



rosstarrant architects

# Marion Co. Outdoor Pavilions

Marion County Board of Education  
Lebanon, Kentucky

RTA 2283  
BG 23-328

## Project Manual

Volume 1 of 1  
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### **Architect**

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FOR  
2283**

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## **SECTION 015000 TEMPORARY FACILITIES AND CONTROLS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Temporary utilities, support, security and protection facilities include, but are not limited to, the following:
  - 1. Temporary telecommunications services.
  - 2. Temporary sanitary facilities.
  - 3. Temporary Controls: Barriers, enclosures, and fencing.
  - 4. Temporary electric and lighting.
  - 5. Security requirements.
  - 6. Vehicular access and parking.
  - 7. Waste removal facilities and services.
  - 8. Temporary and additional required signs.
  - 9. Sewers, drainage and stormwater control.
  - 10. Environmental protection.
  - 11. Tree and plant protection.
  - 12. Lifts and hoists.
  - 13. Construction aids and miscellaneous services and facilities.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 015713 - Temporary Erosion and Sediment Control: Erosion controls during construction.
- B. Section 311500 - Protection of Existing and New Trees: Plant protection during construction.
- C. Section 312319 - Dewatering: Dewatering of site during construction.

#### **1.03 TEMPORARY UTILITIES**

- A. Contractor may use the Owner's existing water and electric utilities at the site (except phone/internet and utilities for field office(s)) as required for the new portions of this project. However, if the privilege of using the Owner's utilities are abused, then the Contractor shall reimburse the Owner any amount over a normal monthly bill amount.
  - 1. Conditions of Use of Owner's Utilities: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.
  - 2. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner, Architect, testing agencies and authorities having jurisdiction.
  - 3. Provide adequate capacity at each stage of construction. before temporary utility is available, provide trucked-in services.
  - 4. All required temporary work shall provide for safe and proper performance of the work. The Contractor shall be responsible for adequate design and construction of all temporary work used in construction of Contract Work.
  - 5. Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
  - 6. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

#### **1.04 ELECTRICAL SERVICE**

- A. Provide, weatherproof, grounded electric power service and distribution system of size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnection means, automatic ground-fault , and main distribution switchgear.

1. Electrical service to comply with NECA, NEMA, UL and NFPA for temporary electrical needs.
2. Electrical outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110-to-120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light. Provide receptacle outlets adequate for connection of power tools and equipment.
3. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
4. Provide warning signs at power outlets other than 110 to 120 V.

#### **1.05 WATER SERVICE**

- A. Contractor to provide temporary water and distribution service as required by construction activities.
  1. Use trigger-operated nozzles for water hoses, to avoid waste of water.
- B. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Provide water at gravel wash pit(s), where indicated and, at construction exits of the site.
  1. Provide water, with pressure necessary, to clean vehicles and tires of mud and debris prior to exiting construction site.

#### **1.06 TELECOMMUNICATIONS SERVICES**

- A. Phone service shall be for use by all personnel engaged in construction activities, throughout the construction period.
  1. At each telephone, post a list of important telephone numbers.
  2. Cellular telephone service may be substituted for use by the Contractor's superintendent.
  3. Internet service with an e-mail address for the Contractor's superintendent is to be provided.
  4. Contractor required to have personnel on site with smartphone(s), laptop and/or a tablet with internet access/connections.
    - a. Internet service with an e-mail address for the Contractor's superintendent is to be provided.

#### **1.07 TEMPORARY SANITARY FACILITIES**

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization. Comply with regulations and health codes for type, number, location, operation and maintenance of fixtures and facilities.
  1. Single occupant units of chemical, aerated recirculation, or combustion type; fully vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar material.
  2. Provide containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
- B. Maintain daily in clean and sanitary condition.
- C. Owner's existing restroom facilities in the building are not to be used under any circumstances.

#### **1.08 ENVIRONMENTAL PROTECTION**

- A. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or other entities near Project site.
  1. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

- B. Stormwater Control: Refer to stormwater control requirements of specification section 015713 Temporary Erosion and Sediment Control.
- C. Tree and Plant Protection: Refer to tree and plant protection requirements of specification section 311500 Protection of Existing and New Trees.

## **1.09 BARRIERS**

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
  - 1. High Density/Visibility Fence:
    - a. High-density polyethylene fencing material meeting ASTM D4595 testing for 360 lbs/ft.
      - 1) Color: High visibility orange.
    - b. Fence Height: 4'-0".
    - c. Posts: Steel or wood at 6'-0" on center, maximum, or as needed to ensure rigidity.
      - 1) Provide protector post caps as required.
    - d. Ties: Secure fencing to the post every 6 inches with a polyethylene tie.
    - e. Top Stringer: For long continuous lengths of fencing, a tension wire or rope shall be used as a top stringer to prevent sagging between posts.
    - f. Fence shall not be wired or stapled to trees.
    - g. If fence becomes damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.
- B. Provide protection for plants designated to remain. Replace damaged plants.

## **1.10 LIFTS AND HOISTS**

- A. Provide facilities for hoisting materials and personnel. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

## **1.11 VEHICULAR ACCESS AND PARKING**

- A. Coordinate parking areas to accommodate construction personnel with the Owner. If on-site space is not adequate, provide additional off-site parking. Contractor is responsible for any fees or expenses incurred by off-site parking and transportation.
- B. Coordinate access and haul routes with governing authorities and Owner.
- C. Provide and maintain fire department access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets. Streets used as access to and from the site shall be kept free of mud and debris.
- E. Existing on-site roads and parking areas shall not be used for construction traffic, staging and storage, unless specifically approved by Owner and Architect.
- F. Fire Truck Access: Access to the building site and surrounding buildings must be maintained during construction for local fire truck access. Phase construction as required to maintain access to new, existing, or temporarily relocated standpipe, fire hydrant connections, the requirements of Section 3311 and 3312 of the 2015 International Building Code with Kentucky Amendments, and fire alarm annunciator panels. Coordinate with the local fire department that would respond to an alarm during the initial start up of construction to ensure a complete understanding of their requirements.

## **1.12 WASTE REMOVAL**

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition. All exitways, walks, drives, grass areas, and landscaping must be kept free from debris at all times.

- B. Provide adequate trash containers of proper size.
- C. Provide containers with lids. Collect waste from construction areas and elsewhere daily. Remove trash from site per following.
  - 1. Dispose of all material in a lawful manner.
  - 2. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 degrees F.
- D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- E. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Comply with NFPA 241 for removal of combustible waste material and debris.
- F. Failure to comply with the above requirements shall be cause for stopping work until the condition is corrected.

### **1.13 PROJECT IDENTIFICATION**

- A. Provide project identification sign of design and construction indicated in this section.
  - 1. Do not permit installation of unauthorized signs.
  - 2. Engage an experienced sign company to produce the signs required.
- B. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.
- C. Additional Required Signs: Contractor to provide sign or signs in a location or locations clearly visible to all Contractors, not less than 2' x 4' in dimension, with the following wording "Unlawful possession of a weapon on school property in Kentucky is a felony punishable by a maximum of five (5) years in prison and a ten thousand dollar (\$10,000) fine." Installation shall include all supporting framing and setting materials required.
  - 1. Sign can be digitally printed on pressure sensitive vinyl with UV resistant inks and mounted on a 1/2 inch MDO board or 10 mm PVC board or printed directly on the MDO or PVC board with UV resistant inks.
- D. No other signs are allowed without Owner permission except those required by law.

### **1.14 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove each temporary when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion.
- B. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- C. Clean and repair damage caused by installation or use of temporary work.

### **PART 2 PRODUCTS - NOT USED**

### **PART 3 EXECUTION - NOT USED**

### **END OF SECTION**

## **SECTION 015713 TEMPORARY EROSION AND SEDIMENT CONTROL**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Prevention of erosion due to construction activities.
- B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.
- C. Restoration of areas eroded due to insufficient preventive measures.
- D. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 311000 - Site Clearing: Limits on clearing; disposition of vegetative clearing debris.
- B. Section 312200 - Grading: Temporary and permanent grade changes for erosion control.
- C. Section 321123 - Aggregate Base Courses: Temporary and permanent roadways.
- D. Section 329219 - Seeding: Permanent turf for erosion control.

#### **1.03 REFERENCE STANDARDS**

- A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus; 2014.
- B. ASTM D4491/D4491M - Standard Test Methods for Water Permeability of Geotextiles by Permittivity; 1999a (Reapproved 2014).
- C. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity; 1999a (Reapproved 2014).
- D. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2011.
- E. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a.
- F. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile; 2012.
- G. ASTM D4873 - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples; 2002 (Reapproved 2009).
- H. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit; Current Edition.
- I. FHWA FLP-94-005 - Best Management Practices for Erosion and Sediment Control; 1995.
- J. USDA TR-55 - Urban Hydrology for Small Watersheds; USDA Natural Resources Conservation Service; 2009.

#### **1.04 PERFORMANCE REQUIREMENTS**

- A. Comply with requirements of EPA (NPDES) for erosion and sedimentation control, as specified by the NPDES, for Phases I and II, and in compliance with requirements of Construction General Permit (CGP), whether the project is required by law to comply or not.
- B. Also comply with all more stringent requirements of State of Kentucky Erosion and Sedimentation Control Manual.

- C. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.
- D. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.
  - 1. Obtain and pay for permits and provide security required by authority having jurisdiction.
  - 2. Owner will withhold payment to Contractor equivalent to all fines resulting from non-compliance with applicable regulations.
- E. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.
- F. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
  - 1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
  - 2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 25 years.
- G. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
  - 1. Control movement of sediment and soil from temporary stockpiles of soil.
  - 2. Prevent development of ruts due to equipment and vehicular traffic.
  - 3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- H. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
  - 1. Prevent windblown soil from leaving the project site.
  - 2. Prevent tracking of mud onto public roads outside site.
  - 3. Prevent mud and sediment from flowing onto sidewalks and pavements.
  - 4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- I. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
  - 1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
  - 2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.
- J. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
  - 1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
- K. Open Water: Prevent standing water that could become stagnant.
- L. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

## 1.05 SUBMITTALS

- A. See Division 1 for submittal procedures.



- B. Erosion and Sedimentation Control Plan:
1. Submit within 2 weeks after Notice to Proceed.
  2. Include:
    - a. Site plan identifying soils and vegetation, existing erosion problems, and areas vulnerable to erosion due to topography, soils, vegetation, or drainage.
    - b. Site plan showing grading; new improvements; temporary roads, traffic accesses, and other temporary construction; and proposed preventive measures.
    - c. Where extensive areas of soil will be disturbed, include storm water flow and volume calculations, soil loss predictions, and proposed preventive measures.
    - d. Schedule of temporary preventive measures, in relation to ground disturbing activities.
    - e. Other information required by law.
    - f. Format required by law is acceptable, provided any additional information specified is also included.
  3. Obtain the approval of the Plan by authorities having jurisdiction.
  4. Obtain the approval of the Plan by Owner.
- C. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.
- D. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.
- E. Maintenance Instructions: Provide instructions covering inspection and maintenance for temporary measures used during construction and temporary measures that must remain after Substantial Completion.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Mulch: Use one of the following:
1. Straw. Do not use hay.
  2. Wood waste, chips, or bark.
  3. Erosion control matting or netting.
- B. Grass Seed For Temporary Cover: Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.
- C. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D4751.
  2. Permittivity:  $0.05 \text{ sec}^{-1}$ , minimum, when tested in accordance with ASTM D4491/D4491M.
  3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
  4. Tensile Strength: 100 pounds-force, minimum, in cross-machine direction; 124 pounds-force, minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
  5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
  6. Tear Strength: 55 pounds-force, minimum, when tested in accordance with ASTM D4533.
  7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.

