SUBGRADE: Any compaction equipment capable of producing the required embankment and subgrade densities, without

lamination, will be permitted. Clayey type soils shall be compacted with a kneading type compaction equipment, such as a sheepsfoot roller. Cohesionless soils shall be compacted with a vibratory type equipment, such as a vibrating plate or roller. All compaction equipment shall be in good condition and shall be operated efficiently to assure uniform compaction.

1.7 SUBGRADE FOR SIDEWALKS AND DRIVEWAYS: Subgrade for sidewalks and driveways within the limits of the right-of-way shall comply with Item 1.5. No tests are required unless specified by the Inspector.

1.8 EQUIPMENT OPERATED ON STREETS: The contractor shall be permitted to operate only pneumatic tired equipment over any paved street surfaces and shall be responsible for correcting any damage to street surfaces resulting from the contractor's operation. Slip-Form pavers shall take care not to scar adjacent pavement. The use of pads or mats may be required on slopes and is at the discretion of the inspector. Paved streets adjacent to new development shall have all loose soil or mud removed at the end of each days work. Equipment operated on any street, after public dedication and open to general traffic shall be subject to penalties under K.R.S. 189.290 and County Ordinance 620.0.

1.9 UTILITIES: Special precautions shall be taken by the contractor to avoid damage to existing overhead and underground utilities. Before proceeding with the work, the contractor shall confer with all public or private companies, agencies or departments that own or operate utilities in the vicinity of the construction work. The contractor shall be diligent in his efforts to use every possible means to locate existing utilities.

1.10 SOIL DENSITY TESTING: All soil density testing shall be at the expense of the developer. The results of these tests shall be mailed directly to the developer, design engineer, inspector, and the contractor. The results of all soil testing shall be compared to the densities, stated in Items 1.3, 1.4, 1.5, and 1.7 of these regulations. Any deficiencies found in construction work must be remedied in the field or resolved between the developer, contractor, and inspector, subject to approval by a qualified registered professional engineer.

**- END OF SECTION -**

## SECTION 02210

### ROCK REMOVAL

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED

A. The Contractor shall excavate rock, if encountered, as directed by the Engineer, and shall dispose of the excavated material, shall furnish acceptable material for backfill in place of the excavated rock, if required.

B. In general, rock in pipe trenches shall be excavated so as to be not less than 6 inches from the pipe in all directions after it has been laid.

##### 1.02 REFERENCES

A. NFPA 495 - Code for the Manufacture, Transportation, Storage and Use of Explosive Materials.

B. Commonwealth of Kentucky Department of Mines and Minerals, Laws and Regulations Governing Explosives and Blasting.

##### 1.03 REGULATORY REQUIREMENTS

A. Conform to Kentucky Department of Mines and Minerals code for explosive disintegration of rock.

B. Obtain permits from local authorities having jurisdiction before explosives are brought to site or drilling is started.

#### PART 2 - PRODUCTS

##### 2.01 MATERIALS

A. Rock Definition: Solid mineral material that cannot be removed with a power shovel.

B. Explosives: Type recommended by explosives firm and required by authorities having jurisdiction.

C. Delay Devices: Type recommended by explosives firm and conforming to State regulations.

D. Blasting Materials: Type recommended by explosives firm and conforming to State regulations.

## **PART 3 - EXECUTION**

### **3.01 EXPLOSIVES**

A. Explosives may be used only with the written consent of the Kentucky Transportation Cabinet and Boone County Public Works. No explosives may be transported, stored, or used without documentation from the required authorities.

B. The Contractor shall keep explosives on the site only in such quantity as may be needed for the work under way and only during such time as they are being used. He shall notify the Engineer, in advance, of his intention to store and use explosives. Explosives shall be stored in a secure manner and separate from all tools. Caps or detonators shall be safely stored at a point over 100 feet distance from the explosives. When the need for explosives has ended, all such materials remaining on the work shall be promptly removed from the premises.

C. The Contractor shall observe all State, Federal and municipal laws, ordinances and regulations relating to the transportation, storage, handling and use of explosives. In the event that any of the above-mentioned laws, ordinances or regulations require a licensed blaster to perform or supervise the work of blasting, said licensed blaster shall, at all times, have his license on the work and shall permit examination thereof by the Engineer or other officials having jurisdiction.

