

## **SECTION 10 - TRENCHING AND BACKFILLING**

### **10.1 General**

- A. Work included in this Section includes trenching and backfilling for underground pipelines and related structures only.

#### **10.1.1** Related requirements specified in other Sections of the Standards.

- A. Section 8 - General Construction Standards
- B. Section 9 - Site Clearing
- C. Section 11 - Seeding
- D. Section 12 - Water Distribution System
- E. Section 13 - Sanitary Sewer System

#### **10.1.2** Reference Specifications are referred to by abbreviation as follows:

- A. American Society for Testing and Materials .....ASTM
- B. American Association of State Highway  
and Transportation Officials .....AASHTO
- C. Virginia Department of Transportation .....VDOT

**10.1.3** Store and use explosives in accordance with Federal, State, and Local regulations. The Contractor shall be responsible for and shall satisfactorily correct all damage resulting from use of explosives.

**10.1.4** Owner will provide compaction testing.

**10.1.5** Locate existing utilities, culverts, and structures, above and/or below ground, before any excavation starts. Coordinate work with utility companies. Protect, maintain in service, and prevent damage to utilities not designated to be removed. When utilities are encountered and are not shown on Drawings or when locations differ from those shown on Drawings, notify the Design Engineer for instructions before proceeding.

## **10.2 Products**

### **10.2.1 Pipe Bedding Fill**

- A. Granular pipe bedding shall meet requirements for coarse aggregates, Size No. 57 stone for non-pressure pipe in accordance with VDOT Road and Bridge Specifications.
- B. Granular pipe bedding shall meet requirements for Size No. 21A or 21B stone for pressure pipe in accordance with VDOT Road and Bridge Specifications.
- C. Crushed or recycled concrete shall not be used as pipe bedding.
- D. Fly ash shall not be used as pipe bedding.

### **10.2.2 Select Backfill**

- A. Aggregate backfill shall meet requirements for subbase and aggregate base material, Size No. 21A or 21B, in accordance with VDOT Road and Bridge Specifications.
- B. Clean Earth Fill shall be an approved material free of debris, roots, frozen materials, organic matter, rock, or gravel larger than 2 in. in any dimension or other harmful matter.
  - (1.) Crushed or recycled concrete shall not be used as backfill.
  - (2.) Fly ash shall not be used as pipe backfill.

### **10.2.3 Structural Backfill**

- A. Structural backfill shall meet requirements for coarse aggregate, Size No. 57 for non-pressure pipe in accordance with VDOT Road and Bridge Specifications.
- B. Structural backfill shall meet requirements for subbase and aggregate base material, Size No. 21A or 21B for pressure pipe in accordance with VDOT Road and Bridge Specifications.

**10.2.4** Concrete for cradle or encasement shall have a 28-day compressive strength of 3,000 psi and contain no fly ash.

**10.2.5** Riprap, where shown on the Drawings shall conform to Section 414 of the VDOT Road and Bridge Specifications.

### **10.3 Execution**

**10.3.1** Strip existing topsoil, leaf mold, and organic materials meeting topsoil requirements of Section 11 - "Seeding". Deposit in storage piles separate from other excavated material.

**10.3.2** Where the trench width exceeds the allowable width, the Contractor at his own expense shall provide for increased loads on pipe as directed by the Engineer.

**10.3.3** Unauthorized excavation consists of the removal of material beyond indicated subgrade elevations or side dimensions without specific approval of the Engineer. Where unauthorized excavations occur, restore these areas to the elevations and dimensions shown on the Drawings with granular fill.

**10.3.4** Where removal of unsatisfactory material is due to fault or negligence of the Contractor, by inadequate shoring or bracing, dewatering, material storage, or other failure to meet specified requirements, any work deemed necessary by the Engineer to correct the faulty condition shall be performed at no additional cost.

#### **10.3.5 Excavation and Bedding**

- A. Open trenches only so far in advance of pipe laying as permitted by Engineer.
- B. The width of the trench at and below the top of the pipe shall not exceed the maximum width of trench as defined in Section 8 of these Standards.
- C. Pressure lines shall be installed with bedding as indicated in Standard Drawings D-710-1 and D-710-2 for PVC pipe and D-730 for ductile iron pipe.
  - (1.) Excavate for bell holes at each joint so that the entire barrel of pipe shall be fully supported the entire length.
  - (2.) Where rock is encountered, excavate 6 inches below the bottom of the pipe for bedding in granular material.
- D. Gravity sewer lines shall be installed with bedding as indicated in Standard Drawings D-710-1 and D-710-2 for PVC pipe and D-730 for ductile iron pipe
- E. Dewater excavation as necessary to provide proper protection. If deemed necessary, the Engineer may require continuous dewatering 24 hours per day by adequate pumpage or well-points until backfilling is completed. The method and equipment used for dewatering shall be subject to the approval of the Engineer.
- F. Where unsuitable soil is encountered, excavate to a depth determined by Engineer

- and replace with structural backfill thoroughly and uniformly compacted.
- G. Where underground streams or springs are found, provide temporary drainage, and notify Engineer.
  - H. Remove from project site and dispose of material unsatisfactory for backfill, trash, and all excess material continuously with the progress of the work.
  - I. Remove shoring and all form materials, unless ordered to remain.
  - J. Where rock is encountered, so that a manhole, vault, or other structure will bear entirely on rock, it shall be used to support the foundation. Where only a part of the foundation would bear on rock, excavate to an even depth of 8 inches below the entire structure and backfill with aggregate fill and thoroughly compact. Provide a minimum of 8 inches between rock excavation and sides of structures.
  - K. Compact pipe bedding by tamping or rodding to prevent settlement.