8. Manufacturers: subject to compliance with requirements, manufacturers offering the following products that may be incorporated into the work include:
  - a. TenCate: [www.tencate.com/#sle](http://www.tencate.com/#sle).
  - b. North American Green: [www.nagreen.com/#sle](http://www.nagreen.com/#sle).
  - c. Propex Geosynthetics: [www.geotextile.com/#sle](http://www.geotextile.com/#sle).
- D. Silt Fence Posts: One of the following, minimum 5 feet long:
  1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot.
  2. Hardwood, 2 by 2 inches in cross section.
- E. Gravel: See Section 321123 for aggregate.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

#### **3.02 PREPARATION**

- A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

#### **3.03 SCOPE OF PREVENTIVE MEASURES**

- A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.
- B. Construction Entrances: Traffic-bearing aggregate surface.
  1. Width: As required; 20 feet, minimum.
  2. Length: 50 feet, minimum.
  3. Provide at each construction entrance from public right-of-way.
  4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.
- C. Linear Sediment Barriers: Made of silt fences.
  1. Provide linear sediment barriers:
    - a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
    - b. Along the top of the slope or top bank of drainage channels and swales that traverse disturbed areas.
    - c. Along the toe of cut slopes and fill slopes.
    - d. Perpendicular to flow across the bottom of existing and new drainage channels and swales that traverse disturbed areas or carry runoff from disturbed areas; space at maximum of 200 feet apart.
    - e. Across the entrances to culverts that receive runoff from disturbed areas.
- D. Crushed Stone Silt Checks: Stone check dams located along drainage swales and above headwalls. Silt checks are to be installed as required to reduce the sediment load of the runoff to local, State and Federal requirements. Construction is to be in accordance with the contract documents and KTC requirements.
- E. Soil Stockpiles: Protect using one of the following measures:
  1. Cover with polyethylene film, secured by placing soil on outer edges.
  2. Cover with mulch at least 4 inches thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches of straw; do not use hay.
- F. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
  1. Wood Waste: Use only on slopes 3:1 or flatter; no anchoring required.
- G. Temporary Seeding: Use where temporary vegetated cover is required.

### 3.04 INSTALLATION

- A. Traffic-Bearing Aggregate Surface:
  - 1. Excavate minimum of 6 inches.
  - 2. Place geotextile fabric full width and length, with minimum 12 inch overlap at joints.
  - 3. Place and compact at least 6 inches of 1 1/2 to 3 1/2 inch diameter stone.
- B. Silt Fences:
  - 1. Store and handle fabric in accordance with ASTM D4873.
  - 2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch high barriers with minimum 36 inch long posts spaced at 6 feet maximum, with fabric embedded at least 4 inches in ground.
  - 3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch high barriers, minimum 48 inch long posts spaced at 6 feet maximum, with fabric embedded at least 6 inches in ground.
  - 4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet, use nominal 32 inch high barriers with woven wire reinforcement and steel posts spaced at 4 feet maximum, with fabric embedded at least 6 inches in ground.
  - 5. Install with top of fabric at nominal height and embedment as specified.
  - 6. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches, with extra post.
  - 7. Fasten fabric to wood posts using one of the following:
    - a. Four nails per post with 3/4 inch diameter flat or button head, 1 inch long, and 14 gauge, 0.083 inch shank diameter.
    - b. Five staples per post with at least 17 gauge, 0.0453 inch wire, 3/4 inch crown width and 1/2 inch long legs.
  - 8. Fasten fabric to steel posts using wire, nylon cord, or integral pockets.
  - 9. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches high with post spacing not more than 4 feet.
- C. Mulching Over Small and Medium Areas:
  - 1. Dry Straw: Apply 4 to 6 inches depth.
  - 2. Wood Waste: Apply 2 to 3 inches depth.
  - 3. Erosion Control Matting: Comply with manufacturer's instructions.
- D. Temporary Seeding:
  - 1. When hydraulic seeder is used, seedbed preparation is not required.
  - 2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
  - 3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 1 pound per 1000 sq ft.
  - 4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft.
  - 5. Incorporate fertilizer into soil before seeding.
  - 6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch deep.
  - 7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
  - 8. Repeat irrigation as required until grass is established.

### 3.05 MAINTENANCE

- A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.
- B. Repair deficiencies immediately.

- C. Silt Fences:
  - 1. Promptly replace fabric that deteriorates unless need for fence has passed.
  - 2. Remove silt deposits that exceed one-third of the height of the fence.
  - 3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- D. Stone Silt Checks: Remove accumulated sediment when it reaches 1/3 of the height of the check.
- E. Clean out temporary sediment control structures weekly and relocate soil on site.
- F. Place sediment in appropriate locations on site; do not remove from site.

### **3.06 CLEAN UP**

- A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Architect.
- B. Clean out temporary sediment control structures that are to remain as permanent measures.
- C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

### **END OF SECTION**

**SECTION 024119  
SELECTIVE STRUCTURE DEMOLITION****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Selective demolition of built site elements.
- B. Patching and repairs of existing elements to remain.

**1.02 RELATED SECTIONS**

- A. Section 011000 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 013000 - Administrative Requirements: Preconstruction photographs taken prior to building demolition.
- C. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- D. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.
- E. Section 017300 - Cutting and Patching: Repairs to existing surfaces.
- F. Section 311000 - Site Clearing: Vegetation and existing debris removal.
- G. Section 312200 - Grading: Topsoil removal.
- H. Section 312323 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

**1.03 REFERENCES**

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2004.

**1.04 DEFINITIONS**

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or recycled.
- B. Existing to remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or recycled. Protect construction indicated to remain against damage and soiling during selective demolition.

**1.05 MATERIALS OWNERSHIP**

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.

**1.06 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Submit before work begins.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

**1.07 PROJECT CONDITIONS**

- A. Conditions existing at time of inspection for bidding purposes will be maintained by Owner as far as practical.
- B. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- C. Storage or sale of removed items or materials on-site is not permitted.
- D. Comply with other requirements specified in Section 017000.

**1.08 HAZARDOUS MATERIALS**

- A. Hazardous Materials: It is not expected that hazardous material will be encountered in the work.
  - 1. Hazardous materials will be removed by the Owner before start of work.
  - 2. If material suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.
    - a. Hazardous materials will be removed by Owner under a separate contract.

**PART 2 PRODUCTS****2.01 MATERIALS**

- A. Fill Material: As specified in Section 312323 - Fill and Backfill
- B. Repair Materials: Use repair materials identical to existing materials.
  - 1. Use materials whose installed performance equals or surpasses that of existing materials.

**PART 3 EXECUTION****3.01 SCOPE**

- A. Remove paving and curbs as required to accomplish new work.
- B. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as required so that required rough grade elevations do not subside within one year after completion.

**3.02 EXAMINATION**

- A. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- B. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are the same as those indicated in Project Record Documents.
- C. When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element. Promptly submit a written report to the Architect.

**3.03 GENERAL PROCEDURES AND PROJECT CONDITIONS**

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.
  - 2. Use of explosives is not permitted.
  - 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
  - 4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.

5. Do not close or obstruct roadways or sidewalks without permit.
  6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
  7. Obtain written permission from owners of adjacent properties when selective demolition equipment will traverse, infringe upon or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Protect existing structures and other elements that are not to be removed.
1. Stop work immediately if adjacent structures appear to be in danger.
- D. Site Restoration:
1. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements in Division 31 Sections.
  2. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.
  3. Staging, Parking and Storage: Restore lawn areas used for staging and storage of construction materials or parking during the project back to their original condition.
- E. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

### **3.04 EXISTING UTILITIES**

- A. Protect existing utilities to remain from damage.
- B. Do not disrupt public utilities without permit from authority having jurisdiction.
- C. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- D. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- E. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

### **3.05 DEBRIS AND WASTE REMOVAL**

- A. Except for items or materials indicated to be reused, salvaged, and reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
1. Do not allow demolished materials to accumulate on-site.
  2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Transport demolished materials from Owner's property and legally dispose of them..
- C. Transport demolished materials approved for fill and dispose of at designated spoils areas on Owner's property.
- D. Do not burn demolished materials on site.
- E. Leave site in clean condition, ready for subsequent work.
- F. Clean up spillage and wind-blown debris from public and private lands.

- G. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return to condition existing before start of selective demolition.

**END OF SECTION**



## **SECTION 116813 PLAYGROUND EQUIPMENT**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Pre-manufactured pavillion structures.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 312200 - Grading: Shaping subgrade to specified grade levels; removal of excess soil and rocks.
- B. Section 321313 - Concrete Paving: Pavilion slab.
- C. Section 334600 - Subdrainage

#### **1.03 REFERENCE STANDARDS**

- A. ASTM A135/A135M - Standard Specification for Electric-Resistance-Welded Steel Pipe; 2009 (Reapproved 2014).
- B. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- C. ASTM D3363 - Standard Test Method for Film Hardness by Pencil Test; 2005 (Reapproved 2011).
- D. CPSC Pub. No. 325 - Public Playground Safety Handbook; 2010.

#### **1.04 SUBMITTALS**

- A. Product Data: For all manufactured equipment, provide manufacturer's product data showing materials of construction, dimensions, finishes, compliance with specified standards, field assembly requirements, and installation procedures.
  - 1. Treated Wood Products: Provide information on wood treatment chemical content, toxicity level, and life-cycle durability.
  - 2. Wood Finishes: Provide information on wood finish chemical content and toxicity level.
- B. Shop Drawings: Detailed scale drawings showing layout, elevations, sections, and attachment details.
  - 1. Show locations and dimensions of footings and anchorage points.
  - 2. Clearly identify mounting elevations in relation to a fixed survey point on site and to subgrade elevation and depth of protective surfacing.
  - 3. Show locations of underground utilities, storm drainage system and irrigation system.
  - 4. Show locations of related construction such as walkways and roadways, fences, site furnishings, and plantings.
- C. Samples: For each item that a color must be selected, provide color chart showing full range of colors and finishes.
- D. Maintenance Data: Provide manufacturer's recommended maintenance instructions and list of replaceable parts for each equipment item, with address and phone number of source of supply.
- E. Kentucky Department of Housing, Building and Construction, Division of Building Codes Enforcement (HBC) Submittal: The pavilion manufacturer, supplier and/or installer is responsible to provide and submit all required KIBS Plan Application Forms and shop drawings necessary to obtain all approvals, permits and pay any fees required by HBC for the project.
  - 1. All drawings to be marked "FOR CONSTRUCTION" and bear the required seal and signature of the professional engineer in responsible charge of the engineering, design and shop drawing preparation for the manufacturer.

- F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

## **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company regularly engaged in manufacturing materials and products specified in this section, with not less than three years of documented experience.
  - 1. Provide documentation showing that equipment similar to that specified has been installed in at least ten sites and in successful service for at least five years; provide addresses.
  - 2. Manufacturer's Representative: Provide product rep's name, company name and address.
- B. Installer Qualifications: Company certified by manufacturer for training and experience installing specified structures.

## **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, handle, and store equipment to project site in accordance with manufacturer's recommendations.
- B. Store materials in a dry, covered area, elevated above grade.

## **1.07 WARRANTY**

- A. Provide minimum 10 year warranty for premanufactured pavilion structures.

## **PART 2 PRODUCTS**

### **2.01 PRE-MANUFACTURED PAVILION**

- A. Manufacturers:
  - 1. RCP Shelters, Inc; [www.rcpshelters.com](http://www.rcpshelters.com)
  - 2. Poligon; : [www.poligon.com](http://www.poligon.com)
  - 3. Cedar Forest Products; : [www.cedarforestproducts.com](http://www.cedarforestproducts.com)
  - 4. Icon Shelter Systems Inc; : [www.iconshelters.com](http://www.iconshelters.com)
  - 5. Substitutions: See Section 016000 - Product Requirements.
- B. All premanufactured structures shall be installed per manufacturer's recommendation.
- C. Pavilion Structures:
  - 1. Basis of Design: TS-G2434-04-TG as manufactured by RCP Shelters, Inc., 2100 SE Rays Way, Stuart, FL 34994.
  - 2. Other manufacturers of equal systems may be submitted for review and approval by Architect by addendum during the bidding phase.
  - 3. Components:
    - a. Columns: Powder coated tube steel as sized by manufacturers sealing engineer.
      - 1) Finish: Powder coat finish, color to be selected from manufacturers full line of colors. Various color to be selected for each location.
    - b. Frame: Powder coated tube steel as sized by manufacturers sealing engineer.
      - 1) Finish: Powder coat finish, color to be selected from manufacturers full line of colors. Various color to be selected for each location.
    - c. Roof Deck: #1 Grade T&G Southern Yellow Pine as sized by manufactures sealing engineer.
    - d. Fascia: #1 grade 2x6 Alaskan Yellow Cedar
    - e. Stain: All exposed wood to be factory stained.
    - f. Hardware: As required by manufactures sealing engineer.
    - g. Eave Height: 10'-0"
    - h. Roof Pitch: 4:12

**PART 3 EXECUTION****3.01 LAYING OUT THE WORK**

- A. Stake the location of structures, including perimeter of hard surfaces.
- B. Stake the layout prior to starting any work .
  - 1. If conflicts or obstructions exist, notify Architect.
  - 2. Do not proceed until revised drawings have been provided, showing corrected layout, and obstructions have been removed.