### **3.02 BLASTING PRECAUTIONS**

A. No explosives shall be used within 20 feet of:

1. Buildings and/or structures constructed under construction.
2. Underground and/or overhead utilities whether existing or partially constructed.

B. Permission for any deviation from the restrictions set forth above shall be secured from the Engineer, in writing; however, permission for any such deviations shall not relieve the Contractor from any responsibility in the event of damage to buildings, structures or utilities.

C. All operations involving explosives shall be conducted with all possible care to avoid injury to persons and property. Blasting shall be done only with such quantities and strengths of explosives and in such a manner as will break the rock approximately to the intended lines and grades and yet will leave the rock not to be excavated in an unshattered condition. Care shall be taken to avoid excessive cracking of the rock upon or against which any structure will be built, and to prevent injury to existing pipes or other structures and property above or below ground. Rock shall be well covered with logs or mats, or both, where required. Sufficient warning shall be given to all persons in the vicinity of the work before a charge is exploded.

D. The Contractor shall be solely responsible for his blasting operations. The Contractor shall not hold the Owner and/or the Engineer liable for any damages resulting from his blasting operations on this project.

### **3.03 PAYMENT**

Rock excavation shall be bid as unclassified and will not be paid for separately.

**- END OF SECTION -**

## SECTION 02211

### ROUGH AND FINAL GRADING

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED

- A. Work under this section shall begin within 30 days of pipe installation and shall be completed under the General Contract.
- B. Remove topsoil and stockpile for later reuse.
- C. Protect stockpiled topsoil from erosion by erosion control barriers including straw bales or silt fences, or by use of temporary seeding.
- D. Excavate subsoil and stockpile for later reuse as directed in Section 02200, Earthwork.
- E. Grade and rough contour site.
- F. Finish grade subsoil.
- G. Place, level and compact topsoil.

##### 1.02 RELATED WORK

- A. Section 02110 - Site Clearing.
- B. Section 02200 - Earthwork.

##### 1.03 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01720.
- B. Accurately record location of utilities remaining, rerouted utilities, new utilities by horizontal dimensions, elevations or inverts, and slope gradients.

##### 1.04 PROTECTION

- A. Protect trees and other features remaining as portion of final landscaping.
- B. Protect bench marks, existing structures, fences, roads, sidewalks and other features not designated for demolition.
- C. Protect above or below grade utilities which are to remain.
- D. Contractor shall be responsible to repair any damage to those items not designated for demolition or removal in a manner satisfactory to the Owner at no additional cost to the Owner.

#### PART 2 - PRODUCTS

## **2.01 MATERIALS**

A. Topsoil: Excavated material, graded free of roots, rocks larger than one inch, subsoil, debris, and large weeds.

B. Subsoil: Excavated material, graded free of lumps larger than 12 inches, rocks larger than 12 inches, and debris.

## **PART 3 -EXECUTION**

### **3.01 PREPARATION**

A. Identify required lines, levels, contours, and datum.

B. Identify known below grade utilities. Stake and flag locations.

C. Identify and flag above grade utilities.

D. Maintain and protect existing utilities remaining which pass through work area.

E. Upon discovery of unknown utility or concealed conditions, discontinue affected work; notify Engineer.

### **3.02 TOPSOIL EXCAVATION**

A. Excavate topsoil from areas to be further excavated, and stockpile in area designated on site by the Engineer.

B. Do not excavate wet topsoil.

C. Stockpile topsoil to depth not exceeding 8 feet.

### **3.03 SUBSOIL EXCAVATION**

A. Excavate subsoil from indicated areas and stockpile in area designated on site. Excess subsoil may be reused according to Section 02200, Earthwork.

B. Do not excavate wet subsoil.

C. Stockpile subsoil to height not exceeding 8 feet.

D. When excavation through roots is necessary, perform work by hand and cut roots with a sharp axe.

### **3.04 SUBSOIL PREPARATION**

A. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones, in excess of 1-inch in size. Remove subsoil contaminated with petroleum products.

B. Scarify subgrade to depth of 3-inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.



### **3.05 PLACING TOPSOIL**

- A. Place topsoil in areas where seeding is scheduled.
- B. Use topsoil in relatively dry state. Place during dry weather.
- C. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles, and contours of subgrade.
- D. Remove stone, roots, grass, weeds, debris, and foreign material while spreading.
- E. Manually spread topsoil around structures to prevent damage.
- F. Roll placed topsoil.
- G. Leave stockpile area and site clean and raked, ready to receive landscaping.
- H. Complete final site grading so as to divert surface runoff away from foundation elements.

