

TRENCHING/BACKFILLING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavate trenches for utilities from outside building to existing utilities.
- B. Compacted bedding under pipe, and fill over utilities to sub-grade elevations.
- C. Backfilling and compaction.

1.02 REFERENCES

- A. ANSI/ASTM C136 Method for Sieve Analysis of Fine and Coarse Aggregates.
- B. ANSI/ASTM D698 Test Methods for Moisture Density Relations of Soils and Soil Aggregate Mixtures, Using 5.5 lb. (2.49 kg) Rammer and 12 inch (304.8 mm) Drop.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01300.

1.04 FIELD MEASUREMENTS

- A. Verify that survey benchmark and intended elevations for the Work are as shown on Drawings.

PART 2 PRODUCTS

2.01 FILL MATERIALS

- A. Type 2RC Crushed Stone; free of shale, clay, friable material, sand, debris; graded in accordance with ANSI/ASTM C136 within the following limits: Penn Dot Type 2RC aggregate.
- B. Type 2B crushed stone; washed, free of clay, shale, organic mater; graded in accordance with ANSI/ASTM C136, to the following: Penn Dot 2B aggregate.
- C. Type B- Penn Dot Type B Fine Aggregate.
- D. Subsoil: Reused, free of gravel or stone larger than 3 inch size, and free of any debris.
- E. All Penn Dot standards referenced shall be per those in effect at the time of construction.

2.02 ACCESSORIES

- A. Geo-textile Fabric: Dupont Typar 3401 or approved equal.
- B. Vapor Retardant: 6-mil thick, polyethylene.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Any material to be used must be approved by Engineer.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Maintain and protect existing utilities remaining, which pass through work area.
- C. Protect plant life, lawns, and other features remaining as a portion of final landscaping.
- D. Protect benchmarks, existing well, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.
- E. Protect above and below grade utilities, which are to remain.
- F. Cut out soft areas of sub-grade not capable of insitu compaction. Backfill with Type 2B fill and compact to density equal to or greater than requirements for subsequent backfill material.

3.03 EXCAVATION

- A. Excavate subsoil required for electric conduit to existing utilities.
- B. Cut trenches sufficiently wide to enable installation of utilities and allow inspection.
- C. Excavation shall not interfere with normal 45 degree bearing splay of foundations.
- D. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd, measured by volume. Larger material will be removed under Section 02202.
- F. Correct unauthorized excavation at no cost to Owner.
- G. Correct areas over excavated by error in accordance with Section 02222.
- H. Stockpile excavated material in area designated on site and remove excess material not being used, from site.

3.04 BEDDING

- A. Support pipe and conduit during placement and compaction of bedding fill.

3.05 BACKFILLING AND COMPACTION

A. General

- 1. Backfilling includes all refilling of excavation and compaction for pipe trenches and around structures. Backfilling can be done as promptly as possible without damage to pipe or structures in place. Backfilling shall be done only with permission of engineer.

B. Initial Trench Backfilling

- 1. In backfilling all trenches after pipe has been installed, the initial backfill material, consisting of select material if in non-vehicular traffic ways or #2RC stone if in vehicular traffic ways, shall be placed on both sides of the pipe in uniform layers to a height of two inches above the top of the pipe:
 - a. in 6 inch lifts, if of earth*
 - b. in 12 inch lifts, if of #2RC stone

*Selected earth material is defined as earth free of stone larger than 1 ½" in any dimension and organic material.

- 2. Each layer of fill material shall be carefully deposited in the trench and solidly tamped with approved mechanical equipment in a manner that would not disturb the structure and which will obtain maximum stability.

C. Final Trench Backfilling – Township, Borough and Access Roads

- 1. The remainder of the excavations may be machine filled by either of the following methods:
 - a. In layers not exceeding eight inches (8") in thickness, if material is earth and mechanically compacted. Selected earth material for fill material installed in this section of the trench is defined as earth free of stone larger than six inches (6") in any dimension.
 - b. Higher earth lifts may be approved by Engineer providing compaction equipment in his judgment will not damage the pipe and providing at least four feet (4') of compacted material has been placed and approved by Engineer prior to the use of compacting equipment. Where this heavy compaction equipment is used, Engineer may require retesting of the pipe at the Contractor's expense.

2. If, in the opinion of Engineer, material available for backfilling is of such character that satisfactory compaction cannot be obtained, Contractor shall provide other suitable material as Engineer may direct. Stone shall be considered unsuitable backfill material if it represents over ten percent of the backfill and is not crushed and graded.

D. Final Trench Backfill – State Roads and Streets

1. On roads and streets owned by the Pennsylvania Department of Transportation, Form 408 shall apply for final backfill and compaction. (Latest edition).