**3.02 VERIFICATION OF CONDITIONS**

- A. Verify that footings have been installed in proper locations and at proper elevations.
- B. Verify location of underground utilities and facilities in area; damage to underground utilities and facilities will be repaired at Contractor's expense.

**3.03 INSTALLATION**

- A. Install concrete footings with top surface a minimum of 1/2 inch below required subgrade elevation.
- B. Install in accordance with CPSC Pub. No. 325, ASTM F1487, manufacturer's instructions, and requirements of authorities having jurisdiction (AHJ).
- C. Do not modify structures on site without written approval of manufacturer.

**3.04 CLEANING**

- A. Restore adjacent existing areas that have been damaged from the construction.
- B. Clean structures of construction materials, dirt, stains, filings, and blemishes due to shipment or installation; clean in accordance with manufacturer's instructions, using cleaning agents as recommended by manufacturer.
- C. Clean area of excess construction materials, debris, and waste.
- D. Remove excess and waste material and dispose of off-site in accordance with requirements of authorities having jurisdiction.

**3.05 PROTECTION**

- A. Protect installed products until Date of Substantial Completion.
- B. Replace damaged products before Date of Substantial Completion.

**END OF SECTION**

**SECTION 311000  
SITE CLEARING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Clearing and protection of vegetation.
- B. Removal of existing debris.
- C. Removal of existing site improvements including pavements, utilities and utility structures, foundations or other site improvements.

**1.02 RELATED REQUIREMENTS**

- A. Section 011000 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 015713 - Temporary Erosion and Sediment Control.
- D. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.
- E. Section 312200 - Grading: Topsoil removal.
- F. Section 312323 - Fill: Filling holes, pits, and excavations generated as a result of removal operations.
- G. Section 312513 - Permanent Erosion Controls
- H. Section 311500- Protection of Existing Trees

**PART 2 PRODUCTS****2.01 MATERIALS**

- A. Fill Material: As specified in Section 312323 - Fill and Backfill

**PART 3 EXECUTION****3.01 SITE CLEARING**

- A. Comply with other requirements specified in Section 017000.
- B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

**3.02 EXISTING UTILITIES AND BUILT ELEMENTS**

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Protect existing structures and other elements that are not to be removed.
- E. Pavements and slabs are to be saw cut to provide a clean edge. Concrete pavements are to be cut at the nearest control joint to the required demolition area.

**3.03 VEGETATION**

- A. Scope: Remove trees, shrubs, brush, and stumps in areas to be covered by building structure, paving, playing fields, lawns, planting beds, borrow areas (when applicable) and disposal areas (when applicable).
- B. Install substantial, highly visible fences at least 3 feet high to prevent inadvertent damage to vegetation to remain:
  - 1. At vegetation removal limits.
  - 2. Around trees to remain within vegetation removal limits; locate no closer to tree than at the drip line.
  - 3. Around other vegetation to remain within vegetation removal limits.
- C. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
  - 1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.
  - 2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
  - 3. Sod: Re-use on site if possible; otherwise sell if marketable, and if not, treat as specified for other vegetation removed.
- D. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner.

**3.04 DEBRIS**

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION**

## **SECTION 311500 PROTECTION OF EXISTING TREES**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Protection of existing and newly planted trees is to be performed on the project site and at any areas adjacent to or near the site where construction activities impact the Tree Protection Zone (TPZ). Tree protection will function as follows:
  - 1. The foliage canopy and branching structure are to be kept clear from contact with equipment, vehicles, materials and activities
  - 2. The roots and soil conditions are to be preserved in an intact and non-compacted state
  - 3. No Soil disturbance is permitted within the identified Tree Protection Zone (TPZ) unless otherwise approved.
- B. Work included: Furnish all labor, materials, equipment and services necessary to protect existing trees on site and on adjacent road right-of-way and sites, including but not limited to:
  - 1. Survey and layout, installation, maintenance, adjustment during construction, and final removal of protective barriers and signs.
  - 2. Pruning as required, including hand excavation and root pruning if required and approved by the landscape architect and/or arborist.
  - 3. Excavation, soil stabilizing

#### **1.02 RELATED REQUIREMENTS**

- A. Section 011000 - Summary: Contract descriptions, description of alterations work, work by others, future work, occupancy conditions, use of site and premises, work sequence.
- B. Section 013000 - Administrative Requirements: Submittal procedures, project meetings, progress schedules and documentation, reports, coordination.
- C. Section 015713 - Temporary Erosion and Sedimentation Control.

#### **1.03 DEFINITIONS AND PROCEDURES**

- A. Tree Protection Zone (TPZ) (May be interchanged with Critical Root Zone (CPZ) and Drip-Line below): An area around the base of a tree with a radius of 10 times the diameter of the tree's trunk or twenty feet, whichever is greater.
- B. Tree Protection Barrier: any fencing or other barrier material, including supports and bracing for such, to be used to surround and enclose the TPZ.
- C. Critical Root Zone Area (CRZ): The area of undisturbed natural soil around a tree defined by a horizontal circle drawn at grade with the trunk at the center and extending for a radial distance equal to the distance from the center of the trunk to the outermost portion of the drip line.
- D. Drip Line: the area surrounding a tree directly below the outermost portions of the tree canopy, or a circular area with a radius of one-half of the height of the tree extending outward from the center point of the tree.
- E. Warning Sign: A warning sign is to be prominently displayed on each fence at 25- foot intervals.
- F. Root Protection: Materials or devices installed at ground level to protect the root system of trees from compaction during construction.
- G. Root Boring for utility installation: Directional micro-tunneling and boring may be permitted within the limits of the TPZ subject to approval by the Landscape Architect.
- H. Tree Topping: Practice of removing a substantial portion or all of the upper canopy of a tree. Tree Topping will not be allowed in this project.

- I. Root Boring: Boring beneath protected trees to provide a tunnel for the installation of utilities.

## **PART 2 PRODUCTS**

### **2.01 TREE PROTECTION PRODUCTS**

- A. Fencing: 4'-0" high orange plastic 'snow' or barrier fence. Provide steel posts spaced at 6 ft. minimum.
- B. Tree Protection Area Signs: minimum size 12" x 18", may be lettered vertically or horizontally.
  - 1. Size: minimum 12" x 18", vertical or horizontal placement.
  - 2. Text: CAUTION - TREE PROTECTION ZONE - DO NOT REMOVE. NO DUMPING, BURNING, STORAGE, CUTTING, MACHINERY OR VEHICLES.
  - 3. Material to be painted plywood or other weather resistant material.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Prior to the beginning of demolition or construction work, field verify the TPZ for each existing tree to be preserved. Perform any root exploratory excavation necessary to determine root location and condition and/or other existing conditions.
- B. Instruct all construction workers to observe the TPZ limits.

### **3.02 INSTALLATION**

- A. No construction activity including grade changes, surface treatments or excavations of any kind is permitted within the TPZ of any existing tree to remain unless otherwise indicated on the project plan drawings. The area within the TPZ must remain undisturbed at all times.
- B. No root cutting is permitted unless done with the approval of the landscape architect and requiring the services of a qualified arborist or approved tree professional. An exploratory excavation by hand or using a low water pressure hydro vac method must be completed prior to commencing with open face cuts outside the TPZ.
- C. Do not store materials or fill within the TPZ.
- D. Do not allow movement, parking or storage of vehicles or equipment within the TPZ.
- E. Do not discharge exhaust into foliage or allow fires under and adjacent to trees.
- F. Do not allow run off of spillage of damaging materials into the TPZ, including but not limited to concrete overflow or sleuth, gas, oil, paint, etc.
- G. Protection Barrier Fencing Layout:
  - 1. Typical Layout: Fencing is to enclose the entire area under the canopy drip line or TPZ (whichever is greater) of each tree or group of trees to be protected throughout the demolition and construction period.
  - 2. Special Layout:
    - a. For trees located within a planting strip or island, and where existing vehicular and/or pedestrian pathways must be kept open for use, only the planting strip or island and landscaped side of the TPZ is to be enclosed with the required fencing type.
    - b. For trees located in a tree well or sidewalk planter pit, the tree is to be wrapped with 2 inches of orange plastic fencing from the ground to the height of the first branch and overlaid with 2 inch thick wooden slats bound securely. Protect the tree bark from direct contact with the slats. Use caution during installation to avoid damage to branches and tree stem.
- H. Install Tree Protection Barrier Fencing

1. Orange safety fence: Embed posts a minimum 18 inches at no more than 5 (five) foot spacing. Fencing is to be tied closed completely surrounding the TPZ.
- I. Install Tree Protection Area and Enclosure Signage.
- J. Tree Topping: No Tree Topping will be allowed.
- K. Tree Pruning: Branches which are found to be a barrier to construction or a health and safety hazard may be removed subject to the approval of the landscape architect/arborist.
  1. When removing a branch, cut outside the branch bark ridge and collar. Do not make a flush cut adjacent to the trunk of the tree or branch being pruned.
  2. Make a partial cut from beneath at a point several inches away from the trunk.
  3. Make a second cut from above several inches out from the first cut to allow the limb to fall safely.
  4. Complete the removal with a final cut just outside the branch collar (the raised area that surrounds the branch where it joins the trunk).
  5. Make all cuts clean and remove any jagged edges carefully.

### **3.03 INTERFACE WITH OTHER WORK:**

- A. Coordinate tree protection with all demolition, excavation and utility work in the area..

### **3.04 FIELD QUALITY CONTROL**

- A. See Division 1 for Quality Requirements.
- B. Inspect for existing soil conditions which may be detrimental to tree health and survival; existing utilities within or adjacent to the TPZ; and extent of root system beyond the visible drip line.
- C. Any trees which are found to be in poor or damaged condition are to be evaluated by the landscape architect or arborist. Trees that are deemed to have a minimal chance of survival or which pose a health or safety risk may be removed or pruned by more than one-third subject to approval of the landscape architect/arborist and Owner.

### **3.05 MAINTENANCE**

- A. See Division 1 for additional requirements relating to maintenance service.
- B. Trees are to be watered, aerated and maintained as necessary to ensure survival.
- C. Repair or replace any fencing, ground protection or signage that has been removed or damaged. Inspect installations on a continuous basis.
- D. Tree protection devices are to be removed at the end of the project (after final completion) and the area beneath the TPZ returned to original condition.

### **END OF SECTION**



**SECTION 312200  
GRADING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Removal of topsoil.
- B. Rough grading the site for site structures.
- C. Finish grading.

**1.02 RELATED REQUIREMENTS**

- A. Section 015713 - Temporary Erosion and Sediment Control.
- B. Section 311000 - Site Clearing.
- C. Section 312316 - Excavation.
- D. Section 312316.13 - Trenching: Trenching and backfilling for utilities.
- E. Section 312323 - Fill: Filling and compaction.
- F. Section 312513 - Permanent Erosion Controls
- G. Section 329219 - Seeding: Finish ground cover.

**1.03 SUBMITTALS**

- A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

**1.04 DEFINITIONS**

- A. Finish Grade Elevations: Indicated on Drawings.
- B. Zone of Influence: Area beneath a footing or foundation that extends out from the bottom edge of the footing/foundation at a 45-degree angle down to a depth equal to 3 times the footing width.
- C. Fat Clays: Soil types with the classification of CH and a Plasticity Index (PI) above 30%.

**1.05 QUALITY ASSURANCE**

- A. Perform Work in accordance with State of Kentucky, Highway Department standards.

**1.06 PROJECT CONDITIONS**

- A. It is recommended that earthwork be done during the warm and dry months. If earthwork is to be done during cold or wet months, the use of DGA in lieu of general soil fill should be considered for structural and pavement areas. Time extensions will not be considered for any delays due to the Contractor choosing to not use DGA in lieu of general soil fill during cold or wet months.
- B. A Geotechnical Investigation was not performed for the project site. As such, it is highly recommended that the contractor excavate test pits prior to preparation of their bids in order to further clarify the extend of the materials which may be encountered.
- C. The soils found on this site are very sensitive to changes in the moisture content and will quickly degrade in such conditions and when subjected to construction traffic. The Contractor should carefully evaluate equipment to be used on the site so as to minimize degradation of the soils. In addition, the Contractor is to include in their bid the stabilization or repair of soils that will be affected by construction activities.