### **3.06 TOLERANCES**

- A. Top Surface of Subgrade: Plus or minus three inches.
- B. Top of topsoil: Plus or minus 1-inch.

### **3.07 TOPSOIL THICKNESS**

The compacted topsoil thickness for various locations for seeded grass is 6-inches minimum.

- END OF SECTION -

**SECTION 02224**

**HORIZONTAL BORE AND JACK**

**PART 1 - GENERAL**

**1.01 SUBMITTALS**

A. The Contractor shall submit to the Engineer details of the procedure proposed for boring, along with a description of the equipment available for use.

**1.02 WORK INCLUDED**

- A. Boring.
- B. Installation of casing pipe.
- C. Casing pipe protection.

**1.03 QUANTITIES**

All excavation is unclassified.

**1.04 REFERENCES**

- A. ANSI B16.5
- B. Commonwealth of Kentucky Transportation Cabinet Specifications (KDOH).

**PART 2 - PRODUCTS**

**2.01 STEEL CASING PIPE**

A. The pipe shall be steel, new material, with a minimum yield of 35,000 psi and a wall thickness as shown below. All joints in the casing pipe shall be welded.

<u>MINIMUM THICKNESS INCHES</u>	<u>NOMINAL DIAMETER INCHES</u>
0.312	12
0.375	16
0.438	24

B. The steel casing pipe shall be as follows:

<u>CARRIER PIPE (I.D.) SIZE</u>	<u>CASING PIPE (O.D.) SIZE</u>
4"	14"
6"	18"
8"	20"
10"	22"

12"

24"

C. Welding of the steel casing pipe shall be solidly butt-welded with a smooth non-obstructing joint inside and conform to all specifications as required by American Welding Society (AWS). The casing pipe shall be installed without bends. All welders and welding operators shall be qualified as prescribed by AWS requirements.

D. Steel cover pipe for use as a conduit for a carrier pipe shall be plain with a bituminastic mill undercoater inside and out.

### **PART 3 - EXECUTION**

#### **3.01 GENERAL**

Where shown on the Drawings, the Contractor shall install steel casing pipe by the boring method. Two methods of boring will be permitted. In the first, the casing pipe shall be pushed or jacked into the hole as the auger cuts out the material. The second method consists of drilling the hole completely through the fill and pushing or jacking the casing pipe into the hole after the auger has completed the bore. The pipes shall be installed in a manner that will not disrupt traffic, and shall conform to the lines, grades, and location shown on the Drawings.

#### **3.02 CASING PIPE**

All joints in the casing pipe shall be welded in at least twenty-foot lengths.

#### **3.03 CARRIER PIPE INSTALLATION**

A. The carrier pipe will not be permitted to rest on bells or couplings. See Detail in Project Drawings. Alternate use of hard rubber spacer blocks as manufactured by T.D. Williamson, Inc., Tulsa, OK; Mahoning Municipal Products, Canfield, OH; or equal is an acceptable substitute.

B. The void between carrier pipe and casing pipe shall be as detailed on the Contract Drawings or filled with an approved granular material.

C. The carrier pipe shall be ductile iron pipe.

#### **3.04 WATER PROOFING**

After installation of the carrier pipe within the casing pipe, the ends of the casing shall be sealed as detailed on the Contract Drawings or with brick and mortar until a tight seal is obtained.

#### **3.05 CONTRACTORS LIABILITIES**

The cost of repairing any damage which is caused by the boring operation to the highway above the bore shall be borne by the Contractor.

**-END OF SECTION-**

## SECTION 02230

### PIPE BEDDING AND BACKFILLING

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED

The Contractor shall furnish, place and compact all pipe bedding and backfill materials specified herein or denoted on the Drawings. The materials, equipment, labor, etc. required herein are to be considered as part of the requirements and costs for installing the various pipes, structures and other items they are incidental to.

#### PART 2 - PRODUCTS

##### 2.01 MATERIALS

A. Crushed stone material shall conform to the requirements of applicable sections of the Kentucky Bureau of Highways Standard Specifications and shall consist of clean, hard, and durable particles or fragments, free from dirt, vegetation or objectionable materials.

