

**PART 1 GENERAL**

## 1.1 SCOPE:

- A. This item covers all work, equipment and tools necessary for construction of excavated trenches and backfill for buried pipe systems.

## 1.2 DEFINITIONS:

- A. **TRENCH EXCAVATION** - Trench excavation shall be unclassified excavation and shall include all materials that are encountered to the depths as shown on the Plans or as directed by the Engineer.
- B. **TRENCH FOUNDATION** - Trench foundation is defined as the material on the bottom of the trench on which the pipe bedding is to lay and is responsible for the support of the pipeline.
- C. **TRENCH FOUNDATION STABILIZATION** - Trench foundation stabilization is the zone of material, engineered fill, which makes up the trench foundation when liquefaction caused by high pore water pressure occurs in the trench.
- D. **PIPE BEDDING** - Pipe bedding is defined as the furnishing and placing of specified materials on the trench foundation so as to uniformly support the barrel of the pipe. The total bedding depth shall be a minimum of 4-inches unless otherwise specified.
- E. **PIPE ZONE** - Pipe zone is defined as the full width of the trench, and from the top of the bedding to a point 4-inches above the outside zenith of the pipe. Pipes larger than 12-inches may require more than 4-inches and as such will be detailed on Plans.
- F. **TRENCH BACKFILL** - Trench backfill is defined as the furnishing, placing and compaction of material in the trench between the top of the pipe zone material and the bottom of the pavement base rock, ground surface, or surface material as directed.
- G. **SURFACE REMOVAL AND REPLACEMENT** - Surface removal and replacement is defined as the removal and/or replacement of surface material such as topsoil, sod, sidewalks, gravel, etc. which requires special consideration in order to accomplish and restore the trench excavation area as specified.
- H. **GEOTEXTILE FABRIC** - Geotextile fabric is defined as a woven or non-woven fabric manufactured specifically for use in civil engineering applications. Fibers used in the manufacture of geotextiles consist of long chain synthetic polymers. At least 85 percent by weight of the long chain polymers are polyolephins, polyesters, or polyamides.
- I. **AC TRENCH (CAP) REMOVAL & REPLACEMENT** - is defined as asphaltic cement which must be saw-cut, removed, and replaced within right-of-way on road and street surfaces.

**PART 2 PRODUCTS****2.1 TRENCH FOUNDATION STABILIZATION:**

- A. The trench foundation shall be native material in all areas except where ground water or other conditions exist, and in the opinion of the engineer, the native material is such that it cannot support the pipe.
- B. In those conditions, excavation shall be included to additional depths as required and backfilled with crushed rock ranging in size from 2<sup>1</sup>/<sub>2</sub>-inches to 1-inch minus, or pipe bedding material as directed.
- C. If in the opinion of the engineer it is necessary the over excavation shall be lined with a geotextile fabric which conforms to these Specifications.

**2.2 PIPE TRENCH BEDDING AND ZONE:**

- A. Pipe trench bedding and zone material shall be placed as shown on the plans and in accordance with (Type A, B, C, or D as shown on) Standard Detail No.3800-2, and shall consist of one of the following;
  - 1. TYPE A - Bare earth.
  - 2. TYPE B, C, and D -Shall be 1-inch minus crushed aggregate conforming to Section 2300.
  - 3. See Standard Detail 3800-2.

**2.3 PIPE TRENCH BACKFILL**

- A. Trench backfill, as specified on the Plans, shall consist of one of the following;
  - 1. CLASS 1 BACKFILL - Class 1 backfill shall be native or common material, free of deleterious material as approved by the engineer which, in the opinion of the engineer, meets the desired characteristic required for the specific surface loading or other criteria of the backfill zone.
  - 2. CLASS 2 BACKFILL - Class 2 backfill shall the same type and nature as Class 1, above.
  - 3. CLASS 3 BACKFILL - Class 3 backfill shall be imported granular material consisting of gravel or crushed rock, free of deleterious material as approved by the engineer, meeting the requirements of Section 2300. Designated size shall be 1-inch minus, unless otherwise specified.
  - 4. CLASS 4 BACKFILL - Class 4 backfill shall be controlled density fill (CDF), a mixture of portland cement, fly ash, aggregates, water and admixtures proportioned to provide a non-segregating free flowing and excavatable material which will result in a hardened,

dense, non-setting fill. This mixture shall be batched and mixed in accordance with ASTM C 94 and shall further conform to the following:

Portland Cement:	ASTM C 150, Type I or II.
Fly Ash:	Class F or Class C, ASTM C 618.
Aggregates:	ASTM C 33.
Water:	Potable.
Admixtures:	AASHTO M 194 or ASTM C 260.