- D. The new vehicular pavement and stone base areas are not designed for construction traffic and should not be used for construction activities unless they are stabilized using #2 crushed stone and geogrid. Stabilization should include any undercutting and material handling, borrow or disposal necessary to maintain the design subgrade elevations after stabilization has been done. Any areas of subgrade, road base or pavement damage are to be repaired.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Topsoil: Excavated from site and free of weeds. Supplement as needed with imported fertile agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds and roots; pH value of minimum 5.4 and maximum 7.0. Topsoil to be amended as needed.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.
- B. Verify the absence of standing or ponding water. Refer to Specification Section 312319 for Dewatering requirements.

### **3.02 PREPARATION**

- A. All site grading is unclassified.
- B. Identify required lines, levels, contours, and datum.
- C. Stake and flag locations of known utilities.
- D. Locate, identify, and protect from damage above- and below-grade utilities to remain.
- E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading. Refer to Specification Section 312319 for additional Dewatering requirements.
- F. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.
- G. Protect trees to remain by providing substantial fencing around entire tree at the outer tips of its branches; no grading is to be performed inside this line.
- H. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping.

### **3.03 ROUGH GRADING**

- A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.
- B. Do not remove topsoil when wet.
- C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.
- D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.
- E. See Section 312323 for filling procedures.
- F. Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key fill material to slope for firm bearing.
- G. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

- H. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

### **3.04 SOIL REMOVAL and STOCKPILING**

- A. Stockpile topsoil to be re-used on site; remove remainder from site. Topsoil stockpile is to be covered or seeded and mulched to protect the pile from erosion.
- B. Stockpile subsoil that is to be re-used on site; remove remainder from site. Cover stockpile to prevent erosion and saturation of the material.
- C. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet; protect from erosion.

### **3.05 FINISH GRADING**

- A. Before Finish Grading:
  - 1. Verify building and trench backfilling have been inspected.
  - 2. Verify subgrade has been contoured and compacted.
- B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products and legally dispose of it off-site.
- C. Where topsoil is to be placed, scarify surface to depth of 3 inches.
- D. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches.
- E. Place topsoil to the following compacted thicknesses:
  - 1. Areas to be Seeded with Grass: 6 inches.
  - 2. Areas to be Sodded: 5 inches.
- F. Place topsoil during dry weather.
- G. Remove roots, weeds, rocks, and foreign material while spreading.
- H. Near plants, buildings, and other improvements spread topsoil manually to prevent damage.
- I. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.
- J. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

### **3.06 TOLERANCES**

- A. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) from required elevation.
- B. Top Surface of Finish Grade: Plus or minus 0.04 foot (1/2 inch).

### **3.07 REPAIR AND RESTORATION**

- A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.
- B. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

### **3.08 FIELD QUALITY CONTROL**

- A. See Section 312323 for compaction density testing.

**3.09 CLEANING**

- A. Sediment Control/Silt Fencing: Provide fabric silt fencing and other erosion control devices as required and shown on plans to control erosion and allow lawn crew to establish grass uniformly across slope areas.
- B. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.
- C. Leave site clean and raked, ready to receive landscaping.

**END OF SECTION**

## **SECTION 312316 EXCAVATION**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Excavating for footings, slabs-on-grade, paving, and site structures.
- B. Temporary excavation support and protection systems.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 015713 - Temporary Erosion and Sediment Control: Slope protection and erosion control.
- B. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring. General requirements for dewatering of excavations and water control.
- C. Section 312200 - Grading: Soil removal from surface of site.
- D. Section 312200 - Grading: Grading.
- E. Section 312319 - Dewatering
- F. Section 312323 - Fill: Fill materials, backfilling, and compacting.

#### **1.03 DEFINITIONS**

- A. Finish Grade Elevations: Indicated on Drawings
- B. Zone of Influence: Area beneath a footing or foundation that extends out from the bottom edge of the footing/foundation at a 45-degree angle down to a depth equal to 3 times the footing width.
- C. Fat Clays: Soil types with the classification of CH and a Plasticity Index (PI) above 30%.

#### **1.04 REFERENCE STANDARDS**

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

#### **1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Field Quality Control Submittals: Document visual inspection of load-bearing excavated surfaces.

#### **1.06 PROJECT CONDITIONS**

- A. All excavation is unclassified including bedrock excavation.
- B. Verify that survey bench mark and intended elevations for the Work are as indicated.

### **PART 2 PRODUCTS - NOT USED**

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that survey bench mark and intended elevations for the work are as indicated.
- B. Determine the prevailing groundwater level prior to excavation. If the proposed excavation extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by Architect. If the proposed excavation extends more than 1 foot into the prevailing groundwater, control groundwater intrusion with a comprehensive dewatering procedures, or as directed by Geotechnical Engineer. Refer to Specification Section 312319 for additional Dewatering requirements.

**3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 312200 for topsoil removal.
- C. Locate, identify, and protect utilities that remain and protect from damage.
- D. Notify utility company to remove and relocate utilities.
- E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- F. Ensure that dewatering measures have been implemented and are functioning prior to excavation activities. Refer to Specification Section 312319 for additional Dewatering requirements.
- G. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Architect.

**3.03 EXCAVATING**

- A. Excavate to accommodate new structures and construction operations.
- B. If a footing/foundation trench or other excavation inside the building footprint is to be left open for more than 48-hours or when a rain event occurs, the excavation is to be over-excavated an additional 4-inches and a lean concrete mud mat or layer of flowable fill should be placed 4-inches thick over the bottom of the excavation. This mud mat can extend no more than 4-inches into the minimum soil cushion between the footing and bedrock.
- C. Fill areas that do not pass proof-roll are to be undercut and/or stabilized as necessary to provide a stable platform for fill placement.
- D. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- E. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
- F. Do not interfere with 45 degree bearing splay (zone of influence) of foundations without approval from the Architect and approved specific backfill requirements.
- G. Hand trim excavations. Remove loose matter.
- H. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 312323.
- I. Provide temporary means and methods, as required, to remove all water from excavations until directed by Architect. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control. Refer to Specification Section 312319 for additional Dewatering requirements.
- J. Determine the prevailing groundwater level prior to excavation. If the proposed excavation extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Architect. If the proposed excavation extends more than 1 foot into the excavation, control groundwater intrusion with a comprehensive dewatering procedures, or as directed by the Geotechnical Engineer. Refer to Specification Section 312319 for additional Dewatering requirements.
- K. Remove excavated material that is unsuitable for re-use from site.
- L. Stockpile excavated material to be re-used in area designated on site 312200.

- M. Remove excess excavated material from site.

#### **3.04 REPAIR**

- A. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 312323.

#### **3.05 FIELD QUALITY CONTROL**

- A. See Division 1 for general requirements for field inspection and testing.
- B. Provide for visual inspection of load-bearing excavated surfaces by Architect before placement of foundations.

#### **3.06 PROTECTION**

- A. Divert surface flow from rains or water discharges from the excavation.
- B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.
- C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.
- D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- E. Keep excavations free of standing water and completely free of water during concrete placement.

**END OF SECTION**

## **SECTION 312316.13 TRENCHING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Excavation, backfilling and compacting for utilities outside the building to utility main connections.
- B. Backfilling of trenches excavated as a result of demolished utility lines and structures.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 015713 - Temporary Erosion and Sediment Control.
- B. Section 312200 - Grading: Site grading.
- C. Section 312316 - Excavation: Building and foundation excavating.
- D. Section 312316.26 - Rock Removal: Removal of rock during excavating.
- E. Section 312323 - Fill: Backfilling at building and foundations.
- F. Section 312323.13 - Flowable Fill: Backfill of utilities and excavations in the zone of influence of a foundation, footing or structural element inducing a load to the subgrade materials.
- G. Section 334100 - Subdrainage: Filter aggregate and filter fabric for foundation drainage systems.

#### **1.03 DEFINITIONS**

- A. Finish Grade Elevations: Indicated on drawings.
- B. Zone of Influence: Area beneath a footing or foundation that extends out from the bottom edge of the footing/foundation at a 45-degree angle down to a depth equal to 3 times the footing width.

#### **1.04 REFERENCE STANDARDS**

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.
- B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 2012.
- C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.
- D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)); 2012.
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.
- F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.
- G. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.
- H. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2010.

#### **1.05 SUBMITTALS**

- A. See Division 1 for submittal procedures.



- B. Materials Sources: Submit name of imported materials source.
- C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.
- D. Compaction Density Test Reports.

### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. When necessary, store materials on site in advance of need.

## **PART 2 PRODUCTS**

### **2.01 FILL MATERIALS**

- A. General Fill - Fill Type Lean Clay (CL): Subsoil excavated on-site and imported from off-site as necessary for new work.
  - 1. Graded.
  - 2. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
  - 3. Complying with ASTM D2487 Group Symbol CL.
  - 4. Having no more than 5-percent rock/gravel in the top 24-inches in landscape areas, and no more than 15-percent rock/gravel in any location.
- B. Structural Fill - Fill Type DGA - Fill Type \_\_\_\_ : Complying with State of Kentucky \_\_\_\_\_ Highway Department Highway Department standard.
- C. Flowable Fill: A controlled low-strength material made of cement, water, sand, and an air-entraining admixture that it can be excavated by hand or use of a backhoe. See Section 312323.13.
- D. Coarse Granular Fill - Fill Type #2: Coarse aggregate, conforming to State of Kentucky Highway Department standard.
- E. Graded Granular Fill (also referred to as Drainage Fill) - Fill Type #57 Crushed Limestone: Graded aggregate, conforming to State of Kentucky Highway Department standard.

### **2.02 ACCESSORIES**

- A. Geotextile Fabric: Non-biodegradable, non-woven, needle punched, 6-oz/sy(minimum weight) .

### **2.03 SOURCE QUALITY CONTROL**

- A. See Division 1 for general requirements for testing and analysis of soil material.
- B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.
- D. Provide materials of each type from same source throughout the Work.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that survey bench marks and intended elevations for the work are as indicated.

### **3.02 PREPARATION**

- A. All trenching is unclassified, including trenching in bedrock.
- B. Identify required lines, levels, contours, and datum locations.
- C. See Section 312200 for additional requirements.
- D. Locate, identify, and protect utilities that remain and protect from damage.

- E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- F. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the Architect. Refer to Specification Section 312319 for additional Dewatering requirements.

### **3.03 TRENCHING**

- A. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- B. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
- C. Do not interfere with 45 degree bearing splay of foundations (Zone of Influence) without approval from the Architect and Structural Engineer and approved specific backfill procedures.
- D. Hand trim excavations. Remove loose matter.
- E. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.
- F. Remove excavated material that is unsuitable for re-use from site.
- G. Stockpile excavated material to be re-used in area designated in Section 312200.
- H. Provide temporary means and methods, as required, to remove all water from trenching until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control. Refer to Specification Section 312319 for additional Dewatering requirements.
- I. Determine the prevailing groundwater level prior to trenching. If the proposed trench extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Architect. Refer to Specification Section 312319 for additional Dewatering requirements.
- J. If a trench is to be left open for more than 48-hours or when a rain event occurs, the trench is to be excavated an additional 4-inches and a lean concrete mud mat or layer of flowable fill should be placed 4-inches thick over the bottom of the excavation.

### **3.04 PREPARATION FOR UTILITY PLACEMENT**

- A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with:
  - 1. Flowable Fill in areas located in the zone of influence of any footing or foundation.
  - 2. Structural Fill in areas within the building footprint or under pavements that are not located in the zone of influence.
  - 3. General Fill in landscape areas
- B. Remove loose soil and any debris from the excavation prior to installing the utility and backfill.
- C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- D. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

### **3.05 BACKFILLING**

- A. Backfill to contours and elevations indicated using unfrozen materials.
- B. Employ a placement method that does not disturb or damage other work.

- C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- D. Maintain within 2% of the optimum moisture content of fill materials to attain required compaction density.
- E. Granular/Crushed Stone Fill: Place and compact materials in equal continuous layers not exceeding 6 inches loose depth when using heavy compaction equipment (sheepsfoot rollers, smooth drums, etc.) and not exceeding 4 inches loose depth when using hand operated or remote controlled equipment.
- F. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches loose depth when using heavy compaction equipment (sheepsfoot rollers, smooth drums, etc.) and not exceeding 4 inches loose depth when using hand operated or remote controlled equipment.
- G. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- H. Correct areas that are over-excavated.
  - 1. Thrust bearing surfaces: Fill with concrete.
  - 2. Other areas: Use general fill, flush to required elevation, compacted to minimum 98 percent of maximum dry density.
- I. Compaction Density Unless Otherwise Specified or Indicated:
  - 1. Under slabs-on-grade and similar construction: 98 percent of maximum dry density.
  - 2. At paving: 95 percent of maximum dry density.
  - 3. At landscape locations: 85 percent of maximum dry density.
- J. Reshape and re-compact fills subjected to vehicular traffic.