B. The two types of material used in this Section for pipe bedding and backfill are as follows:

1. Compacted Granular Fill
2. Controlled Low Strength Material (CLSM – Flowable Fill)

C. Subbase material for structures shall be naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed stone.

D. Backfill materials at structures shall be satisfactory soil materials free of debris, waste, frozen materials, vegetable, and other deleterious matter.

#### PART 3 - EXECUTION

##### 3.01 PIPE BEDDING

A. Water main piping shall be supported as follows:

1. All water main piping shall be laid on a bed of granular material except when a concrete encasement situation occurs. All pipe bedding material shall be compacted granular fill and shall be placed to a depth of 6" in an earth trench and 12" in a rock trench. Aggregate bedding shall be graded to provide for a uniform and continuous support beneath the pipe at all points.
2. The trench bottom for water main piping shall be stable, continuous, relatively smooth and free of frozen material, clotted dirt, foreign material larger than 1/2-inch in diameter. The foundation for water main piping shall be prepared so that the entire load of the backfill on top of the pipe will be carried uniformly on the barrel of the pipe. Any uneven areas in the trench bottom shall be shaved off or filled in with compacted granular fill. When the trench is made through rock, the bottom shall be

lowered to provide 6 inches of clearance around the pipe. Compacted granular fill shall be used to bring the trench bottom to grade.

B. After each pipe has been brought to grade, aligned, and placed in final position, granular fill for water main pipe bedding shall be deposited and compacted under the pipe haunches and on each side of the pipe up to the spring line of the pipe to prevent lateral displacement and hold the pipe in proper position during subsequent pipe jointing, bedding, and backfilling operations.

C. In wet, yielding and mucky locations where pipe is in danger of sinking below grade or floating out of grade or line, or where backfill materials are of such a fluid nature that such movements of pipe might take place during the placing of the backfill, the pipe must be weighted or secured permanently in place by such means as will prove effective.

D. Where an unstable (i.e., water, mud, etc.) trench bottom is encountered, stabilization of the trench bottom is required. This is to be accomplished by undercutting the trench depth and replacing to grade with a foundation of crushed stone aggregate.

E. The depth of the foundation is dependent upon the severity of the trench bottom. The size of stone aggregate used in the foundation will be determined by the condition of the unstable material. Once the trench bottom has been stabilized, the required bedding material can be placed.

F. It should be noted that no pipe shall be laid on solid or blasted rock.

G. Pipe bedding as required in Paragraphs A, B and D of this Section is not considered a separate pay item.

### 3.02 BACKFILL FOR PIPING

#### A. Initial Backfill

1. This backfill is defined as that material which is placed over the pipe from the spring line to a point 6 inches above the top of the pipe. For water main piping the material shall be compacted granular fill and may be machine placed without compaction. Uneven places in the backfill shall be leveled by hand.
2. Material used in the initial backfilling is NOT a separate pay item. Payment for the material is included in the unit price per linear foot of water main.

#### B. Final Backfill

1. There are two cases where the method of final backfilling varies. The various cases and their trench situations are as follows:
  - a. Case I - Areas not subject to vehicular traffic.
  - b. Case II - Paved areas including streets, drives and walks.
2. In all cases, walking or working on the completed pipelines, except as may be necessary in backfilling, will not be permitted until the trench has been backfilled to a point six (6) inches above the top of the pipe. The method of final backfilling for each of the above cases is as follows:

- a. Case I - The trench shall be backfilled from a point 6 inches above the top of the pipe to a point 8 inches below the surface of the ground with earth material free from large rock (over one-half cubic foot in volume), as shown on the drawings. The remainder of the trench shall be backfilled with earth material free of any rocks.
  - b. Case II - The trench shall be backfilled in the correct manner as shown on the drawings according to the County Restoration Details or the State Maintained Streets and Roads Details, whichever is applicable.
3. Compacted Granular Fill and earth backfill material used in final backfill are not separate pay items. Payment shall be included in the unit price per linear foot of water main.
  4. CLSM material used in final backfill is not separate pay items. Payment shall be included in the unit price per linear foot of water main.

