

SECTION 02225

TRENCHING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Trenching for Water Main, Sanitary Sewer, and Their Services.
- B. Trenching for Storm Sewer.
- C. Trench Bedding, Backfilling and Compaction.

1.2 RELATED SECTIONS

- A. Section 01400 - Quality Control: Testing fill compaction.
- B. Section 01500 - Construction Facilities and Temporary Controls: Water control in excavations.
- C. Section 02160 - Excavation Support Systems.
- D. Section 02211 - Rough Grading: Topsoil and subsoil removal from Site surface.
- E. Section 02223 - Backfilling: General backfilling.
- F. Section 02660 - Water Distribution: Pipe bedding materials.
- G. Section 02722 - Storm Sewerage Systems.

1.3 UNIT PRICE - BASIS OF MEASUREMENT

- A. Trenching:
 - 1. Basis of Measurement: Included in the unit price bid for the utility being installed.
 - 2. Basis of Payment: Includes all labor, material, and equipment required for trenching, bedding, backfill and compaction on this Project.

1.4 REFERENCES

- A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- B. ASTM D2992 - Test Methods of Density of Soil and Soil-Aggregate in Place by the Nuclear Methods (Shallow Depth).
- C. ASTM C12 - Standard Practice for Installing Vitrified Clay Pipe Lines.
- D. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Gravity - Flow Applications.

1.5 FIELD MEASUREMENTS

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

2. PART 2 PRODUCTS

2.1 BEDDING/BACK FILL MATERIALS

- A. Type A - Coarse Stone Fill: MDOT 6A, 100% crushed - for wet excavation, excavation within open drain, backfill for subgrade undercutting for poor soil or in pipe trench, compacted to a minimum of 95 percent of the materials maximum dry density as determined by modified proctor methods. A ballast type crushed stone free of shale, clay, friable material, sand, and debris graded in accordance with ANSI/ASTM C136.
- B. Type B - Granular Fill: MDOT Class IIA - for dry excavation, pipe bedding to 12" above pipe, and trench backfill within roadway influence or dry excavation. Compacted to a minimum of 95 percent of the materials maximum dry density as determined by modified proctor method in layers not to exceed 12 inches loose depth. Substitute with Type A MDOT 6A coarse stone for wet excavation.
- C. Type C - Structural Fill: MDOT Class I - for lower area of excess excavation over 24" compacted to a minimum of 95 percent of the materials maximum dry density as determined by modified proctor method.
- D. Type D - Native Subsoil: Reused, free of gravel larger than 3 inch size, organic material, and debris, backfill above bedding of pipe to subgrade in greenbelt area. Compacted to a minimum of 90 percent of the materials maximum dry density as determined by modified proctor method in layers not to exceed 12 inches loose depth, unless otherwise specified.
- E. Type E - Dense Aggregate: MDOT 22A dense graded aggregate for driveway and temporary patches on traveled surfaces, compacted to a minimum of 98 percent of its maximum dry density as determined by modified proctor method.
- F. Type F – MDOT Standard Flowable Fill (Fill Class C concrete) – for headwall, sheet piling repair, and culvert storm sewer back filling.

3. PART 3 EXECUTION

3.1 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Maintain and protect existing utilities remaining, which pass through Work area.
- C. Protect benchmarks, grade and slope stakes.

3.2 EXCAVATION

- A. Excavate subsoil required for utility piping and accessories as indicated on the plans.
- B. Excavate on the required line to the depth required below the pipe grade for bedding thickness required.

- C. Trenches for pipe shall be excavated to the following minimum of and maximum widths measured at the top of the pipe:

<u>Pipe Size</u>	<u>Trench Width</u>	
	<u>Minimum</u>	<u>Maximum</u>
6" and smaller	18"	24"
8" & 10"	24"	30"
12" & 15"	30"	36"
18"	34"	40"
21"	38"	42"
24"	42"	46"
27"	45"	49"
30"	49"	53"
36"	56"	60"
Larger than 36"	I.D. + 20"	I.D. + 24"

- D. Where trench widths exceed the maximum specified above, the Owner's representative may require special bedding or the use of extra strength pipe at the Contractor's expense.
- E. Minimum trench width is 18 inches.
- F. Excavation shall not interfere with normal 45 degree bearing splay of foundations.
- G. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
- H. Remove lumped subsoil, boulders, and rock 6 inches below bottom of pipe.
- I. Where soil in the bottom of the trench is unsuitable in the opinion of the Engineer, excavate below the trench bottom and place Type A fill, as directed by the Engineer. See Section 02222 – Excavation, Subgrade Undercutting and Section 02223 - Backfilling.
- J. Correct unauthorized excavation at no cost to Owner.
- K. Correct areas over-excavated by error with Type A fill, in accordance with Section 02223 – Backfilling.
- L. Stockpile excavated material in area designated on Site and remove excess material not being reused from Site.
- M. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- N. Notify Owner's representative of unexpected subsurface conditions and discontinue affected Work in area until notified to resume Work.
- O. Protect excavation by methods required to prevent cave-in or loose soil from falling into excavation.
- P. Provide, operate, and maintain pumping equipment to keep trench free of water. Payment for dewatering shall be included in the pay item being installed.
- Q. Use trench boxes or other form of temporary protection when required by OSHA and MIOSHA Standards or when protection of existing utilities is necessary.

3.3 BEDDING

- A. Place and compact bedding below the pipe to the depth specified on the plans.
- B. Support pipe and conduit during placement and compaction of bedding fill.

3.4 BACKFILLING

- A. See Section 02223 – Backfilling.
- B. Place 4 inches tamped Type B fill along the side of the pipe, filling any void space under the pipe. Execute tamping with a T bar or other tamping device approved by the Engineer.
- C. Place additional tamped Type B fill along side the pipe to a height equal to the top of the pipe.
- D. Place and compact Type B fill material to 12 inches above the top of the pipe unless shown otherwise on the Project plans.

3.5 TOLERANCES

- A. Top Surface of Backfilling: Under Paved Areas: Plus or minus 1/2 inch from required elevations.

3.6 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400 - Quality Control.
- B. Tests and analysis of fill material will be performed in accordance with MDOT Standard Requirements and with Section 01400 - Quality Control.
- C. Compaction testing will be performed in accordance with MDOT Standard Requirements and with Section 01400 - Quality Control.
- 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 the Engineer.
- F. Proof roll compacted fill surfaces under paving. See Section 02223 - Backfilling.

3.7 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 01500 - Temporary Controls.
- B. Recompact fills subjected to vehicular traffic prior to placing wearing surface.

END OF SECTION