### **3.06 BEDDING AND FILL AT SPECIFIC LOCATIONS**

- A. At utility trenches excavated as a result of demolition and removal of existing utility lines and structures.
  - 1. At Building and Paving Areas:
    - a. Trenches are to be backfilled with either flowable fill or DGA from the bottom of the removed utility's trench up to the subgrade elevation immediately adjacent to the trench. Refer to Specification 312323.13 - Flowable Fill.
  - 2. At all other areas:
    - a. Trenches are to be backfilled with General Fill or DGA from the bottom of the removed utility's trench up to the subgrade elevation immediately adjacent to the trench.

### **3.07 TOLERANCES**

- A. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

### **3.08 FIELD QUALITY CONTROL**

- A. See Division 1 for general requirements for field inspection and testing.
- B. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor"), AASHTO T 180, or ASTM D698 ("standard Proctor").
- C. If tests indicate work does not meet specified requirements, remove work, replace and retest.
- D. Frequency of Tests: One (1) test for each 150 feet or less of trench length, but no fewer than two (2) tests..

**3.09 CLEANING**

- A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

**END OF SECTION**

**SECTION 312316.26  
ROCK REMOVAL****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Removal of identified and discovered rock during excavation.

**1.02 RELATED REQUIREMENTS**

- A. Section 312323 - Fill: Fill materials.

**1.03 PRICE AND PAYMENT PROCEDURES**

- A. All rock excavation is unclassified.

**1.04 DEFINITIONS**

- A. Site Rock: Solid mineral material with a volume in excess of 1/3 cubic yard or solid material that cannot be removed with a 3/4 cubic yard capacity power shovel without drilling.
- B. Trench Rock: Solid mineral material with a volume in excess of 1/6 cubic yard or solid material that cannot be removed with a 3/4 cubic yard capacity power shovel .
- C. Heave Rock: Rock that is fractured during blasting thus creating voids and causing the rock to "heave" and have a greater volume. Heave rock is not suitable for supporting structures or pavements.
- D. Weathered bedrock is not considered to be bedrock in this definition.
- E. Mixed Rock: Mixture of soil and shot rock with more than 15-percent soil. Mixed rock is not suitable for structural fill and can only be used as deep fill (more than 10-feet of cover) in landscape areas if the maximum particle size is 12-inches or less in any dimension.

**1.05 PROJECT CONDITIONS**

- A. Schedule Work to avoid disruption to occupied buildings nearby.
- B. Nothing in this specification section relieves the Contractor of any responsibilities for any damage to the existing structures or utilities as a result of rock removal activities.

**PART 2 PRODUCTS****PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify site conditions and note subsurface irregularities affecting work of this section.

**3.02 PREPARATION**

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

**3.03 ROCK REMOVAL**

- A. Bedrock is to be removed as required for all new construction.
- B. Remove bedrock to provide 18-inches of soil cover, including topsoil, for all landscape areas located in areas to be re-graded.
- C. Excavate and remove rock by mechanical methods only; use of explosives is prohibited.
- D. Mechanical Methods: Drill holes and utilize expansive tools or hoe-ramming/jack hammering techniques to fracture rock.
- E. Form level bearing at bottom of excavations.

- F. Remove shaled layers to provide sound and unshattered base for footings.
- G. Remove excavated materials from site.
- H. Correct unauthorized rock removal in accordance with backfilling and compacting requirements of Section 312323.
- I. Correct unauthorized rock removal to directions of Architect.

#### **3.04 FIELD QUALITY CONTROL**

- A. Provide for visual inspection of foundation bearing surfaces and cavities formed by removed rock.
- B. Provide for visual inspection of removal of heave rock and replacement in an engineered manner that will minimize future settlement or swell of the fractured rock.

**END OF SECTION**

## **SECTION 312319 DEWATERING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Dewatering of site during construction.

#### **1.02 RELATED SECTIONS**

- A. Section 312316 - Excavation: Excavating for subdrainage system piping and surrounding filter aggregate.
- B. Section 312323 - Fill: Filter aggregate, up to subgrade elevation.
- C. Section 312316.13 - Trenching: Excavating and backfilling for site subdrainage systems.

#### **1.03 REFERENCES**

- A. ASTM D 2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2003.

#### **1.04 PROJECT CONDITIONS**

- A. The Contractor is to provide any temporary piping required to reroute downspout and roof drains away from the work areas until the permanent drainage system is installed and in working order.
- B. Dewatering systems shall be installed prior to excavation activities in order to control surface and ground water flows. Dewatering measures shall be maintained and remain installed for the duration of project activities.
- C. Damage or destabilization/degradation of the on-site soils due to failure to dewater or otherwise prepare the site will be repaired at the Contractors expense.

#### **1.05 PERFORMANCE REQUIREMENTS**

- A. Dewatering Performance:
  1. Design, furnish, install, test, operate, monitor and maintain dewatering system of sufficient scope, size and capacity to control surface and ground water flow into excavations and permit construction to proceed on dry stable subgrades.
  2. Dewatering systems shall be installed prior to excavation activities in order to control surface and ground water flows. Dewatering measures shall be maintained and remain installed for the duration of project activities.
  3. Prevent water from ponding inside foundation walls, including after the floor slabs have been installed, and causing the foundation soils to become saturated.

### **PART 2 - NOT USED**

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades and from flooding the Project site and surrounding areas.
- B. Reroute surface water away from excavated areas. Do not allow water to accumulate in excavations or on footings that have already been installed but not backfilled. Do not use utility, foundation or other trenches as temporary drainage ditches unless specifically designed for only that purpose.
- C. Prevent water from ponding inside the foundation walls, within the building footprint and in pavement areas.

- D. The Contractor is to provide and maintain pumps, well points, sumps, suction and discharge lines and other dewatering system components necessary to convey water away from excavations and control the groundwater to a level at least 3'-0" below the lowest point of the excavation.
- E. Do not use open-sump pumping that leads to loss of fines, soil piping, subgrade softening and slope instability.
- F. Dispose of water removed by dewatering in a manner that avoids endangering public health, property and portions of work under construction or completed. Avoid creating an inconvenience to others, and maintain sedimentation controls as required by authorities having jurisdiction.
- G. All dewatering discharge is to be routed to a sediment pond or sediment bags so that the sediment can settle prior to the discharge water leaving the site or entering any waterway or storm sewer.

### **3.02 FIELD QUALITY CONTROL**

- A. Dewatering systems are to be inspected at least weekly and any and all repairs or refinements performed to maintain a fully operational system that achieves the intended purpose.
- B. Standby equipment is to be maintained on site so that it can be immediately installed if failure of primary equipment occurs.

### **3.03 PROTECTION**

- A. Protect pipe and dewatering system from other construction activities.
- B. Remove dewatering system at the completion of construction or when determined by the Architect that it is no longer needed. Any holes in interior slabs and voids under the slabs are to be repaired using lean concrete for the voids and a non-shrink concrete repair grout for the slabs.

**END OF SECTION**



**SECTION 312323****FILL****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Filling, backfilling,, backfilling, and compacting for footings, footings, slabs-on-grade, paving, paving, and site structures.
- B. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

**1.02 RELATED REQUIREMENTS**

- A. Section 015713 - Temporary Erosion and Sediment Control: Slope protection and erosion control.
- B. Section 312200 - Grading: Site grading.
- C. Section 312316 - Excavation: Removal and handling of soil to be re-used.
- D. Section 312316.13 - Trenching: Excavating and backfilling for utility trenches outside the building to utility main connections.
- E. Section 312316.26 - Rock Removal: Removal of rock during excavating.
- F. Section 312323.13 - Flowable Fill
- G. Section 312513 - Permanent Erosion Controls
- H. Section 334100 - Subdrainage: Filter aggregate and filter fabric for foundation drainage systems.

**1.03 DEFINITIONS**

- A. Finish Grade Elevations: Indicated on drawings.
- B. Zone of Influence: Area beneath a footing or foundation that extends out from the bottom edge of the footing/foundation at a 45-degree angle down to a depth equal to 3 times the footing width.

**1.04 REFERENCE STANDARDS**

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.
- B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 2012.
- C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.
- D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)); 2012.
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.
- F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.
- G. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.
- H. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2010.

- I. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2010.

## **1.05 SUBMITTALS**

- A. See Division 1 Sections for submittal procedures.
- B. Materials Sources: Submit name of imported materials source.
- C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.
- D. Compaction Density Test Reports.

## **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. When necessary, store materials on site in advance of need.

## **PART 2 PRODUCTS**

### **2.01 FILL MATERIALS**

- A. General Fill - Fill Type Lean Clay: Subsoil excavated on-site and imported as necessary for new work.
  - 1. Graded.
  - 2. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
  - 3. Complying with ASTM D2487 Group Symbol CL.
  - 4. Having no more than 5-percent rock/gravel in the top 24-inches in landscape areas, and no more than 15-percent rock/gravel in any location.
- B. Structural Fill - Fill Type DGA - Fill Type \_\_\_\_ : Complying with State of Kentucky \_\_\_\_\_ Highway Department Highway Department standard.
- C. Flowable Fill: A controlled low-strength material made of cement, water, sand, and an air-entraining admixture that it can be excavated by hand or use of a backhoe. See Section 312323.13.
- D. Graded Granular Fill (also referred to as Drainage Fill) - Fill Type #57 Crushed Limestone: Crushed aggregate, conforming to State of Kentucky Highway Department Standard.
- E. Coarse Granular Fill - Fill Type #2 Crushed Limestone: Coarse aggregate, conforming to State of Kentucky Highway Department standard.

### **2.02 ACCESSORIES**

- A. Geotextile Fabric: Water pervious type, black polypropylene, non-biodegradable, non-woven, needlepunched, 6 oz minimum weight.

### **2.03 SOURCE QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.
- D. Provide materials of each type from same source throughout the Work.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. All fill material is unclassified.
- B. Verify that survey bench marks and intended elevations for the Work are as indicated.
- C. Identify required lines, levels, contours, and datum locations.
- D. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.
- E. Verify structural ability of unsupported walls to support imposed loads by the fill.
- F. Proof roll all areas to receive fill prior to placing fill as required in the geotechnical report. Proof rolls should only be done when the soils are near optimum moisture content. Any areas that do not pass proof roll are to be stabilized and approved in accordance with the Geotechnical Report. Any suitable soils removed as part of the stabilization process due to moisture content issues are to be moisture conditioned and used as fill in other locations.
- G. Confirm that fat clay (CH) material has been removed under all floor slab and pavement areas so that no fat clay is located within 24-inches of the top of subgrade.
- H. Verify areas to be filled are not compromised with surface or ground water.

### **3.02 PREPARATION**

- A. Scarify and proof roll subgrade surface to a depth of 6 inches to identify soft spots.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill or as outlined per over-excavation below.
- C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

### **3.03 FILLING**

- A. Fill to contours and elevations indicated using unfrozen materials.
- B. Soils are not to be "over-compacted" or worked in a manner that will cause them to break down and lose strength.
- C. Employ a placement method that does not disturb or damage other work.
- D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. Granular/Crushed Stone Fill: Place and compact materials in equal continuous layers not exceeding 6 inches loose depth when using heavy compaction equipment (sheepsfoot rollers, smooth drums, etc.), and layers not exceeding 4 inches loose depth when using hand operated or remote controlled equipment.
- G. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches loose depth when using heavy compaction equipment (sheepsfoot rollers, smooth drums, etc.), and layers not exceeding 4 inches loose depth when using hand operated or remote controlled equipment.
- H. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- I. Correct areas that are over-excavated.

1. Load-bearing foundation surfaces and floor slab areas: Use structural fill, compacted to 98 percent of maximum dry density, to slab subgrade elevation in areas outside of the zone of influence of any footings or foundations. All excavations in the zone of influence of any footings or foundations are to be backfilled with flowable fill. If the backfill of the over-excavated areas encroaches into the minimum of 12-inches of soil cushion between the bottom of the footing and the top of bedrock, the Architect and Structural Engineer are to be notified immediately to determine if an alternate backfill method is necessary.
  2. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.
- J. Reshape and re-compact fills subjected to vehicular traffic.
- K. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control. Refer to Specification Section 312319 for additional Dewatering requirements.