C. Excavated materials from trenches, in excess of quantity required for trench backfill, shall be disposed of by the Contractor. It shall be the responsibility of the Contractor to obtain location or permits for its disposal, unless specific waste areas have been designated on the Drawings or noted in these specifications. Unit prices for the various pipe sizes shall include the cost of disposal of excess excavated materials, as set forth herein, not additional compensation being allowed for hauling or overhaul.

### 3.03 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

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

C. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

**- END OF SECTION -**



## SECTION 02270

### SLOPE PROTECTION AND EROSION CONTROL

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED

- A. The Contractor shall do all work and take all measures necessary to control soil erosion resulting from construction operations, shall prevent the flow of sediment from the construction site, and shall contain construction materials (including excavation and backfill) within a protected working area so as to prevent damage to adjacent property.
- B. The Contractor shall not employ any construction method that violates a rule, regulation, guideline or procedure established by Federal, State or local agencies having jurisdiction over the environmental effects of construction. The Contractor shall be responsible for obtaining all associated permits.
- C. Pollutants such as chemicals, fuels, lubricants, bitumen, raw sewage and other harmful waste shall not be discharged into or alongside of any body of water or into natural or man-made channels leading thereto.
- D. All work shall be in accordance with the Erosion and Sediment Control Plan, Sanitation District permit requirements and notes as shown on the plan details.

#### PART 2 - PRODUCTS

##### 2.01 MATERIALS

- A. Temporary Slope Protection and Erosion Control: Straw mulch shall be reasonably clean and free of noxious weeds and deleterious materials. Filter fabric for sediment traps shall be of suitable materials acceptable to the Engineer.
- B. Permanent Slope Protection and Erosion Control: On slopes 2H:1V and steeper, and where shown on the Drawings, place Dumped Rock Fill with a 24 inch minimum thickness over non-woven geotextile filter fabric.
- C. Silt Fence Materials
  - 1. Fence Posts -- The length shall be minimum of 36 in. long. Wood posts will be 2-by-2-in. hardwood of sound quality. The maximum spacing between posts shall be 6 ft. Posts shall be driven at least 12 inches into the ground.

2. Reinforced Silt Fence -- Posts shall be a minimum 1.33 lb/linear foot steel posts driven at least 12 inches into the ground.. The maximum spacing between posts shall be 10 ft. Wire mesh support shall be used and fastened to the upstream side of the posts, consisting of 6-in. by 6-in. 14 gauge wire mesh. The wire mesh shall be extended at least 6 inches in the trench.
3. Silt Fence Fabric (see chart below):

Fabric Properties	Values
Grab Tensile Strength	50 lb. minimum
Mullen Burst Strength	190 psi minimum
Slurry Flow Rate	5 gal./min.f <sup>2</sup> maximum
Ultraviolet Radiation Stability	90% Minimum

**PART 3 - EXECUTION**

**3.01 METHODS OF CONSTRUCTION**

- A. The Contractor shall use any of the acceptable methods necessary to control soil erosion and prevent the flow of sediment to the maximum extent possible. These methods shall include, but not be limited to, the use of water diversion structures, diversion ditches and settling basins.
- B. Construction operations shall be restricted to the areas of work indicated on the Drawings and to the area which must be entered for the construction of temporary or permanent facilities. The Engineer has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and fill operations and to direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of wetlands and adjacent watercourses. Such work may involve the construction of temporary berms, dikes, dams, sediment basins, slope drains, and use of temporary mulches, mats, or other control devices or methods as necessary to control erosion.
- C. Excavated soil material shall not be placed adjacent to wetlands or watercourses in a manner that will cause it to be washed away by high water or runoff. Earth berms or diversions shall be constructed to intercept and divert runoff water away from critical areas. Diversion outlets shall be stable or shall be stabilized by means acceptable to the Engineer. If for any reason construction materials are washed away during the course of construction, the Contractor shall remove those materials from the fouled areas as directed by the Engineer.
- D. For work within easements, all materials used in construction such as excavation, backfill, roadway, and pipe bedding and equipment shall be kept within the limits of the easements.