- B. See Standard Detail 3800-1.

#### 2.4 TOPSOIL:

- A. Topsoil shall be fertile, loamy, natural surface soil consisting of sands, clays and organic matter in combination and free from substances toxic to plant growth, noxious weeds, roots, refuse, sticks and lumps.

#### 2.5 GEOTEXTILE FABRIC:

- A. Fabric shall be woven geotextile fabric and as specified in SECTION 2200, "Geotextiles and Fabrics", of these Specifications.

#### 2.6 AC TRENCH CAP:

- A. Existing asphaltic cement material overlying trench excavation shall be replaced with Type "C" bituminous hot-mix as specified in Section 2400 after trench has been satisfactorily backfilled and compacted.
- B. See Standard Detail 3800-5.

### PART 3 EXECUTION

#### 3.1 CLEARING THE RIGHT-OF-WAY:

- A. Where clearing of the right-of-way is necessary, it shall be completed prior to the start of the trenching. Trees and brush shall be cut as near to the surface of the ground as feasible and piled for disposal. Disposal by burning shall conform to DEQ requirements, unless otherwise directed by the engineer. The contractor shall observe all Federal and State laws relating to fire permits and local regulations relating to burning such materials. Daily burning info may be obtained by calling 503.982.0011.
- B. Existing trees or tree limbs whether on public or private property, are not to be removed without permission from the engineer.

- C. Contractor shall call for locates of all underground utilities prior to excavation beginning. A spotter shall be utilized during all excavations to ensure protection of marked and potentially unmarked utilities. Reference Article H.3 of the General Conditions.
- D. Contractor shall adhere to Article H.4 of the General Conditions in regards to protecting the environment and public from construction pollutants.
- E. All excavations within the right-of-way shall be covered at the end of each workday to protect persons and property.

### 3.2 OBSTRUCTIONS:

- A. This item refers to obstructions which may be removed and do not require replacement. Obstructions to the construction of the trench such as but not limited to stumps, abandoned piling, abandoned structures, logs, rubbish, and debris of all types shall be removed by the contractor at his own expense without additional compensation from the owner.
- B. The engineer will, if requested by the contractor, make changes in alignment to avoid major obstructions if such alignment changes can be made without adversely affecting the intended functioning of the facility.
- C. Refer to Article E.8 of the General Conditions for other obstructions.

### 3.3 AC TRENCH CAP:

- A. All bituminous and concrete pavements, regardless of the thickness, shall be saw cut, to a vertical face, prior to excavation of trenches with a concrete saw. Width of the pavement cut shall be at least six (6) inches greater than the required width of the trench at ground surface on each side. Pavement removed during excavation shall be piled separately from the earth spoil and removed from the site, to a "Permitted" landfill, or recycle plant, and shall not be used in backfilling the trench.
- B. Bituminous asphalt mix shall be handled, mixed, placed, and compacted as specified in Section 2400.
- C. Trench surface (backfill surface) shall be leveled and compacted by means of a vibratory compactor to a depth of 2.5-inches (Min., or to existing thickness) below the existing finished grade. Backfill shall be compacted as specified on the Plans.

### 3.4 TRENCH WIDTH

- A. Width of trenches in which pipe is to be laid shall be twenty-four-inches (24") greater than the outside diameter of the pipe (1-ft. each side of the O.D.), except by permission of the engineer; and

- B. Trench width shall not extend outside dedicated rights-of-way for public thoroughfares or beyond the limits of the construction easement.

### 3.5 LINE AND GRADE:

- A. The bottom of the trench shall be carried to the lines and grades shown on the Plans or as established by the Engineer, with proper allowance for pipe thickness and for gravel cushion or special bedding when required. Any part of the trench over-excavated below grade shall be corrected with material of the type approved by the engineer, for the full width of the trench and thoroughly compacted layers not to exceed 8-inches, to the established grade and at the Contractor's expense.

### 3.6 DEWATERING:

- A. Dewatering shall conform to the requirements as outlined in Article H.6 of the General Conditions of the City of Woodburn, OR.

### 3.7 SHORING:

- A. Shoring, sheeting and bracing of trenches and pits shall conform to Article H.5 of the General Conditions of the City of Woodburn, OR.