### **3.04 FILL AT SPECIFIC LOCATIONS**

- A. Use general fill unless otherwise specified or indicated.
- B. Building Pad Mass Fill :
1. Use General Fill or Structural Fill. Fill is to be uniform and contractor shall not mix materials during filling operations.
  2. Fill up to subgrade elevations.
  3. Maximum depth per lift: 6 inches, compacted.
  4. Compact to minimum 98 percent of maximum dry density.
- C. At Lawn Areas:
1. Use general fill.
  2. Compact to 85 percent of maximum dry density.
  3. See Section 312200 for topsoil placement.

### **3.05 TOLERANCES**

- A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.

### **3.06 FIELD QUALITY CONTROL**

- A. See Division 1 Sections for general requirements for field inspection and testing.
- B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.
- C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor"), ASTM D1557 ("modified Proctor"), or AASHTO T 180.
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest.
- E. Frequency of Tests: One (1) test for every 2000 sq. ft. or less of paved area or building slab per lift, but in no case fewer than two (2) tests per lift.
- F. The Contractor should anticipate and allow for testing time of encountered and imported materials. Some testing can take three to four business days.
- G. Proof roll compacted fill at surfaces that will be under slabs-on-grade and paving.

### **3.07 CLEANING**

- A. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

- B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

**END OF SECTION**

**SECTION 312323.13  
FLOWABLE FILL****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Flowable Fill or Controlled Low Strength Materials (CLSM)
- B. Backfill for site utilities within the zone-of-influence of any footing/foundation.

**1.02 RELATED REQUIREMENTS**

- A. Section 312316.13 - Trenching: Excavation and backfilling for foundations and utilities outside the building footprint.
- B. Section 312323 - Fill: Filling and Compaction.

**1.03 REFERENCE STANDARDS**

- A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2010.
- B. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.
- C. ACI 305R - Hot Weather Concreting; American Concrete Institute International; 2010.
- D. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 2010.
- E. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2011a.
- F. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2012.
- G. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.
- H. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2010b.
- I. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.
- J. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2011.
- K. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2011.
- L. ASTM D4832 - Preparation and Testing of Controlled Low Strength Material Test Cylinders
- M. ASTM D5971 - Sampling Freshly Mixed Controlled Low Strength Material
- N. ASTM D6103 - Flow Consistency of Controlled Low Strength Material
- O. ASTM D6023 - Unit Weight, Yield, Cement Content and Air Content (Gravimetric) of Controlled Low Strength Material

**1.04 SUBMITTALS**

- A. See Division 1 Sections for submittal procedures.
- B. Product Data: Provide data on mix materials and admixtures.
- C. Design Data: Mix design and test results showing that the mix design meets the mix and performance requirements.

## **PART 2 PRODUCTS**

### **2.01 CONCRETE MATERIALS**

- A. Obtain cementitious materials from same source throughout.
- B. Cement: ASTM C150/C150M Air Entraining - Type IA portland type, grey color.
- C. Fine Mix Aggregates: ASTM C33.
- D. Fly Ash: ASTM C 618, Class F - Optional for Non-Excavatable flowable fill.
- E. Water: Clean, and not detrimental to concrete.
- F. Air Entrainment Admixture: ASTM C260.
- G. Chemical Admixtures: ASTM C494/C494M, Type A - Water Reducing.
  - 1. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

### **2.02 ACCESSORIES**

### **2.03 FLOWABLE FILL/CLSM MIX DESIGN**

- A. The Flowable Fill/CLSM material is to be a self-leveling and self-compacting, cementitious material with low compressive strength (see below).
- B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- C. If flowable fill is to be pumped, a modified mixture shall be submitted along with test results that indicate that the mix will meet the strength restrictions. In addition, the supplier is to ensure that the air content at the point of discharge from the pump meets the below requirements.
- D. Excavatable Flowable Fill Properties (not-pumped):
  - 1. Compressive Strength, when tested in accordance with ASTM D4832 at 28 days: 30 to 80 psi maximum. Strength shall not exceed 130 psi at 180-days.
  - 2. Fly Ash Content: None
  - 3. Cement Content: 50 to 100 lb per cubic yard.
  - 4. Water: Content to provide self-leveling mix with flowability per below and without excess bleed water.
  - 5. Total Air Content: 20-30 percent, determined in accordance with ASTM D6023.
  - 6. Flowability: 6 to 8 inches in accordance with ASTM D6103.
  - 7. Unit Weight (wet): 90-115 pcf
  - 8. Aggregate Size: Concrete Sand

### **2.04 MIXING**

- A. Transit Mixers: Comply with ASTM C94/C94M.
- B. Do not add water to the mix once the truck has left the concrete plant.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify trench subgrade is acceptable and ready to support fill and future loads.
- B. Verify gradients and elevations of base are correct.
- C. Verify that utilities have been properly anchored to eliminate vertical and horizontal movement.

**3.02 PREPARATION**

- A. Wrap utilities with protective felt paper or other protective wrap as approved by the governing body for the utility.
- B. Notify Testing Agent minimum 24 hours prior to filling operations.

**3.03 FORMING**

- A. Place and secure forms as necessary at the ends of each pour.

**3.04 COLD AND HOT WEATHER INSTALLATION**

- A. Follow recommendations of ACI 305R when installing during hot weather.
- B. Follow recommendations of ACI 306R when installing during cold weather.
- C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.
- D. Protect from freezing for a minimum of 36-hours after placement.

**3.05 PLACING FLOWABLE FILL/CLSM**

- A. Place fill in accordance with ACI 304R.
- B. Place fill material continuously over the full width of the trench/excavation.

**3.06 TOLERANCES**

- A. The contractor should anticipate a 1/8-inch per foot of depth shrinkage of the Flowable Fill/CLSM material during the initial 7-day curing period.
- B. Maximum Variation From True Position Post-Cure: Plus 1/4 inch (no minus).

**3.07 FIELD QUALITY CONTROL**

- A. The Owner will employ an independent testing agency to perform field quality control tests, as specified in Division 1 Sections.
  - 1. Provide free access to Flowable Fill/CLSM operations at project site and cooperate with appointed firm.
  - 2. Submit proposed mix design of each class of Flowable Fill/CLSM to inspection and testing firm for review prior to commencement of installation operations.
  - 3. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.
- B. Compressive Strength Tests: ASTM D4832. For each test, mold and cure five Flowable Fill/CLSM test cylinders. Obtain test samples for every truck delivered.
  - 1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as material it represents.
  - 2. Perform one flowability test and one air content test for each set of test cylinders taken.
  - 3. Perform compression tests at 7-days, 14-days, 28-days, 56-days and 180-days
- C. Maintain records of placed Flowable Fill/CLSM items. Record date, pour time, batch time, location of pour, quantity, air temperature, and test samples taken. All test reports are to be typed.
- D. Any tests or time limits that do not meet the specified requirements are to be reported to the Contractor and that material shall be considered unacceptable. Any material placed that is deemed unacceptable shall be removed and replaced with acceptable material.



**3.08 PROTECTION**

A. Immediately after placement, protect from premature drying, excessive hot or cold temperatures, and mechanical injury for a minimum of 36-hours.

B. Do not subject the fill material to foundation or other loads that may exceed the material strength.

**END OF SECTION**

## **SECTION 312513 PERMANENT EROSION CONTROLS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Erosion blankets and netting.
- B. Slope protection

#### **1.02 RELATED SECTIONS**

- A. Section 015713 - Temporary Erosion Controls
- B. Section 312200 - Grading
- C. Section 311000 - Site Clearing.
- D. Section 312316 - Excavation.
- E. Section 312323 - Fill: Filling and compaction.
- F. Section 329219 - Seeding: Finish ground cover.

#### **1.03 REFERENCES**

- A. Kentucky Erosion Prevention and Sediment Control Field Guide by Kentucky Division of Conservation. Refer to these guidelines for construction and maintenance of erosion control items.
- B. Kentucky Division of Water ([www.water.ky.gov](http://www.water.ky.gov))

#### **1.04 SUBMITTALS**

- A. Erosion Control Material Data: Include manufacturer, product and design calculations for each product used.

#### **1.05 QUALITY ASSURANCE**

- A. Perform Work in accordance with State of Kentucky, Highway Department standards.

#### **1.06 PROJECT CONDITIONS**

- A. Protect above- and below-grade utilities that remain.
- B. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from installation equipment and vehicular traffic.

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS**

- A. Long-Term Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a double-net, photo-degradable woven mesh with a minimum 1-year design life. Include manufacturer's recommended biodegradable stakes, 6 inches long. Acceptable products are:
  - 1. Curlex II by American Excelsior Company
  - 2. S150 by North American Green
  - 3. ECS-2 and ECX-2 by East Coast Erosion Blankets
- B. Short-Term Erosion-Control Blankets: Biodegradable twisted jute or spun-coir mesh in a single-net product with straw or coconut-fiber fill. Include manufacturer's recommended steel wire staples, 6 inches long. Acceptable products are:
  - 1. Curlex I by American Excelsior Company
  - 2. S75 by North American Green

- 3. ECS-1 by East Coast Erosion Blankets
- C. Other Materials: See Section 312323.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that finish grading and intended elevations for the Work are as indicated and that all debris and rock fragments larger than 1/2-inch have been removed from the area to be covered.

#### **3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum.
- B. Identify and mark areas to receive erosion controls.

#### **3.03 INSTALLATION**

- A. Protect areas to be seeded as follows:
  - 1. Slopes 4:1 (H:V) or greater are to receive long-term erosion-control blankets.
  - 2. Slopes between 4:1 and 6:1 are to receive short-term erosion-control blankets.
- B. Roll out erosion controls beginning at the bottom of the slope or the lowest end of the ditch line.
- C. Overlap ends of the controls a minimum of 24-inches or per the manufacturers recommendation, whichever is larger.
- D. Overlap the edges of the controls a minimum of 12-inches or per the manufacturers recommendation, whichever is larger.
- E. Install biodegradable anchors per the manufacturers recommendation. If erosion controls begin to pull up, slide or otherwise come loose, install additional anchors as needed for proper installation.
- F. Sod can be used for all slopes identified above (not drainage swales or ditches) as a substitute for the listed erosion controls. Sod is to be laid perpendicular to the slope and staked to prevent slipping.

#### **3.04 CLEANING AND PROTECTION**

- A. Leave site clean and raked, ready to receive landscaping.

#### **END OF SECTION**

## **SECTION 321123 AGGREGATE BASE COURSES**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Aggregate base course.
- B. Paving aggregates.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 312200 - Grading: Preparation of site for base course.
- B. Section 312323 - Fill: Compacted fill under base course.
- C. Section 321313 - Concrete Paving: Finish concrete surface course.

#### **1.03 REFERENCE STANDARDS**

- A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses; 1965 (2004).
- B. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.
- C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2014.
- D. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 2012.
- E. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)); 2012.
- F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.
- G. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.
- H. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2010.
- I. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2010.

#### **1.04 SUBMITTALS**

- A. See Division 1 Sections for submittal procedures.
- B. Materials Sources: Submit name of imported materials source.
- C. Aggregate Composition Test Reports: Results of laboratory tests on proposed and actual materials used.
- D. Compaction Density Test Reports.

#### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. When necessary, store materials on site in advance of need.
- B. Aggregate Storage, General:
  - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.

2. Prevent contamination.
3. Protect stockpiles from erosion and deterioration of materials.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Coarse Aggregate Type #2 Crushed Limestone: Coarse aggregate, conforming to State of Kentucky Highway Department standard.
- B. Blended Aggregate Type DGA: Pug DGA conforming to State of Kentucky Highway Department standard.
- C. Herbicide: In accordance with State of Kentucky Highway Department Standards .

### **2.02 SOURCE QUALITY CONTROL**

- A. See Division 1 for Quality Requirements for testing and analysis of aggregate materials.
- B. Where aggregate materials are specified using ASTM D2487 classification, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.
- D. Provide materials of each type from same source throughout the Work.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that survey bench marks and intended elevations for the work are as indicated.
- B. Verify substrate has been inspected, gradients and elevations are correct, and is dry.
- C. Proof-roll areas to receive aggregate base course material and have proof-roll approved by the soils testing agent.
- D. Due to the type of soils encountered on the site, proof-rolling during wet periods or when the existing soils are above optimum moisture content will not be acceptable. All proof-rolling will need to be done during dry conditions.

### **3.02 PREPARATION**

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place aggregate on soft, muddy, or frozen surfaces.

