

## SECTION 33 05 05

### TRENCHING AND BACKFILLING

#### PART 1 GENERAL

##### 1.01 SUMMARY

A. Section Includes:

1. Trenching requirements for underground piping and appurtenances, including requirements for excavation, backfill, and compaction.

B. Related Sections:

1. Section 31 10 00 – Site Clearing
2. Section 33 10 00 – Water Utilities
3. Section 33 31 00 – Sanitary Utility Sewer Piping
4. Section 33 40 00 – Storm Drainage Utilities

##### 1.02 REFERENCES

A. North Dakota Department of Transportation “Standard Specifications for Road and Bridge Construction”

1. Section 203 – Excavation and Embankment

B. American Society of Testing Materials (ASTM):

1. C1479 – Standard Practice for Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations.
2. D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe Sewers and Other Gravity-Flow Applications.
3. D698 – Test Method for Laboratory Compaction Characteristics for Soil Using Standard Effort.

##### 1.03 SUBMITTALS

A. Submittals shall conform to Section 01 33 00.

1. Provide Data for each Borrow Material to include:
  - a. Name and location of source.
  - b. Results of gradation tests.

##### 1.04 DEFINITIONS

- A. Bedding: The soil material adjacent to the pipe which makes contact with the pipe foundation, walls of the trench, and upper level of backfill. The purpose of bedding is to secure the pipe to true line and grade, and to provide structural support to the pipe barrel.

- B. Foundation: Soil material beneath the pipe bedding.
- C. Improved Pipe Foundation: Foundation provided by importing material from sources outside the Site. Required when foundation is soft or unstable.
- D. Filter Aggregate: Free draining mineral product used around drain tile pipe.
- E. Rock Excavation: Includes any boulders, concrete, or masonry structure exceeding 1 cubic yard. Excludes concrete pavement, curb and gutter, and sidewalk.
- F. Pipe Zone: That part of the trench below a distance of 1 foot above the top of the pipe.
- G. Sand Cushion: Aggregate bedding material used around pipe in areas where rock excavation is encountered, where pipe insulation is used, and when crossing existing utilities.

#### 1.05 SEQUENCING AND SCHEDULING

- A. Contractor shall call in locates before starting construction in a given area, requesting utility locations in the field.
- B. Uncover utilities and verify both horizontal and vertical alignments sufficiently in advance of construction to permit adjustments in the Work. Determine location of existing utilities and identify conflicts before excavating trench for pipe installation.
- C. Backfill and compact all trench excavations promptly after the pipe is laid.

#### 1.06 WARRANTY

- A. Trench settlements that occur during the correction period and are greater than 1/2 inch as measured from the beginning to the end of the settlement will be repaired at the Contractor's expense.

### **PART 2 PRODUCTS**

#### 2.01 PIPE BEDDING MATERIAL

- A. Polyvinyl Chloride (PVC) Pipe
  - 1. Granular bedding shall consist of pit run sand, gravel or granular soil, not more than 35 percent passing the No. 200 sieve, screened as may be necessary to remove all stones which would be retained on a 1 inch sieve.

## 2.02 BACKFILL MATERIAL

- A. Suitable materials selected from the excavated materials to the extent available and practical.
- B. Suitable materials are mineral soils free of rubbish, trees, stumps, branches, debris, frozen soil, oversize stone, concrete and bituminous chunks, and other unsuitable material.

## **PART 3 EXECUTION**

### 3.01 EXAMINATION

- A. Prior to construction, inspect existing utility structures and surface features, and document condition.

### 3.02 PREPARATION

- A. Notify Utility Owners to field mark their utility locations.
- B. Protect as necessary surface features, such as utility poles, trees, structures, pavement, etc., that are not designated for removal.
- C. Notify utility companies of progress schedule so they can accomplish any necessary relocation and removals that they have agreed to relocate, remove, or support.
- D. Implement traffic control.
- E. Complete removal or salvage of surface features, such as fences, shrubs, signs, and mailboxes.
- F. Strip off existing topsoil from within the trench excavation limits and stockpile. Separate vegetative stripping's from salvageable topsoil and dispose of appropriately.

### 3.03 CONSTRUCTION

- A. Conform to ASTM C2321, or modified herein.
- B. Trench Excavation
  1. Excavate trench to alignment and grade shown on the Drawings.
  2. Trench shall be of ample width to permit the pipe to be laid and jointed properly and the backfill to be placed and compacted properly.
  3. Brace, shore, or sheet trench and provide drainage. Comply with applicable State Regulations relating to industrial safety to a safe angle of

repose. Angle of repose may be no less than that required by the Occupational Safety and Health Act (OSHA).

4. Pile all excavated material in a manner that will not endanger the Work or obstruct sidewalks, driveways, gutters, etc.
5. Segregate soils in the excavated material that are not suitable for trench backfill.
6. Dispose of excess excavated materials off of right-of-ways and easements in a suitable site selected by the Contractor.
7. Haul materials, other than natural soil materials that are suitable as backfill material, to an approved landfill.
8. Excavate trenches to provide minimum 12 inch separation between pipes laid in the same trench.

C. Water Control

1. Dewater the ground as necessary to excavate the trench and install the pipe. All pipe and structures shall be laid in a dry condition prior to backfill. Maintain groundwater level a minimum of 1 foot below the pipe invert.

D. Trench Bottom

1. Excavate to a sufficient depth to insure adequate foundation when the bottom of the trench is soft or where unsatisfactory foundation conditions exist. Bring excavation up to pipe grade with thoroughly compacted granular materials.
2. Provide temporary support, remove, relocate, or reconstruct existing utilities located within the trench excavation. Utility shall designate method employed. Use particular care and provide compacted fill or other stable support for utility crossings to prevent detrimental displacement, rupture, or failure.

3.04 PIPE BEDDING

- A. Polyvinyl Chloride Sewer Pipe: Bed pipe in accordance with ASTM D2321
- B. Reinforced Concrete Pipe: Granular bedding shall consist of pit run sand, gravel or granular soil, not more than 35 percent passing the No. 200 sieve, screened as may be necessary to remove all stones which would be retained on a 1 inch sieve.
- C. Use only selected materials free from rock, boulders, debris, or other high void content substances to a level 1 foot above the top of pipe. Remove ledge rock, boulders, and large stones to provide at least 6-inch clearance from pipe.
- D. Dig bell holes of ample dimension at each joint such that the pipe barrel rests continuously on the bedding.

### 3.05 BACKFILL WITHIN PIPE ZONE

- A. Backfill immediately after pipe is laid. Restrain pipe as necessary to prevent their movement during backfill operations.
- B. Place material completely under pipe haunches in uniform layers not exceeding 4 inches in depth.
- C. Compaction of materials placed within the pipe bedding and encasement zones shall be accomplished with portable or hand equipment methods, so as to achieve thorough consolidation under and around the pipe and avoid damage to the pipe.

### 3.06 BACKFILL ABOVE THE PIPE ZONE

- A. Use suitable on site material.
- B. Place in uniform depth layers not to exceed 12 inches before compaction. Complete the compaction of each layer before placing material for the succeeding layer.
- C. Compact each layer by mechanical means. Trenches shall be compacted to a minimum of 95 percent, except to 100 percent in the upper 3 feet of the subgrade zone, where trenches are located below roadways or driveway.
- D. The method and means of placement and type of compaction equipment used is at the discretion of the Contractor. However, all portions of the trench backfill must meet minimum specified compaction requirements.
- E. Excavated material, including excess rock excavation material, not suitable or required for backfill shall be disposed of outside of the Site.