#### **10.3.6 Sheeting**

- A. Maintain trench walls in a safe condition at all times.
- B. Sheeting and shoring left in place shall be cut off to a depth of not less than 18 inches below grade.

#### **10.3.7 Compaction**

- A. Percentage of maximum density requirements.
  - (1.) Compact each layer of fill or backfill to not less than the following percentages of the maximum density at optimum moisture content as determined by ASTM D698 (AASHTO T-99).
    - a. 100 percent beneath and within 25 ft. of buildings and structures, including those shown for future construction.
    - b. 95 percent beneath pavements, walks, and road shoulders, including those shown for future construction.
    - c. 90 percent in other unpaved areas.
- B. Where compaction greater than 90 percent is required, test reports shall be submitted to the Department prior to Substantial Completion (e.g., for private development projects, prior to Tentative Acceptance).

- C. Test reports are not required where the trench is completely backfilled with select aggregate fill.

### **10.3.8 Backfill and Compaction**

- A. Around and adjacent to structures, backfill shall be of material of suitable stability and perviousness. Backfill shall be placed in 6-inch layers, each layer being compacted by approved means. No backfill shall be placed against a structural wall until all connecting structural members are in place. It shall be the Contractor's responsibility to provide compaction to such a degree that the resultant subsidence after placing shall not be detrimental to the stability or appearance of the structure or adjacent areas. The Contractor shall provide adequate protection to all structures during backfilling and use every precaution to avoid damaging or defacing them.
- B. Backfill trench to a compacted depth of 1 foot over the pipe with clean earth fill. Backfill shall be properly placed uniformly on each side of the pipe and compacted as required. Do not backfill on muddy or frozen soil, or with muddy or frozen soil.
- C. Backfill trench from 1 foot above the pipe to grade with clean earth fill free of stones larger than 6 inches or 1/2 the layer thickness, whichever is smaller. Layers shall not exceed 12 inches, except that under road shoulders and under existing or future paved areas, layers shall not exceed 8 inches. Backfill shall be compacted to the density specified for the areas in which it is located except that minimum compaction in any area shall be to the density of the adjacent soil. Settlement may be achieved by mechanical tamping, or other means as determined by the Contractor, which shall satisfy the compaction requirements.
- D. Excavate depressions caused by removal of stumps or other clearing operations to firm subgrade; fill with clean earth fill and compact as specified.
- E. Compact soil materials using equipment suitable for materials to be compacted and for work area locations.
- F. Compact aggregate fill placed under manholes or other structures to required density.

### **10.3.9 Grading**

- A. Uniformly grade all areas within the limits designated on the Drawings, including adjacent transition areas. Finish surfaces within specified tolerances with uniform levels or slopes between points where elevations are shown and existing grades.
- B. Finish all surfaces free from irregular changes.

- C. Finish subgrade areas to receive topsoil to within 0.10 foot of required subgrade elevations.
- D. Shape subgrade under walks to line, grade, and cross-section to within 0.10 foot of required subgrade elevations.
- E. Shape subgrade under pavement to line, grade, and cross-section to within 1/2 inch of required subgrade elevations.
- F. Protect newly graded areas from traffic and erosion. Repair and reestablish grade in settled, eroded, or rutted areas to the specified tolerances.
- G. Where compacted areas are disturbed by subsequent construction or adverse weather, scarify the surface, reshape, and compact to the required density. Use hand tamper for recompaction over underground utilities.

#### **10.3.10 Utilities to be Abandoned or Removed**

- A. When underground utilities are to be abandoned in place, plug, cap, or seal with concrete at the "construction limits" or at points shown.
- B. Remove underground utilities indicated on the Drawings to be removed and backfill resulting excavation with suitable material, compacted as specified. Plug, cap, or seal utilities with concrete, at the construction limits or at points shown.

#### **10.3.11 Erosion Control**

- A. Comply with local erosion control ordinance and with the Virginia Erosion and Sediment Control Handbook by the Virginia Soil and Water Conservation Commission to control erosion and sedimentation.
- B. Comply with the Responsible Land Disturber (RLD) Certification program requirements.
- B. All applicable erosion and siltation control measures shall be taken prior to grading.
- C. No more than 500 feet of trench shall be open at any one time.
- D. All utility lines, not in streets, shall be mulched with hay or straw and seeded as soon as possible after backfill.

- E. Any disturbed area not paved, sodded, or built upon by November 15, is to be seeded on that date with oats, abruzzi rye, or equivalent and mulched with hay or straw.
- F. Protect graded areas from the action of the elements. Settlement or other damage that occurs prior to acceptance of the work shall be repaired, and grades shall be satisfactorily reestablished.
- G. Repair after cleanup: Upon completion of construction work and after spoils and debris have been removed, regrade any areas disturbed by operations.

#### **10.3.12 Clean Up**

- A. Keep area of Work cleaned up at all times, and promptly remove all materials and debris not intended for incorporation in the Work. Broom clean the surfaces of all paved areas immediately after backfilling operations.
- B. Maintain backfilled trenches from the nuisance of dust, mud, or settling during the entire length of the Contract and for a period of one year following Final Acceptance of the Work.
- C. In the event the Contractor fails to satisfy these requirements to the satisfaction of the County, or otherwise prosecute the Work in a reasonable or proper manner, and after a reasonable period of time has elapsed after notification by the County of unsatisfactory conditions, the Owner reserves the right to employ outside services to take such corrective action as deemed necessary by the Engineer. The cost incurred in taking corrective actions will be deducted from any monies due the Contractor by the Owner or by such other means of collection as may be available to the Owner.

#### **10.3.13 Preparation for Final Inspection**

- A. Locate and adjust all manholes, valve boxes, etc. to final grade, and flush out all gravity pipe lines as necessary prior to final inspection by the Engineer.