- E. The Contractor shall not pump silt-laden water from trenches or other excavations into wetlands, or adjacent watercourses. Instead, silt-laden water from excavations shall be discharged within areas surrounded by baled hay or into sediment traps to ensure that only sediment-free water is returned to the watercourses. Damage to vegetation by excessive watering or silt accumulation in the discharge area shall be avoided.
- F. Prohibited construction procedures include, but are not limited to, the following:
1. Dumping of spoil material into any streams, wetlands, surface waters or unspecified locations.
  2. Indiscriminate, arbitrary, or capricious operation of equipment in wetlands or surface waters.
  3. Pumping of silt-laden water from trenches or excavations into surface waters or wetlands.
  4. Damaging vegetation adjacent to or outside of the construction area limits.
  5. Disposal of trees, brush, debris, paints, chemicals, asphalt products, concrete curing compounds, fuels, lubricants, insecticides, washwater from concrete trucks or hydroseeders, or any other pollutant in wetlands, surface waters, or unspecified locations.
  6. Permanent or unauthorized alteration of the flow line of any stream.
  7. Open burning of debris from the construction work.
- G. Any temporary working roadways required shall be clean fill approved by the Engineer. In the event fill is used, the Contractor shall take every precaution to prevent the fill from mixing with native materials of the site. All such foreign fill materials shall be removed from the site following construction.

### **3.02 EROSION CHECKS**

- A. The Contractor shall furnish and install rock silt barriers and filter fabric checks in all locations indicated on the Drawings, surrounding the base of all deposits of stored excavated material outside of the disturbed area, and where indicated by the Engineer. Checks, where indicated on the Drawings, shall be installed immediately after the site is cleared and before trench excavation is begun at the location indicated. Checks located around stored material shall be located approximately 6 feet from that material.
1. **Rock Barriers:** Temporary rock silt barriers shall be used where indicated on the drawings. They may be used in lieu of fabricated silt fence on areas where silt fence posts cannot be installed due to bed rock. Rock barriers shall be installed to a minimum height of 2 feet and shall be placed to prevent bypassing around the ends of the barrier. Shot rock from on-site construction may be used. A mixture of rock sizes shall be used to prevent short-circuiting of water through the barrier.

2. Silt Fence:

- a. Silt fence shall be constructed before upslope land disturbance begins.
- b. All silt fences shall be placed as close to the contour as possible so that water will not concentrate at low points in the fence and so that small swales or depressions which may carry small concentrated flows to the silt fence are dissipated along its length.
- c. To prevent water pounded by the silt fence from flowing around the ends, each end shall be constructed upslope so that the ends are at a higher elevation.
- d. Where possible, silt fence shall be placed on the flattest area available.
- e. Where possible, vegetation shall be preserved for 5 ft. (or as much as possible) upslope from the silt fence. If vegetation is removed, it shall be reestablished within 7 days from the installation of the silt fence.
- f. The height of the silt fence shall be a minimum of 18 in. above the original ground surface.
- g. The silt fence shall be placed in a trench cut a minimum of 6 in. deep. The trench shall be cut with a trencher, cable laying machine, or other suitable device which will ensure an adequately uniform trench depth.
- h. The silt fence shall be placed with the stakes on the downslope side of the geotextile and so that 6 in. of cloth are below the ground surface. Excess material shall lay on the bottom of the 6-in.-deep trench. The trench shall be backfilled and compacted.
- i. Seams between section of silt fence shall be overlapped with the end stakes of each section wrapped together before driving into the ground.
- j. Maintenance--Silt fence shall allow runoff to pass only as diffuse flow through the geotextile. If runoff overtops the silt fence, flows under or around the ends, or in any other way becomes a concentrated flow, one of the following shall be performed, as appropriate: 1) the layout of the silt fence shall be changed, 2) Accumulated sediment shall be removed, or 3) Other practices shall be installed.

3. Inlet Protection in Swales, Ditch Lines or Yard Inlets

- a. Inlet protection shall be constructed either before upslope land disturbance begins or before the storm drain becomes operational.

