

SECTION 104 - TRENCHING & BACKFILLING FOR UTILITY LINES

104.1 GENERAL

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

104.1.1 Related requirements specified in other Sections of the Specifications.

- A. Section 102 - Traffic Control
- B. Section 103 - Site Clearing
- C. Section 105 - Rock Excavation
- D. Section 106 - Seeding
- E. Section 107 - Sanitary Sewer System
- F. Section 108 – Storm Drainage System
- G. Section 109 - Water Distribution System

104.1.2 Reference Specifications are referred to by abbreviation as follows:

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

104.1.3 The Contractor shall provide compaction testing as deemed necessary by the City.

104.1.4 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 Engineer for instructions before proceeding.

104.2 PRODUCTS

104.2.1 Pipe Bedding Fill

Granular fill shall meet requirements for VDOT #68 or #57 aggregate.

104.2.2 Select Backfill

- A. Aggregate fill shall be VDOT #21A.
- B. Clean earth fill shall be approved material free of debris, roots, frozen materials, organic matter, rock or gravel larger than 2 inches in any dimension or other harmful matter.

104.2.3 Concrete for bedding, backfill or encasement shall have at least 2,000 psi compressive strength.

104.2.4 Rip rap, where shown on the Drawings shall conform to VDOT Road and Bridge Specifications.

104.3 EXECUTION

104.3.1 Strip existing topsoil, leaf mold and organic materials, meeting topsoil requirements of Section 106 - "Seeding." Deposit in storage piles separate from other excavated material.

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

104.3.3 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 City Engineer to correct the faulty condition shall be performed at no additional cost.

104.3.4 Excavation and Bedding

- A. Open trenches are limited to 100'.
- B. The width of the trench at and below the top of the pipe shall be the outside diameter of the pipe plus 24 inches.
- C. The trench width shall be of adequate width to allow for a mechanical compactor between the pipe and the trench wall.

- D. Pressure lines shall be installed with bedding as indicated in the Standard Drawings.
- E. Gravity sewer lines in good material shall be installed with a modified class B bedding as shown on standard drawing S-8.
- F. Dewater excavation as necessary to provide proper protection. If deemed necessary, the Engineer may require continuous dewatering 24 hours per day by adequate pumping or well-points until backfilling is completed. The method, and equipment used for dewatering shall be subject to the approval of the Engineer.
- G. Where unsuitable soil is encountered, excavate to depth determined by the City Engineer and replace with suitable material approved by the City Engineer.
- H. Where underground streams or springs are found, provide temporary drainage and notify City Engineer.
- I. Remove from the project site and dispose of material unsatisfactory for backfill, trash, and all excess material continuously with the progress of the work.
- J. Remove shoring and all form materials, unless otherwise directed.
- K. Where rock is encountered which will serve as a foundation for a manhole, vault, or other structure, it shall not be removed. 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.
- L. Compact pipe bedding by mechanical tamping to prevent settlement.

104.3.5 SHEETING

- A. Maintain trench walls in a safe condition at all times. The City Engineer reserves the right to require the use of sheeting and/or shoring at any time the Engineer deems it necessary.
- B. Sheeting and shoring left in place shall be cut off to a depth of not less than 18 inches below finish grade.

104.3.6 COMPACTION

Percentage of maximum density requirements:

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 D 698 (AASHTO T-99):

- A. 100 percent beneath and within 25 feet 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.

104.3.7 BACKFILL

- A. Backfill trench to a compacted depth of 1 foot over the pipe with approved 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.
- B. Backfill over any plastic or PVC pipe to 1' over the top of the pipe with VDOT #68 or #58 aggregate.
- 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. Compaction shall be achieved by vibratory mechanical tamping.
- D. Excavation depressions caused by removal of stumps or other clearing operations to firm subgrade shall be filled with clean earth fill and compacted as specified.
- E. Place backfill materials adjacent to structures evenly. Take care to prevent wedging action of the backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.
- F. Compact backfill materials using equipment suitable for the materials being compacted and the work area locations. Use power-driven hand tampers for compacting materials adjacent to structures.

- G. Compact aggregate fill placed under manholes or other structures to required density.
- H. When specified the trench shall be backfilled full depth with VDOT 21A aggregate.

104.3.8 GRADING

- A. Uniformly grade all areas within the limits designated on the Drawings, including adjacent transition areas.
- B. Finish all surfaces to be 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 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.

104.3.9 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.

104.3.10 CLEAN UP

- A. Keep areas 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 City, or otherwise prosecute the Work in a reasonable or proper manner, and after a reasonable period of time has elapsed after notification by the City of unsatisfactory conditions, the City reserves the right to employ outside services to take such corrective action as deemed necessary by the City Engineer. The cost incurred in taking corrective actions will be deducted from any monies due the Contractor by the City or such other means of collection as may be available to the City.

104.3.11 PREPARATION FOR FINAL INSPECTION

Locate and adjust all manholes, valve boxes, etc. to final grade and flush out all gravity pipelines as necessary prior to final inspection by the City Engineer.

104.4 MEASUREMENT AND PAYMENT

- A. Excavation - Excavation for utility work is incidental to all other work. No separate payment is made.
- B. Rip Rap - When specified as a separate bid item, rip rap will be paid for by the ton or square yard for the Class specified.
- C. Backfill - When there is not enough suitable backfill material on site, VDOT 21A Aggregate shall be used and paid for by the ton. Otherwise there is no separate payment for backfill.
- D. Full Stone Backfill - When specified as a separate bid item, the entire trench depth will be backfilled with VDOT 21A Aggregate. Payment will be for the linear footage of trench backfilled with stone.
- E. Bedding Stone - The specified pipe bedding stone shall be incidental to the cost of the pipe.
- F. Trench Stabilization- Shall be #1 or #3 aggregate (as directed by the City Engineer) used to replace over excavation of unsuitable material

below the typical bedding line. Placement shall be as directed by the City Engineer. Payment shall be by the TON and shall include the cost of removal and disposal of the unsuitable material.