

## **Technical Specification 013.01**

### **EXCAVATING, GRADING, TRENCHING, & BACKFILLING**

#### **1.0 General**

- a) The utility contractor shall furnish all labor, equipment, and materials for all excavation, grading, trenching, and backfilling associated with the installation of water, sewer, pump stations, drainage structures, curb and gutter, streets, sidewalks, driveways, slopes, storm drainage, and other associated infrastructure within the limits of the project work area. All work done shall be in accordance with the approved plans and specifications.

#### **2.0 Existing Conditions and Utility Locations**

- a) It is the utility contractor's responsibility to perform all site inspections to familiarize himself with the scope of work involved and the existing conditions at the project site.
- b) The contractor is responsible for locating all existing underground utilities in the area of work. If utilities are to remain in place then the contractor shall provide adequate means of protection during earthwork, excavating, trenching, and backfilling operations.
- c) Should unlocated, or incorrectly located, piping or other utilities be encountered during excavation the utility owner shall be notified immediately. The utility contractor shall cooperate with the County and other respective utility companies to protect and keep respective services and facilities in operation. The contractor shall also repair any damaged utilities to the satisfaction of the utility owner.
- d) Barricade all open excavations occurring as part of this work and post with warning signs and /or lights. Continuously operate all warning lights as recommended by the Authority Having Jurisdiction (AHJ). The utility contractor shall also protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

#### **3.0 Technical Standards**

- a) ASTM C33 ---- Standard specification for concrete aggregates
- b) ASTM D2487 - Classification of soils for engineering purposes.

#### **4.0 Soil Classifications**

- a) Use soils free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, organic matter, refuse, frozen materials, rocks and lumps greater than 4 inches in diameter and other deleterious matter.

- b) For the purpose of this specification, soils to be used as fill material are grouped into five classes according to soil properties and characteristics:

Class I: Angular, 1/4 to 1-1/2 inch, graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, and crushed stone, crushed gravel, and crushed shells

Class II: Coarse sands and gravels with maximum practical size of 1-1/2 inch, including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class.

Class III: Fine sand and clayey gravels, including fine sands, sand-clay mixtures, and gravel-clay mixtures. Soil Types GM, GC, SM, and SC are included in this class.

Class IV: Silt, silty clays, and clays, including inorganic clays and silts of medium to high plasticity and liquid limits. Soil Types MH, ML, CH, and CL are included in this class. **These materials are not recommended for bedding, haunching, or initial backfill.**

Class V: This class includes the organic soil, OL, OH, PT as well as soils containing frozen earth, debris, rocks, larger than 40 mm (1-1/2 in.) in diameter, and other foreign materials. **These materials are not recommended for bedding, haunching, or initial backfill.**

## 5.0 Trench Excavation, Pipe Bedding, Backfilling, and Compaction for Utility Systems

- a) Trench Excavation

- 1) Excavation shall be accomplished in accordance with the grades and lines as established by the Engineer or Surveyor and as required by the work to be performed. Excavation shall include the removal and replacement of all asphalt, concrete, curb, rock, earth, fences, trees (as applicable), shrubs, and other materials. The contractor will exercise care to prevent undercutting lower than the required subgrade. All materials from excavation, considered as suitable by this specification, shall be used as fill wherever required, and the contractor shall arrange his work so that this usage of excavated materials will be possible. Unsuitable and surplus materials from the excavation, if any, shall be disposed of by the contractor at his expense. All areas of the site shall be graded and maintained at all times to prevent surface runoff from draining into the excavations and to prevent ponding of water therein.
- 2) Excavated materials not required for topsoil, fill or backfill shall be removed from the site of the work by the contractor, but none shall be deposited on private property without written consent of the property owner. For County capital improvement projects any agreements between

the contractor and private property owners must be provided to the County also.

- 3) All excavations shall be in compliance with all current OSHA requirements and it is the utility contractor's responsibility to ensure that the project work is in compliance with all OSHA requirements.
- 4) All piping shall be installed at a minimum depth of 36 inches unless otherwise approved by Brunswick County. Installations shallower than 36 inches, if approved, will require the use of ductile iron pipe.
- 5) Trenches for piping shall be excavated true to line and grade as shown on the approved plans.
- 6) Trench widths at and below the top of the pipe shall be the minimum necessary for proper installation. Trench banks above the top of the pipe shall be as vertical as practicable. Overdepth excavation shall be backfilled with Class I material and compacted.
- 7) The utility contractor shall provide, at his expense and as directed by the Engineer, especially bedding material or concrete encasement as may be necessary due to over-width excavation.
- 8) Trench depth to the lines and grades shown on the drawings. Where elevations are not shown, trench to a depth sufficient to provide at least 36 inches of cover above the top of pipe, unless otherwise specified. Grade all trenches to provide a constant slope free of sags and high spots. Recesses shall be excavated where required to accommodate bells and joints.
- 9) Keep trenches free of water. Include cost of dewatering in unit price bid for pipe. No separate payment for dewatering will be made by the County.
- 10) Properly brace sheet and support trench walls as soil conditions require and in strict conformance with the approved plans, all pertinent laws, and OSHA regulations. Provide adequate bracing and shoring to protect adjacent improvements. Contractor shall provide certification for all premanufactured trench bracing devices prior to any excavation activities.

b) Pipe Bedding

- 1) Gravity Sewer Mains – Refer to Brunswick County gravity sewer pipe bedding Standard Detail:

Class A bedding: For gravity mains less than twenty (20) feet deep undercut trench bottom six (6) inches minimum below pipe and fill with size #57 stone up to and including the springline of the pipe.

