

## SECTION 02225

### TRENCH BACKFILL

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. This section consists of handling and storage of materials to be used for fill, backfill, and final grading.

##### **1.02 RELATED WORK**

- A. Section 02210, Excavation and Embankment
- B. Section 02665, Water Distribution and Transmission Systems
- C. Section 02700, Sanitary Sewer Systems

#### **PART 2 PRODUCTS**

##### **2.01 MATERIALS**

###### **A. PIPE BEDDING MATERIAL**

1. In general, pipe bedding material shall meet all pipe manufacturer recommendations. When there is discrepancy between the following directives and the manufacturer's recommendations for pipe bedding material, the more conservative engineering grade quality of materials shall be used as directed by the ENGINEER.
2. Pipe bedding material around the pipe from six (6) inches under the pipe to six (6) inches over the pipe shall consist of native clay and/or sand. This native pipe bedding material shall be incidental to the associated pipe installation. This material shall be free from clods, frozen material, or stones larger than three-quarters (3/4) inch in their maximum dimension. Where wet or otherwise unstable conditions exist, the material in this zone shall be free draining, non-plastic material. Where suitable material is available in the material excavated from the trench, the CONTRACTOR may procure the select material by screening, sifting or manually sorting the material removed from the trench in a manner approved by the ENGINEER.
3. Type 1 Pipe Bedding, material around the pipe from six (6) inches under the pipe to six (6) inches over the pipe, shall be used when on-site native soil is unsuitable or as directed by the ENGINEER. This material shall be silt, clay, silty sand, silty gravels, or clayey sand or gravel (ASTM D-2487 classification ML, CL, ML-CL, SM, SC, GM, GC, SW, SP) free of stones larger than ¾ inch in their maximum dimension.
4. Trench Foundation material is required for foundation in over-excavated trenches and shall consist of the bedding material from six (6) inches under the pipe and below. The bedding material shall consist of clean gravel or sand having a maximum size of one and one-half (1½) inches, with zero to five percent (0 to 5%) passing the #200 sieve.

B. CEMENT TREATED FILL

Cement treated fill, when specified, shall meet the following criteria:

<u>INGREDIENT</u>	<u>LBS/CY</u>
Cement (0.45 Sack)	42 lbs (19 kg)
Water (39 Gallons)	325 lbs (147.4 kg)
Coarse Aggregate (size No. 57)	1700 lbs (771.1 kg)
Sand (ASTM C 33)	1845 lbs (837 kg)

**PART 3 EXECUTION**

**3.01 CONSTRUCTION**

A. COMMON AND SELECT BACKFILL

1. All trenches shall be backfilled immediately after grade, alignment and jointing of the pipe has been inspected and approved. Leakage tests, pressure tests or tests for alignment and grade shall be performed after backfill. If any tests fail, the CONTRACTOR shall be responsible for work required to correct the defects.
2. After the select pipe bedding material has been placed and compacted as specified above, the remainder of the trench backfilling shall be done. All backfill material shall be free from cinders, ashes, refuse, organic and frozen material, boulders, or other materials that are unsuitable. From one (1) foot above the top of pipe to six (6) inches below the ground surface, or to the subgrade elevation for streets or paved surfaces, material containing stones up to four (4) inches in the greatest dimension may be used.
3. Where shown on the plans, the CONTRACTOR shall provide embankment over the pipe above the original ground surface to a height, which will satisfy the minimum depth of cover requirements. Such embankment shall be constructed to the cross section shown on the plans.

B. TRENCH BACKFILL

1. Materials used for bedding and backfill shall be carefully deposited in layers with a depth suitable to the equipment used for compaction. The moisture and compaction shall be per the requirements of Section 02210 Excavation and Embankment, Paragraph 3.02. All backfill material requiring the addition of water shall be wetted and mixed to a uniform consistency prior to placing in the trench.
2. Compaction by flooding will not be permitted.
3. If the backfilled trench has not been tested at required intervals during backfilling, the CONTRACTOR shall provide excavation equipment to dig compaction test holes through each layer of backfill. Compaction tests shall be as required in paragraph 3.03 of this Section. Should tests fail, the CONTRACTOR shall remove all trench backfill above the failed lift and rework to passing moisture and compaction in the area of deficiency. ENGINEER shall determine the area of deficiency. All work required to bring the failed test area into specification shall be at the CONTRACTOR expense. Passing backfill tests only assures the OWNER that the minimum

acceptable level of testing was achieved. The passing tests do not relieve the CONTRACTOR of his responsibility to compact the entire trench and does not relieve his guarantee of the trench as identified in this specification.