### **3.03 INSTALLATION**

- A. Under Portland Cement Concrete Paving:
  1. Place Blended Aggregate Type DGA to a total compacted thickness identified on the drawings.
  2. Compact to 95 percent of maximum dry density.
- B. Place aggregate in maximum 4 inch layers and roller compact to specified density.
- C. Level and contour surfaces to elevations and gradients indicated.
- D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- E. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

- G. Apply herbicide to finished surface.

### **3.04 TOLERANCES**

- A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.
- B. Scheduled Compacted Thickness: Within 1/4 inch.

### **3.05 FIELD QUALITY CONTROL**

- A. See Division 1 Sections for general requirements for field inspection and testing.
- B. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.
- C. Results will be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with AASHTO T 180, ASTM D698 ("standard Proctor"), or ASTM D1557 ("modified Proctor").
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest.
- E. Frequency of Tests: One (1) test for every 2000 sq. ft. or less of paved area per lift, but in no case fewer than two (2) tests per lift.
- F. Proof roll compacted aggregate at surfaces that will be under slabs-on-grade.

### **3.06 CLEANING**

- A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

**END OF SECTION**

## **SECTION 321313 CONCRETE PAVING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Concrete sidewalks and integral curbs.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 312200 - Grading: Preparation of site for paving and base and preparation of subsoil at pavement perimeter for planting.
- B. Section 312323 - Fill: Compacted subbase for paving.
- C. Section 321123 - Aggregate Base Courses: DGA base course.
- D. Section 321373 - Joint Sealers: Sealant for joints.
- E. Section 321613 - Concrete Curb and Gutters

#### **1.03 REFERENCE STANDARDS**

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).
- B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
- C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.
- D. ACI 305R - Hot Weather Concreting; 2010.
- E. ACI 306R - Cold Weather Concreting; 2010.
- F. ASTM A36 - Steel plate for plate dowel systems.
- G. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.
- H. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- I. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- J. ASTM B633 Type II - Electroplated zinc for plate dowel systems
- K. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.
- L. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.
- M. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.
- N. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- O. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2014.
- P. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.
- Q. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.
- R. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.

- S. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2014.
- T. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).
- U. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).

#### **1.04 SUBMITTALS**

- A. See Division 1 Sections for submittal procedures.
- B. Product Data: Provide data on joint filler, admixtures, curing compound, and fiber reinforcement.
- C. Design Data: Indicate pavement thickness, designed concrete strength, reinforcement, and typical details.

### **PART 2 PRODUCTS**

#### **2.01 FORM MATERIALS**

- A. Wood form material, profiled to suit conditions.
- B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).
  - 1. Thickness: 3/8 inch.

#### **2.02 REINFORCEMENT**

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) yield strength; deformed billet steel bars; unfinished.
- B. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; unfinished.
- C. Plate Dowels: Light and Medium Duty Concrete - ASTM A36 steel plates with electroplated zinc coating meeting ASTM B633 Type II. Plate sizes and spacing to meet specified concrete thickness.

#### **2.03 CONCRETE MATERIALS**

- A. Obtain cementitious materials from same source throughout.
- B. Concrete Materials: Provide in accordance with State of Kentucky Highways standards.
- C. Cement: ASTM C150/C150M, Normal - Type I Portland cement, gray color.
- D. Fine and Coarse Mix Aggregates: ASTM C33/C33M.
- E. Water: Clean, and not detrimental to concrete.
- F. Fiber Reinforcement: Shrinkage crack control, micro synthetic, fibrillated, polypropylene fibers shown to have long-term resistance to deterioration when in contact with alkalis and moisture; 3/4 to 1 inch length and designed to reduce shrinkage cracking of concrete.
  - 1. Acceptable Products:
    - a. PSI FIBERSTRAND F by Euclid Chemical
    - b. Procon F-E by Nycon Corporation
    - c. Fibermesh 300 by Propex Operating Company
    - d. Econo-Net by Forta Corporation
- G. Air-Entraining Admixtures: ASTM C260/C260M.
- H. Chemical Admixtures: ASTM C494/C494M, Type A - Water Reducing.



1. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

#### **2.04 ACCESSORIES**

- A. Curing Compound: ASTM C309, Type 1, Class A.
- B. Curing Compound:
  1. Sonneborn's Sonosil
  2. L&M's L&M Cure
  3. Dayton Superior's Day Chem Sil-Cure (J-13)
- C. Joint Sealer: Type as specified in Section 321373.

#### **2.05 CONCRETE MIX DESIGN**

- A. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- B. Micro Fiber Reinforcement: Add to mix at rate of 1.5 pounds per cubic yard, or as recommended by manufacturer for specific project conditions. Fiber is to be added at the plant after all other materials have been added, and have a minimum mix time of 5-minutes..
- C. Concrete Properties:
  1. Compressive strength (prior to fiber), when tested in accordance with ASTM C39/C39M at 28 days; 4500 psi. Testing of the concrete mix prior to adding fiber and again after fiber has been added is required to set the compressive strength requirement for fiber reinforced concrete. This should be done for the first pour of each mix design and the results used to confirm future pours.
  2. Cement Content: Minimum 600 lb per cubic yard.
  3. Water-Cement Ratio: Maximum 0.44 percent by weight.
  4. Total Air Content: 6 percent +/- 1%, determined in accordance with ASTM C 173/C 173M.
  5. Maximum Slump: 4 inches using base design, 5 inches when using fiber and mid-range water reducer, 6 inches when using a mid-range water reducer, +/- 1-inch.
  6. Maximum Aggregate Size: 1 inch.

#### **2.06 MIXING**

- A. Transit Mixers: Comply with ASTM C94/C94M.
- B. Do not add water to the mix once the truck has left the concrete plant.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

#### **3.02 SUBBASE**

- A. See Section 321123 for construction of base course for work of this Section.

#### **3.03 PREPARATION**

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Coat surfaces of manhole frames with oil to prevent bond with concrete pavement.

#### **3.04 FORMING**

- A. Place and secure forms to correct location, dimension, profile, and gradient.

- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

### **3.05 REINFORCEMENT**

- A. Place reinforcement as indicated and per the manufacturers recommendations.
- B. Provide doweled joints at all isolation joints with one end of dowel set in capped sleeve to allow longitudinal movement.

### **3.06 COLD AND HOT WEATHER CONCRETING**

- A. Follow recommendations of ACI 305R when concreting during hot weather.
- B. Follow recommendations of ACI 306R when concreting during cold weather.
- C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

### **3.07 PLACING CONCRETE**

- A. Place concrete in accordance with ACI 304R.
- B. Do not add water to concrete.
- C. Ensure reinforcement, inserts, embedded parts, formed joints and concrete form work are not disturbed during concrete placement.
- D. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- E. Place concrete to indicated pattern.

### **3.08 JOINTS**

- A. Align curb, gutter, and sidewalk joints.
- B. Place 3/8 inch wide isolation joints at 20 foot intervals and to separate paving from vertical surfaces and other components and in pattern indicated.
  - 1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface.
  - 2. Secure to resist movement by wet concrete.
- C. Provide tooled contraction control joints:
  - 1. In pattern shown on drawings.

### **3.09 FINISHING**

- A. Area Paving: Light broom, texture perpendicular to pavement direction.
- B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius. Remove tooling marks to prevent a picture frame effect.
- C. Remove "slop" created by the concrete finishing from all joints and edges.
- D. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

### **3.10 JOINT SEALING**

- A. See Section 321373 for joint sealer requirements.

**3.11 TOLERANCES**

- A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.
- B. Maximum Variation From True Position: 1/4 inch.

**3.12 FIELD QUALITY CONTROL**

- A. Allow the independent testing agency to perform field quality control tests, as specified in Division 1.
  - 1. Provide free access to concrete operations at project site and cooperate with appointed firm.
  - 2. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
  - 3. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.
- B. Compressive Strength Tests: ASTM C39/C39M; for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.
  - 1. Test fiber reinforced concrete prior to the addition of fiber and again after fiber has been added to set the baseline for the fiber reinforced compressive strength, slump and air content. This is to be done for the first pour of each mix design, and the results used for later pour strength requirements.
  - 2. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
  - 3. Perform one slump test and one air content test for each set of test cylinders taken.
- C. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken. All test reports are to be typed.
- D. Any tests or time limits that do not meet the specified requirements are to be reported to the Contractor and that concrete shall be considered unacceptable.

**3.13 PROTECTION**

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian traffic over pavement for 2 days minimum after finishing.
- C. Do not permit vehicular traffic over pavement until 75 percent design strength of concrete has been achieved.
- D. All pavements that are soiled or otherwise dirty are to be pressure washed and rinsed upon completion of the construction and landscaping work.

**END OF SECTION**

## **SECTION 321373 PAVEMENT JOINT SEALANTS**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. This Section includes the following:
  - 1. Expansion and contraction joints within cement concrete pavement.
  - 2. Joints between cement concrete or asphalt pavement and adjacent structures.
- B. Related Sections include the following:
  - 1. Section 321313 - Concrete Paving: constructing joints in concrete pavement.
  - 2. Section 321613 - Concrete Curbs and Gutters

#### **1.02 SUBMITTALS**

- A. Product Data: For each joint sealant product indicated.
- B. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- C. Qualification Data: For Installer.
- D. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
  - 1. Materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants.
  - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for sealants.

#### **1.03 QUALITY ASSURANCE**

- A. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- B. Preconstruction Compatibility and Adhesion Testing: Submit to joint sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
  - 1. Use ASTM C 1087 or manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
  - 2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint sealant backings, secondary seals, and miscellaneous materials.
  - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
  - 4. For materials failing tests, obtain joint sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
  - 5. Testing will not be required if joint sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
- C. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing of current sealant products within a 36-month period preceding the Notice to Proceed with the Work.
  - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 for testing indicated, as documented according to ASTM E 548.

#### **1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

- B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

## **1.05 PROJECT CONDITIONS**

- A. All expansion, isolation and cold joints, including those in concrete curbs, are to receive joint sealant.
- B. Do not proceed with installation of joint sealants under the following conditions:
  1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
  2. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F (4.4 deg C), whichever is higher.
  3. When joint substrates are wet or covered with frost.
  4. Where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
  5. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

### **2.02 MATERIALS, GENERAL**

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint sealant manufacturer based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

### **2.03 COLD-APPLIED JOINT SEALANTS**

- A. Type S, Grade NS, Class 25 Polyurethane Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag urethane sealant complying with ASTM C920
  1. Sikaflex-1a
  2. Bostik Seal 'N' Flex FC
  3. Tremco Vulkem 116

### **2.04 JOINT SEALANT BACKER MATERIALS**

- A. General: Provide joint sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint sealant manufacturer based on field experience and laboratory testing.
- B. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

### **2.05 PRIMERS**

- A. Primers: Product recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant substrate tests and field tests.

## **PART 3- EXECUTION**

### **3.01 EXAMINATION**

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer, based on preconstruction joint sealant substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

### **3.03 INSTALLATION OF JOINT SEALANTS**

- A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install backer materials of type indicated to support sealants during application and at position required to produce cross sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of backer materials.
  - 2. Do not stretch, twist, puncture, or tear backer materials.
  - 3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses provided for each joint configuration.
  - 3. Produce uniform, cross sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealants from surfaces adjacent to joint.
  - 2. Use tooling agents that are approved in writing by joint sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint sealant manufacturer's written instructions, unless otherwise indicated.
- G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

### **3.04 CLEANING**

- A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

**3.05 PROTECTION**

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.
- B. Apply clean, white, silica sand dusting to the finished tooled surface of the joint sealant to help prevent tracking of the material.

**END OF SECTION**

## **SECTION 321613 CONCRETE CURBS AND GUTTERS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Concrete header curbs, curbs, and gutters.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 312200 - Grading: Preparation of site for paving and base and preparation of subsoil at pavement perimeter for planting.
- B. Section 312323 - Fill: Compacted subbase for paving.
- C. Section 321123 - Aggregate Base Courses: DGA base course.
- D. Section 321373 - Joint Sealers: Sealant for joints.

#### **1.03 REFERENCE STANDARDS**

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2002).
- B. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2005.
- C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.
- D. ACI 305R - Hot Weather Concreting; American Concrete Institute International; 1999.
- E. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 1988 (Reapproved 2002).
- F. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2007.
- G. ASTM C 33 - Standard Specification for Concrete Aggregates; 2007.
- H. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2005.
- I. ASTM C 94/C 94M - Standard Specification for Ready-Mixed Concrete; 2007.
- J. ASTM C 150 - Standard Specification for Portland Cement; 2007.
- K. ASTM C 173/C 173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2008a.
- L. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete; 2006.
- M. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2007.
- N. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete; 2008a.
- O. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2008a.
- P. ASTM C 685/C 685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2007.