### 3.8 LOCATION OF THE EXCAVATED MATERIALS:

- A. During trench excavation, the contractor shall locate the excavated material so it will not obstruct a traveled roadway or street. Unless otherwise approved by the engineer, all streets and roadways shall be kept open to at least one-way traffic.
- B. If excavated material is to be reused it shall be kept free from debris and covered by tarp(s), if necessary, to prevent excessive drying and/or saturation.

### 3.9 FOUNDATION STABILIZATION:

- A. In the event that unforeseen native material at the trench foundation is unsuitable for structural support of the pipe, the contractor shall notify the engineer immediately.
- B. When, in the opinion of the engineer, the material in the bottom of the trench is unsuitable for supporting the pipe, the contractor shall excavate from below the flow line, and to a depth, as directed by the engineer. Contractor shall place geotextile fabric in the trench bottom and backfill with material the Engineer deems necessary to comply with these specifications.

### 3.10 PIPE TRENCH, BEDDING AND ZONE:

- A. TYPE A - Cut trench to native material at grade and place pipe barrel on grade. Remove material to allow for flange and/or bell to rest below grade line. If bed is cut too deep and native material must be replaced it shall be compacted to a firm state as approved by the engineer.

- B. TYPE B - Cut trench to native material to depth indicated on Plans. Place crushed aggregate to pipe grade and compact to 95-percent of AASHTO T-99. Place pipe. Remove material at bells of pipe. Ensure no annular space is left and barrel is fully supported.
- C. TYPE C - Cut trench to native material to depth indicated on Plans. Place crushed aggregate to pipe grade and compact to 95-percent of AASHTO T-99. Place pipe. Remove material at bells of pipe. Chink or tamp in final lift of aggregate to spring line of pipe. Ensure no annular space is left and barrel is fully supported.
- D. TYPE D - Cut trench to native material to depth indicated on Plans. Place crushed aggregate to pipe grade and compact to 95-percent of AASHTO T-99. Place pipe. Remove material at bells of pipe. Chink or tamp in final lift of aggregate to top of pipe zone. Ensure no annular space is left and barrel is fully supported.

### 3.11 TRENCH BACKFILL:

- A. CLASS 1 BACKFILL - The trench shall be backfilled with loose native or approved equal. The fill shall be brought to the surface with a 2-inch minimum crown to allow for future settlement.
- B. CLASS 2 BACKFILL - The trench shall be backfilled with native material or approved equal, compacted, in 8-inch maximum lifts, by mechanical means and brought to surface with a 2-inch min. crown for future settlement.
- C. CLASS 3 BACKFILL - The trench above the pipe zone shall be backfilled with clean, well-graded, coarse to fine, 1-inch minus crushed rock compacted in 8-inch lifts in conformance to 95-percent of AASHTO T-180.
- D. CLASS 4 BACKFILL - Controlled density backfill shall be placed at a rate that allows handling of material to ensure that no voids are created. Material shall be vibrated or rodded into place.

### 3.12 DISPOSAL OF EXCAVATED MATERIAL:

- A. Excavated material in excess of that needed to complete the work shall be disposed of at no expense to the Owner.
- B. All waste material shall be deposited in an approved and/or "Permitted" landfill as defined herein.

### 3.13 PRESERVATION OF EXISTING IMPROVEMENTS:

- A. The Contractor shall conduct operations in a manner that will protect any and all existing facilities in accordance with Article E(8) of the General Conditions and as directed by the Engineer.

**3.14 EXCAVATION OF EXISTING FACILITIES:**

- A. The Contractor shall remove remaining ends of abandoned pipes or portions of other items partially removed under this work, which would be left, exposed on side slopes or at subgrade, to a minimum of 1-foot beyond or below the finished slope or subgrade. Abandoned pipes shall be capped or plugged watertight.

**3.15 MEASUREMENT AND PAYMENT:**

- A. Payment will be on the field measured quantities as outlined in the Bid and as broken down to Type of bedding and class of backfill differentiated by the following depths;

0 - 6 feet  
6 - 10 feet  
10 - 14 feet  
14 - 18 feet  
18 - 22 feet  
Over 22 feet

**PART 4 TESTING****4.1 GENERAL**

- A. At the direction of the engineer a sample of material(s) shall be taken and tested by a qualified/certified testing laboratory for specified properties
- B. At the direction of the engineer any and all backfill, pipe bedding & zone material, and foundation stabilization material shall be tested for in-place quality and specified tolerances.
- C. HMA trench cap material shall be tested by a certified lab and in accordance with Section 2400.

END OF SECTION