- b. The earth around the inlet shall be excavated completely to a depth at least 18 in.
  - c. The wooden frame shall be constructed of 2-by-4-in. construction-grade lumber. The 2-by-4-in. posts shall be driven 1 ft. into the ground at four corners of the inlet and the top portion of 2-by-4-in. frame assembled using the overlap joint shown. the top of the frame shall be at least 6-in. below adjacent roads if ponded water would pose a safety hazard to traffic.
  - d. Wire mesh shall be of sufficient strength to support fabric with water fully impounded against it. It shall be stretched tightly around the frame and fastened securely to the frame.
  - e. Geotextile shall be resistant to sunlight. It shall be stretched tightly around the frame and fastened securely. It shall extend from the top of the frame to 18 in. below the inlet notch elevation. The geotextile shall overlap across one side of the inlet so the ends of the cloth are not fastened to the same post.
  - f. Backfill shall be placed around the inlet in compacted 6-in. layers until the earth is even with notch elevation on ends and top elevation on sides.
  - g. A compacted earth dike or a check dam shall be constructed in the ditch line below the inlet if the inlet is not in a depression and if runoff bypassing the inlet will not flow to a settling pond. The top of earth dikes shall be at least 6 in. higher than the top of the frame.
- B. The erosion check installations should be inspected on a weekly basis and after every runoff event. Accumulated sediments shall be removed when uniform accumulations reach 1/3 the aboveground height of the barriers.

**- END OF SECTION -**



## SECTION 02510

### WALK, DRIVEWAY, ROAD, AND PARKING PAVING

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED

- A. Aggregate Base
- B. Asphaltic Concrete Paving
- C. Reinforced Concrete Paving
- D. Concrete Sidewalks
- E. Concrete Curbing

##### 1.02 REFERENCES

- A. ASTM C33- Aggregate for Concrete.
- B. Kentucky Department of Highways (KDOH) "Standard Specifications for Road and Bridge Construction" latest edition.

##### 1.03 TESTS

Gradation of stone materials will be performed in accordance with ASTM C33.

##### 1.04 RELATED WORK

- A. Section 02211 - Rough Grading.
- B. Section 02200 – Earthwork Excavation and Backfill.
- C. Division 3 - Concrete.

#### PART 2 - PRODUCTS

##### 2.01 MATERIALS

- A. All materials used shall meet the appropriate physical test requirements of the latest edition and/or revision of KDOH "Standard Specifications for Road and Bridge Construction".
- B. Bituminous surface on roadways: Bituminous surfacing materials for roadways shall be hot mixed bituminous asphalt, as specified in Section 402 of the KDOH Standard Specifications.
- C. Aggregate: Aggregate materials shall be as specified in the KDOH Standard Specifications.
- D. Asphaltic concrete materials.

1. Prime Coat: Bituminous Material for prime coat shall be as specified in Section 406 of the KDOH Standard Specifications. Prime coat shall be applied at a rate of 0.40 gallons per square yard over the aggregate base.
  2. Asphalt Concrete: Asphalt concrete conforming to Section 402 of the KDOH Standard Specifications.
  3. Tack Coat: Bituminous tack coat meeting requirements for Section 406 of the KDOH Standard Specifications. Apply at a rate of 0.05 gallons per square yard.
- E. Concrete Sidewalk, Reinforced Concrete Pavement, and Concrete Curb
1. Class "A" Concrete where referred to in this section, shall meet the requirements of KDOH Standard Specifications 601.
  2. Welded wire reinforcing and reinforcing steel shall meet requirements of Division 3 of these specifications, or be as otherwise specified herein.
  3. The sidewalks shall consist of Class "A" concrete, minimum 4-inches thick, reinforced with wire mesh, placed over the previously prepared aggregate base. The shapes and sizes of the sidewalks shall be as indicated on the Drawings.
  4. Reinforced concrete pavement shall consist of Class "A" concrete with the thickness and reinforcing steel as shown on Standard Detail 067. The concrete pavement shall be placed over a compacted aggregate as also shown on the Standard Detail.
  5. The curb shall consist of Class "A" concrete (non-reinforced). The curb shall be placed in accordance with the Drawings or as directed by the Engineer.

### **PART 3 - EXECUTION**

#### **3.01 INSPECTION**

- A. Verify compacted subgrade.
- B. Verify compacted aggregate base is dry and ready to support paving and imposed loads.
- C. Verify gradients and elevations of base are correct.
- D. Verify surface of existing paved area is clean and prepared for application of tack coat and paving.
- E. Beginning of installation means acceptance of existing conditions.

#### **3.02 SUBSOIL PREPARATION**

- A. Eliminate uneven areas and low spots.
- B. Remove debris, roots, branches and stones in excess of 1-inch in size.