- Q. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2008).
- R. ASTM D 1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2008).

#### **1.04 SUBMITTALS**

- A. See Division 1 Sections for submittal procedures.
- B. Product Data: Provide data on joint filler, admixtures, curing compound, and fiber reinforcement.
- C. Design Data: Indicate curb/gutter thickness, designed concrete strength, reinforcement, and typical details. Separate mix designs are required for conventionally formed concrete and machine placed or slip-formed concrete.

### **PART 2 PRODUCTS**

#### **2.01 FORM MATERIALS**

- A. Form Materials: Conform to ACI 301 and as follows.
- B. Steel forms with self-aligning joints designed to withstand the lateral and vertical loads associated with the concrete placement. Form sections are to be a minimum of 10-feet in length for runs that are 10-feet or longer in length.
- C. Joint Filler: Preformed; non-extruding bituminous type (ASTM D 1751) or sponge rubber or cork (ASTM D 1752).
  - 1. Thickness: 3/8 inch.

#### **2.02 REINFORCEMENT**

- A. Reinforcing Steel: ASTM A 615/A 615M Grade 40 (280); deformed billet steel bars; unfinished finish.
- B. Steel Welded Wire Reinforcement: Plain type, ASTM A 185/A 185M; in flat sheets; unfinished.
- C. Dowels: ASTM A 615/A 615M Grade 40 (280); deformed billet steel bars; unfinished finish.

#### **2.03 CONCRETE MATERIALS**

- A. Obtain cementitious materials from same source throughout.
- B. Concrete Materials: Provide in accordance with State of Kentucky Highways standards.
- C. Cement: ASTM C 150 Air Entraining - Type IA portland type, grey color.
- D. Fine and Coarse Mix Aggregates: ASTM C 33.
- E. Fly Ash: ASTM C 618, Class F - Optional for mixes used for slip forming of curb and gutter, or slip forming of concrete pavements. Fly ash is not to be used in concrete that is not slip formed or extruded..
- F. Water: Clean, and not detrimental to concrete.
- G. Fiber Reinforcement: Shrinkage crack control, micro synthetic, fibrilated, polypropylene fibers shown to have long-term resistance to deterioration when in contact with alkalis and moisture; 3/4 to 1 inch length and designed to reduce shrinkage cracking of concrete.
  - 1. Acceptable Products:
    - a. PSI FIBERSTRAND F by Euclid Chemical
    - b. Procon F-E by Nycon Corporation
    - c. Fibermesh 300 by Propex Operating Company
    - d. Econo-Net by Forta Corporation

- H. Air Entrainment Admixture: ASTM C 260.
- I. Chemical Admixtures: ASTM C 494/C 494M, Type A - Water Reducing.
  - 1. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

## **2.04 ACCESSORIES**

- A. Curing Compound: ASTM C 309, Type 1, Class A.
- B. Joint Sealer: Type as specified in Section 321373.

## **2.05 CONCRETE MIX DESIGN**

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- C. Micro Fiber Reinforcement: Add to mix at rate of 1.5 pounds per cubic yard, or as recommended by manufacturer for specific project conditions. Fiber is to be added at the plant after all other materials have been added, and have a minimum mix time of 5-minutes.
- D. Concrete Properties:
  - 1. Compressive Strength (prior to adding fiber), when tested in accordance with ASTM C 39/C 39M at 28 days: 4500 psi. Testing of the concrete mix prior to adding fiber and again after fiber has been added is required to set the compressive strength requirement for fiber reinforced concrete. This should be done for the first pour of each mix design and the results used to confirm future pours.
  - 2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
  - 3. Cement Content: Minimum 639 lb per cubic yard.
  - 4. Water-Cement Ratio: Maximum 0.44 percent by weight.
  - 5. Total Air Content: 6 percent +/- 1%, determined in accordance with ASTM C 173/C 173M.
  - 6. Maximum Slump: 4 inches using base design, 5 inches when using fiber and mid-range water reducer, 6 inches when using a mid-range water reducer, +/- 1-inch.
  - 7. Maximum Aggregate Size: 1 inch.

## **2.06 MIXING**

- A. Transit Mixers: Comply with ASTM C 94/C 94M.
- B. Do not add water to the mix once the truck has left the concrete plant.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify compacted subgrade is acceptable and ready to support imposed loads.
- B. Verify gradients and elevations of base are correct.

### **3.02 SUBBASE**

- A. See Section 321123 for construction of base course for work of this Section.

### **3.03 PREPARATION**

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Coat surfaces of storm structure frames with oil to prevent bond with concrete curb/gutter.
- C. Notify Architect minimum 24 hours prior to commencement of concreting operations. Architect is to review and approve sample pours prior to installation of permanent concrete.

**3.04 FORMING**

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

**3.05 REINFORCEMENT**

- A. Place reinforcement as indicated.
- B. Provide doweled joints as indicated with one end of dowel set in capped sleeve to allow longitudinal movement.

**3.06 COLD AND HOT WEATHER CONCRETING**

- A. Follow recommendations of ACI 305R when concreting during hot weather.
- B. Follow recommendations of ACI 306R when concreting during cold weather.
- C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

**3.07 PLACING CONCRETE**

- A. Place concrete in accordance with ACI 304R.
- B. Do not place concrete when base surface is wet.
- C. Concrete can be placed using the slip form technique. If slip forming is used, fiber-reinforced concrete shall be used.
- D. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.
- E. Place concrete continuously over the full length of the run and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- F. Place expansion joints at the beginning and ending of each pour.
- G. Place expansion joints at the beginning and ending of each pour. Place control joints concrete to indicated pattern.

**3.08 JOINTS**

- A. Align curb, gutter, and sidewalk joints.
- B. Place 3/8 inch wide expansion joints at 40 foot intervals and to separate curb and gutter from adjacent sidewalks, vertical surfaces and other components .
  - 1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface.
  - 2. Secure to resist movement by wet concrete.
- C. Provide sawcut contraction control joints every 8-feet. Where the curb is adjacent to a sidewalk, install contraction joints that align with the sidewalk joints with spacing between 8-feet and 10-feet.
- D. Provide tooled contraction joints between curbs/gutters and adjacent traffic duty pavements.
- E. At 90-degree curb corners, the contraction joint is to be cut parallel to the traffic lane. Diagonal cuts at 90-degree corners are not acceptable.

**3.09 FINISHING**

- A. Curbs and Gutters: Uniform float finish and round edges. Correct all honeycombed areas by filling with mortar. Do not plaster. Finish the top and face while the concrete is plastic by wetting and rubbing with a carborundum brick. Finish the face of header curbs to 4-inches below the finished ground line. Provide uniform texture and color.
- B. Remove "slop" created by the concrete finishing from all joints and edges.
- C. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

**3.10 JOINT SEALING**

- A. All expansion joints are to be sealed. See Section 321373 for joint sealer requirements.

**3.11 TOLERANCES**

- A. Maximum Variation of Surface Flatness and Face Alignment: 1/4 inch in 10 ft.
- B. Maximum Variation From True Position: 1/4 inch.

**3.12 FIELD QUALITY CONTROL**

- A. Allow an independent testing agency to perform field quality control tests, as specified in Division 1.
  - 1. Provide free access to concrete operations at project site and cooperate with appointed firm.
  - 2. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
  - 3. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.
- B. Compressive Strength Tests: ASTM C 39/C 39M. For each test, mold and cure four concrete test cylinders. Obtain test samples for every 25 cu yd or less of each class of concrete placed.
  - 1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
  - 2. Perform one slump test and one air content test for each set of test cylinders taken.
- C. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken. All test reports are to be typed.
- D. Any tests or time limits that do not meet the specified requirements are to be reported to the Contractor and that concrete shall be considered unacceptable.

**3.13 PROTECTION**

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian traffic into curb/gutter area for 2 days minimum after finishing.
- C. Do not permit vehicular traffic into curb/gutter area until 75 percent design strength of concrete has been achieved.
- D. All concrete curb/gutter that is soiled or otherwise dirty are to be pressure washed and rinsed upon completion of the construction and landscaping work.

**END OF SECTION**

## **SECTION 329219 SEEDING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Preparation of subsoil.
- B. Placing topsoil.
- C. Seeding, mulching and fertilizer.
- D. Maintenance.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 015713- Temporary Erosion and Sediment Control
- B. Section 312200 - Grading: Topsoil material.
- C. Section 31 2200 - Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.
- D. Section 312323 - Fill: Topsoil material.
- E. Section 312513 - Permanent Erosion Controls:

#### **1.03 DEFINITIONS**

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

#### **1.04 SUBMITTALS**

- A. Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer; and watering instructions.

#### **1.05 REGULATORY REQUIREMENTS**

- A. Comply with regulatory agencies for fertilizer and herbicide composition.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- A. Furnish maintenance of seeded areas for three months after Date of Substantial Completion.

### **PART 2 PRODUCTS**

#### **2.01 SEED MIXTURE**

- A. Seed Mixture:
  - 1. Tall Fescue Grass Type: 40 percent. (Firecracker LS, Aggressor, Falcon IV, Col-M, 3rd Millenium or similar to be approved by the Landscape Architect).
  - 2. Fine Fescue Grass Type: 30 percent. (Reliant IV, Firefly, Epic, Fortitude, Finelawn Petite or similar to be approved by the Landscape Architect)

3. Kentucky Blue Grass Type: 20 percent. (Freedom III, Blue Velvet, Midnight, Barrister, Nu Destiny, Quantum Lelap, Brilliant, Everglade or similar to be approved by the Landscape Architect).
4. Perennial Rye: 10 percent.
  - a. Approved Varieties:
    - 1) Manhattan 5
    - 2) Divine
    - 3) Secretariat II

## **2.02 SOIL MATERIALS**

- A. Topsoil: Type as specified in Section 312200.

## **2.03 ACCESSORIES**

- A. Mulching Material: Wheat straw, free from seeds and weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
  1. Composition: Recommendations per the soil test.
- C. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.

## **2.04 TESTS**

- A. Analyze to ascertain percentage of nitrogen, phosphorus, potash, percentage inorganic matter soluble salt content, organic matter content, and pH value.
- B. Submit minimum 10 oz sample of topsoil proposed. Forward sample to approved testing laboratory in sealed containers to prevent contamination.
- C. Testing is not required if recent tests are available for imported topsoil. Submit these test results to the testing laboratory for approval. Indicate, by test results, information necessary to determine suitability.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that prepared soil base is ready to receive the work of this Section.
- B. For areas that are graded with slopes less than 6:1, hydroseeding may be used in lieu of seed and mulch.

### **3.02 PREPARATION**

- A. Prepare subgrade in accordance with Section 312200.
- B. Place topsoil in accordance with Section 312200.

### **3.03 FERTILIZING**

- A. Apply fertilizer as recommended in the soil testing results.
- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 3 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

**3.04 SEEDING**

- A. Apply seed at a rate of 7 lbs per 1000 sq ft or as recommended by the seed producer and/or soil testing, evenly in two intersecting directions. Rake in lightly.
- B. Do not seed areas in excess of that which can be mulched on same day.
- C. Planting Season: Timeframe for seeding is to be determined by the landscape architect in accordance with weather and project site conditions.
- D. Do not sow immediately following rain, when ground is too dry, or during windy periods.
- E. Immediately following seeding and compacting, apply mulch to a thickness of 1/2 inches. Maintain clear of shrubs and trees.
- F. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.
- G. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches.

**3.05 PROTECTION**

- A. Identify seeded areas with stakes and string around area periphery. Set string height to 18 inches. Space stakes at 30 inches.
- B. Protect seeded areas in accordance with Section 312513 - Permanent Erosion Controls

**3.06 MAINTENANCE**

- A. Provide maintenance at no extra cost to Owner; Owner will pay for water.
- B. See Division 1 Sections for additional requirements relating to maintenance service.
- C. Provide maintenance of seeded areas for three months from Date of Substantial Completion.
- D. Mow grass at regular intervals to maintain at a maximum height of 4 inches. Do not cut more than 1/3 of grass blade at any one mowing.
- E. Neatly trim edges and hand clip where necessary.
- F. Immediately remove clippings after mowing and trimming.
- G. Water to prevent grass and soil from drying out.
- H. Roll surface to remove minor depressions or irregularities.
- I. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- J. Immediately reseed areas that show bare spots.
- K. Protect seeded areas with warning signs during maintenance period.

**END OF SECTION**