Class B bedding: For gravity mains greater than twenty (20) feet deep undercut trench bottom six (6) inches minimum below pipe and fill with size #57 stone to six (6) inches above the pipe.

- 2) Pressure Mains, Water or Sewer- it is not necessary to bed pressure mains unless unusually wet or mucky field conditions are encountered. Pressure mains shall be installed in properly excavated trenches on the native soil of the trench. If wet or mucky field conditions are encountered then size #57 stone shall be used to provide a firm bedding but only at the direction of the Engineer or County staff.
  - 3) Service Pipe – bedding is not required on water and sewer service laterals unless unusual conditions are encountered in the field. In these cases the Contractor shall bed the service pipe per direction from the Engineer or County staff.
- c) Initial and Final backfilling
- 1) After properly installing the pipe and bedding, if required, trench backfill shall progress as rapidly as pipe laying will permit.
  - 2) Backfill materials shall be of suitable material and be capable of being compacted to a minimum of ninety-eight (98) percent ASTM D698 (Standard Proctor) maximum density at optimum moisture content.
  - 3) Initial and Final backfill shall be of the Type 1 or Type II material as follows:
    - a) Type 1 Material: Excavated material from the trench or materials from other sources which are free from large clods, roots or stones larger than 1 inch may be used as initial backfill in trenches (see Pipe Trench Detail).
    - b) Type 2 Material: Excavated material from the trench or materials from other sources which are free from large clods, roots or stones larger than 8 inches may be used as final backfill in trenches but shall not be used in the final twelve (12) inches of fill (see Pipe Trench Detail).
  - 4) Backfill around the pipe by placing in layers no more than six (6) inches in depth. Backfill shall be compacted with light tamps for the full width of the trench to provide adequate support for the bottom and sides of the pipe. Backfill shall be carried up evenly on both sides of the trench excavation. Particular care is required in backfilling gravity sewer pipe to prevent excessive pipe deflection.
- d) Compaction

- 1) When existing plans and grades require the use of fill to reach the required elevation, the contractor shall deposit suitable material from previously excavated areas or use borrow material. Such material shall be free from debris, roots, trash, stones, or other harmful substances, and shall be spread in successive layers of loose material not more than six (6) inches in depth.
- 2) Each layer shall be spread uniformly by motor grader or other approved device and rolled with an approved tamping or three-wheeled power roller until thoroughly compacted to a minimum of ninety-eight (98) percent ASTM D698 (Standard Proctor) maximum density at optimum moisture content. Rolling with rubber tired vehicles or track type equipment will not be allowed.

## **6.0 Crushed Stone**

- a) Crushed stone shall be size # 57 washed stone only

## **7.0 Concrete**

- a) Concrete placed for cradles, thrust blocks, or encasement shall be 3,000 psi minimum strength at twenty-eight (28) days hydration.

## **8.0 Foundation**

- a) Foundation shall be required in wet, yielding and mucky locations. Foundation shall be constructed by removal of wet, yielding or mucky material and its replacement with sufficient Class I material to correct the instability. Foundation shall only be installed with the approval of the Engineer or Brunswick County staff. Undercutting and filling with stone will not be allowed or paid for in order to control water in the excavation trench.

## **9.0 Undercutting**

- a) Undercutting, unless authorized by the Engineer, shall be replaced and compacted at the contractor's expense. If the material, after excavation to subgrade, is found to be soft, spongy or unfit for use as subgrade, such unsuitable material shall be removed to a depth as directed by the Engineer and the subgrade shall be brought to proper elevation by filling with suitable material from the excavation or from an approved borrow site.

## **10.0 Borrow Material**

- a) The Contractor will supply all borrow material necessary and will provide all labor and equipment necessary to dig and haul such borrow material. Any and all borrow material utilized shall be of suitable quality and meet the requirements of this technical specification.

## **11.0 Excess Water Control**

- a) Grade and maintain all areas of the site to preclude surface runoff into excavations and prevent any water accumulation in the excavation.
- b) Excavations should be kept free of surface water and/or groundwater. Provide and maintain at all times the necessary means and devices to prevent water from entering the excavations and for removing all water entering the excavations during pipe laying operations. Dewatering shall continue until structure is backfilled and compacted.
- c) Include cost of dewatering in the unit cost for pipe. Separate payment will not be made for dewatering operations by Brunswick County.

## **12.0 Contaminated Soils – Excavation, Removal, and Remediation**

- a) In the event that contaminated soils are suspected or encountered the contractor shall stop digging in the suspect area and immediately notify both the Engineer and Brunswick County staff.
- b) It shall be the utility contractor's responsibility to hire a soils testing firm to examine the suspect area for type and density of contamination. Should testing confirm the presence of contaminated soils, the following steps shall be taken:
  - 1) Excavate contaminated material in a manner consistent with all jurisdictional regulations.
  - 2) Immediately remove contaminated material from the site. Contaminated materials may not be stockpiled for any amount of time.
  - 3) Material is to be disposed of at a permitted facility. Tickets must be produced to the Engineer and County staff accounting for every cubic yard of material removed.
  - 4) Per direction of the Engineer and / or Brunswick County, the pipe material shall be changed to pressure class 350 DIP with Nitrile gaskets.
  - 5) The trench is to be bedded and backfilled with select fill per Brunswick County specifications herein.

## **13.0 Field Quality Control**

- a) Field inspection, sampling and testing will be performed as required at either the direction of the Engineer or Brunswick County
- b) If required, an independent soils engineering and testing laboratory shall perform sufficient tests and inspection procedures, to the satisfaction of the Engineer and the County, both in the field and lab to ensure that the provisions of this specification are met. The testing shall be paid by the utility contractor. The testing lab shall be approved by the Engineer and / or Brunswick County.