#### **3.03 PLACING ASPHALT PAVEMENT OVER TRENCHES**



A. General

1. The preparation of the base shall include cleaning of original surface to be resurfaced, the removal of unstable material from the trench or damaged area, removal of crushed rock from the trench to bottom of the existing bituminous pavement, and the addition of crushed rock to the trench where needed. No cutting of edges of existing paving will be required.
2. If temporary pavement has been placed, it shall be removed and the stone base course restored as hereinafter specified. All catch basin and manhole frames and covers, water and gas gates, and other structures in the roadway to receive the surface course shall be adjusted to the elevation required for the finished pavement to conform to the proper grade.
3. Prior to placing pavement, all backfill shall have been properly compacted to eliminate settling of backfill. No pavement shall be placed over poorly compacted backfill. Backfill and stone base course shall be compacted, brought to the proper elevation, and dressed so that new pavement construction shall be at the required grade. The Contractor shall maintain the surface of all excavated and disturbed areas until the pavement is placed. If there is a time lapse of more than 24-hours between completion of preparation of subgrade or placing of stone base course and placing of paving, or if subgrade or stone base course has been eroded or disturbed by traffic, the subgrade or stone base course shall be restored before placing paving.
4. After the stone base course has been rolled to the required grade, the edges of existing pavement shall be cut back 12-inches or more, as required, from the trench excavation wall or damaged area to sound undamaged material, straightened, cleaned, and painted with an approved cut back asphalt to insure a satisfactory bond between it and the newly placed permanent paving.

B. Concrete and Bituminous Paving Repair or Replacement: In case of replacement of state highway paving, depth, other details and method of applying, including base, shall be as detailed on the applicable permits attached to these Specifications and as required by KDOH.

C. Trench Surface Repaving on City and County Streets and Roads:

1. Bituminous Paving Replacement: The cut edges of the existing paving surface shall be trimmed to a depth of at least 2-inches to straight lines for uniform appearance and clean surface at joints. The areas between the cut edges of the paving shall be removed to a depth of 1-inch (minimum) below the bottom of the existing paving. All unstable material in the trench shall be removed and replaced with compacted dense grade aggregate added as needed to bring the base surface to 1-inch below bottom of existing paving. No extra payment will be allowed for removal and replacement of unstable backfill.
2. The paving subgrade shall be compacted as required by KDOH Standard Specifications.
3. Prior to placing the paving material, the bottom and sides of surface to be paved shall be covered with a prime coat to insure adhesion.

4. Next, the bituminous paving shall be hot applied and rolled in accordance with the provisions of Division 400, of KDOH Standard Specifications. Surface shall then be graded to ¼-inch above existing paving surface at edges and crowned to ½-inch above such surface at the center.

### **3.04 SIDEWALK INSTALLATION**

A. Sidewalk surfaces shall be divided into rectangular areas by means of a jointer having a radius of 1/4" and forming a groove not less than 1-inch in depth for the full width of the walk. The length of the rectangles formed shall be 4-feet.

B. The Contractor shall install 1/4-inch premolded expansion joint material extending entirely through and across the sidewalk at intervals not to exceed 24-feet.

C. Sidewalk shall be replaced to the same width, grade, and thickness (4-inches minimum) as existing, unless otherwise directed by the Engineer.

### **3.05 CURB INSTALLATION**

A. Concrete curbs shall be replaced where disturbed by construction with Class "A" concrete with no reinforcing.

B. Asphalt concrete curbs shall be replaced where disturbed by construction in accordance with Standard Detail 068

### **3.06 TOLERANCES**

A. Flatness: Maximum variation of ½-inch measured with 10-foot straight edge.

B. Compacted Schedule Thickness: Within ¼-inch.

C. Variation from True Elevation: Within ½-inch.

D. Top of Sidewalk: Plus or minus 1-inch.

### **3.07 PROTECTION**

Immediately after placement, protect pavement from damage until surface is sufficiently hardened for traffic.

### **3.08 SURFACE MAINTENANCE**

Until the expiration of the guarantee period, the contractor shall maintain surfacing placed under this Contract and shall promptly correct all defects such as cracks, depressions, and holes that occur. At all times, the surfacing shall be kept in a safe and satisfactory condition for traffic. If defects occur in surfacing constructed by the Contractor, the Contractor shall remove all bituminous concrete and base course as is necessary to properly correct the defect. The Contractor shall replace the base course and bituminous concrete in accordance with the requirements of these Specifications.

**-END OF SECTION-**