4. For graveled streets and alleys the backfill shall be completed by blading the stripped gravel back over the trench and re-compact.
  5. Each service line shall be backfilled and compacted to the same requirements as the main line trench. Each service must have at least one passing compaction test.
- C. CEMENT TREATED FILL PIPE SADDLE
1. Where vertical or horizontal clearance between a water and a sewer line identified in Section 02665 Water Distribution and Transmission Systems and 02700 Sanitary Sewer Systems can not be maintained, the water or sewer line shall be encased in a cement treated fill pipe saddle as shown Standard Detail 02225-01.

### **3.02 COMPACTION**

- A. Bedding material under and around the pipe to six (6) inches above the top of the pipe shall be distributed by hand in maximum layers of six (6) inches and thoroughly compacted. Special care shall be taken to assure complete compaction under the haunches of the pipe.
- B. Backfill material shall be placed in the trench for its full width on each side simultaneously. Compaction of pipe bedding shall be in accordance with this specification.
- C. Cement treated fill may be used at the option of the CONTRACTOR provided it meets the requirements of the ENGINEER. ENGINEER may require certification of mix design and batching ingredients.

### **3.03 TESTING**

- A. The minimum frequency for taking compaction tests shall be three (3) compliance tests for every one hundred fifty (150) lineal feet of Trench Backfill. The three (3) compliance tests on backfill shall be taken at different elevations in the trench. The recommended elevation where the three (3) tests should be taken are one (1) test four (4) feet or more below grade and two tests in the top four (4) feet at approximately two-foot (2) intervals for trenches eight (8) feet in depth or less. For trenches greater than eight (8) feet in depth, at a minimum, an additional test shall be taken for every two (2) feet of additional trench depth. The ENGINEER shall use discretion to access trenches for testing purposes as related to the trench safety precautions that are in place by the CONTRACTOR. It is the CONTRACTOR'S responsibility to provide proper trench safety to allow for access to the testing depth of the trench.

## **PART 4 METHOD OF MEASUREMENT AND BASIS OF PAYMENT**

### **4.01 METHOD OF MEASUREMENT**

- A. STANDARD ITEMS
  1. 02225.01 INSTALL TYPE 1 PIPE BEDDING

This item shall be measured by the number of cubic yards of Type 1 Pipe Bedding placed, moisture conditioned, and compacted.

2. 02225.02 INSTALL TRENCH FOUNDATION

This item shall be measured by the number of tons of Trench Foundation material placed, moisture conditioned, and compacted.

3. 02225.03 INSTALL CEMENT TREATED FILL

This item shall be measured by the cubic yard of cement treated fill placed.

4. 02225.04 INSTALL CEMENT TREATED FILL PIPE SADDLE

This item shall be measured by the numerical count of cement treated fill pipe saddles installed.

## **4.02 BASIS OF PAYMENT**

### **A. STANDARD ITEMS**

1. 02225.01 INSTALL TYPE1 PIPE BEDDING

Payment shall include furnishing and installing the bedding; compacting the bedding; and all labor, equipment, tools and incidentals necessary to complete the item.

2. 02225.02 INSTALL TRENCH FOUNDATION

Payment shall include furnishing and installing the foundation material; compacting the foundation material; and all labor, equipment, tools and incidentals necessary to complete the item.

3. 02225.03 INSTALL CEMENT TREATED FILL

Payment shall include furnishing and installing the cement treated fill; and all labor, equipment, tools and incidentals necessary to complete the item.

4. 02225.04 INSTALL CEMENT TREATED FILL PIPE SADDLE

Payment will be for all materials, including cement treated fill; curing of cement treated fill; excavation and backfill; and all equipment, tools and labor for the performance of all work and incidentals necessary to complete the item.