E. Final Backfill Beyond Roads and Streets

1. Trenches and structures in fields and lawn area beyond the curb or shoulder of roads and streets may be machine backfilled and compacted with the wheels of vehicles or other means approved by Engineer. Contractor is on notice that he is required to maintain such backfill and any subsidence shall be corrected.

F. Miscellaneous Requirements for Backfilling

1. Earth for backfill shall be selected materials such as sand, gravel, clay and soil, and shall be free of roots, grass scrap lumber, or other organic material subject to predictable decay. It shall be spread uniformly and compacted by tampers to ninety-five percent of the maximum density obtained by ASSHTO method of compaction.
2. No backfill shall be deposited against concrete until the concrete has set. Compaction of backfill against concrete structures shall not be carried out by motorized equipment closer to structure than the depth of the structure below grade.
3. Backfilling shall not be made with frozen material or when the materials already placed are frozen. If any of the refills shall settle so as to be below the required levels for the proposed finished surface of any place before the final acceptance of the work, the Contractor shall, at his own expense and cost, supply additional material and build up the low places as directed.
4. Sub-grade under roadway areas shall be fine graded and compacted to the exact grade, elevation, and sections required.

G. Additional Backfill

1. Should additional material be required for fill or backfill in excess of that obtained from the site, the Contractor shall develop his own borrow pit.

3.06 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400.
- B. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D698 and with Section 01400.
- C. Compaction testing will be performed in accordance with ANSI/ASTM D698 and with Section 01400.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
- E. Frequency of Tests: As directed by Engineer.

3.07 RESTORATION

- A. Roads and Streets
 - 1. The restoration of road base and surface of state roads shall conform to PennDOT Form 408 (latest edition) or as directed by the Department of Transportation.
 - 2. The department of Transportation may require a concrete cap over all lateral cross trenches in state roads.
- B. Shoulders – Township and Borough Roads
 - 1. These shoulders shall be backfilled to within six inches (6") of the final grade and thereafter 2R stone placed and compacted by roller or mechanical tamping. The width of the shoulder shall be considered to be four feet (4') from the edge of cartway unless the existing shoulder exceeds four feet (4') (in which case the shoulder width shall be taken as the width of the existing shoulders). Beyond the shoulder, restoration shall consist in replacing, in kind, the existing ground. The Contractor shall re-establish all existing swales and gutters to maintain existing drainage facilities.
 - 2. If the disturbed or damaged shoulder is of a higher type than as specified above, the work shall be reconstructed and restored in as firm, strong, and durable condition as before the commencement of the work by Contractor in accordance with the requirements of the Engineer.
- C. Off Road – Developed Areas
 - 1. Backfill in trenches and around structures shall be brought to within six inches (6") of final grade when same are located in lawns. The final six inches (6") shall be filled with topsoil and seeded as specified in Section 02937

D. Off Road – Undeveloped Areas

1. Undeveloped areas are defined as meadow and woodland and fields used for planting of crops or to be retained as "open space".
2. Backfill in fields used for planting crops shall be brought to the level of the bottom of the adjoining topsoil and then filled to adjoining grade with topsoil.
3. Backfill in meadow and woodlands shall be brought to three inches (3") above final grade and neatly rounded. No large rocks, timbers, or foreign material shall be left on the surface.
4. Seeding will be required as outlined in Item C above.

E. Replace of Driveways, Curbs, and Sidewalks

1. Driveways, curbs, and sidewalks that have been removed or damaged shall be replaced in kind to the satisfaction of the property owner.

F. Clean-up and Repair

1. Upon completion of the backfilling, the streets or property shall be cleaned and surplus material removed. All surplus material remaining in the public right-of-way shall become the property of the Contractor and shall be disposed of in such manner as he may elect, subject to the approval of the Engineer.
2. Surplus material excavated from private property shall belong to the Property Owner and shall be disposed of by the Contractor, as required by said Owner.

3.08 TEMPORARY REPAVING

- A. Wherever a trench is dug within existing paving of a road or street, and promptly after backfilling thereof, temporary repaving with bituminous material shall be installed and maintained for at least ninety (90) days before a permanent surface is placed. Any sinking of the trench and paving shall be brought to the proper grade by additional bituminous material. The Contractor shall not place material above the proper grade to be pounded down by traffic. Instead he shall thoroughly compact the fill material, using mechanical equipment so that the grade of fill shall level with adjoining pavement. Puddling may be required as directed under supervision of the Engineer. Temporary paving shall consist of a minimum eight-inch (8") stone base with two inches (2") of bituminous material.

3.09 PROTECTION OF FINISHED WORK

- A. Recompact fills subjected to vehicular traffic.

END OF SECTION