

## SECTION 13 1106 – WATER FEATURE TRENCHING

**PART 1 - GENERAL****1.1 SUMMARY****A. This section includes the following:**

1. Excavating Trenches for piping from 5-feet (1.5m) outside building to project limits.
2. Compacted fill from top of pipe bedding to subgrade elevations.
3. Backfilling and Compaction.

**B. Related Sections:**

1. SECTION 13 1101 – WATER FEATURE EARTHWORK
2. SECTION 13 1102 – WATER FEATURE GEOSYNTHETICS FOR EARTHWORK
3. SECTION 13 1103 – WATER FEATURE GRADING AND EXCAVATION
4. SECTION 13 1104 – WATER FEATURE DEWATERING
5. SECTION 13 1105 – WATER FEATURE FOUNDATION DRAINAGE
6. SECTION 13 1107 – WATER FEATURE BACKFILLING
7. SECTION 13 1108 – WATER FEATURE EROSION AND SEDIMENTATION CONTROL
8. SECTION 13 1303 – WATER FEATURE MEMBRANE LINER
9. SECTION 13 1401 – WATER FEATURE PIPE AND FITTINGS

**C. References:**

1. Site specific Geotechnical Report – Bore Hole Locations and Findings of Subsurface Materials
2. ASTM C136 – STANDARD TEST METHOD FOR SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES
3. ASTM D1556 – STANDARD TEST METHOD FOR DENSITY AND UNIT WEIGHT OF SOIL IN PLACE BY THE SAND-CONE METHOD
4. ASTM D1557 – STANDARD TEST METHOD FOR LABORATORY COMPACTION CHARACTERISTICS OF SOIL USING MODIFIED EFFORT
5. ASTM D 2167 – STANDARD TEST METHOD FOR DENSITY AND UNIT WEIGHT OF SOIL IN PLACE BY RUBBER BALLON METHOD
6. ASTM D6938 – STANDARD TEST METHOD FOR DENSITY OF SOIL AND SOIL-AGGREGATE IN PLACE BY NUCLEAR METHODS (SHALLOW DEPTH)
7. Standard Specifications for local jurisdictions

**1.2 UNIT PRICE – MEASUREMENT AND PAYMENT**

- A.** Excavating Subsoil Materials: By the cubic yard (meter). Includes general excavation to required elevation, loading and placing materials in stockpile and removing from the site.
- B.** Over Excavating: Payment is not made for over excavation work nor for replacement materials.

**1.3 DEFINITIONS**

- A.** Utility: Any buried, pipe, duct, conduit, or cable.

**1.4 FIELD MEASUREMENTS**

- A.** Verify that survey benchmarks, control points, and intended elevations for the Work are as shown on the Contract Documents.

**1.5 COORDINATION**

- A.** Coordinate the Work as per the Project Specifications and referenced sections.
- B.** Verify the Work associated with lower elevation utilities is complete before placing higher elevation utilities.
- C.** The Contractor shall coordinate the installation of all utility Work with the water feature Work.

- D. It is the responsibility of the Contractor to make all connections to Work that is already in place and to coordinate such connections with all other parties.

**PART 2 - PRODUCTS****2.1 FILL MATERIALS**

- A. Fill Type S1: As specified in SECTION 13 1101 – WATER FEATURE EARTHWORK.
- B. Structural Fill Type A: As specified in SECTION 13 1101 – WATER FEATURE EARTHWORK.
- C. Concrete: Lean concrete conforming to SECTION 03 3000 – STRUCTURAL CONCRETE Type C with a compressive strength of 2,500 psi (11.9 kPa).

**2.2 ACCESSORIES**

- A. Geotextile Fabric: As specified in SECTION 13 1102 – WATER FEATURE GEOSYNTHETICS FOR EARTHWORK.
- B. Filter Fabric: As specified in SECTION 13 1105 – WATER FEATURE FOUNDATION DRAINAGE.

**PART 3 - EXECUTION****3.1 PREPARATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. Protect plant life, improvements, and other on-site features to remain as a portion of the final landscaping.
- C. Protect benchmarks, existing structures, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- D. Maintain and protect above and below grade utilities.
- E. Cut out soft areas of subgrade not capable of compaction in place. Backfill with coarse aggregate (Type A) and compact to a density equal or greater than requirements for subsequent backfill material.

**3.2 EXCAVATING**

- A. Excavating subsoil required for utilities in accordance with local governing agencies requirements.
- B. Cut Trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with the Work.
- C. Do not interfere with the 45-degree bearing splay of foundations.
- D. Hand trim excavations. Hand trim for bell and spigot pipe joints. Remove loose matter.
- E. Correct areas over excavated in accordance with SECTION 31 2316.
- F. Stockpile excavated material in area designated on site and remove excess material not being reused from the site.
- G. The execution and preparation of trenches shall not proceed in advance of pipe installation more than 50-feet (15m), except as approved by the Owner. Trenching shall not, under any conditions, exceed the quantity of pipe that can be bedded, inspected, tested, backfilled, and compacted in one (1) working day.
- H. Excavation near existing utilities shall be performed in such a manner so as to prevent damage to the utilities.
- I. The sides of trenches shall be kept as nearly vertical as possible from the trench bottom to a level 12-inches (300mm) above the top of pipe.

- J. The trench bottom shall be associated to true line and grade and shall not be less than 24-inches (600mm) wide, nor more than 24-inches (600mm) wider than the outside diameter of the pipe, so that a clean space from 9- to 12-inches (225 to 300mm) is provided on each side of the pipe.
- K. The Contractor shall furnish, install, and maintain sheeting, bracing, and shoring as required to support the sides of the excavation, and to prevent any movement that may damage adjacent utilities, or structures, damage or delay the Work, or endanger life and health. All voids outside the supports shall be immediately filled and compacted.

### 3.3 BACKFILLING

- A. Backfill trenches to the contours and to the elevations indicated on the Contract Documents with unclassified fill materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- C. Coarse Aggregate (Type A): Place and compact materials in equal continuous layers not exceeding 8-inches (200mm) compacted depth.
- D. Unclassified Fill: Place and compact materials in equal continuous layers not exceeding 8-inches (200mm) compacted depth.
- E. Employ a placement method that does not disturb or damage foundation perimeter drainage, or utilities in the trench.
- F. Maintain optimum moisture content of each layer of fill materials to attain required compaction density. Add water by uniform sprinkling.
- G. Remove surplus fill materials from the site.
- H. Leave fill material stockpile areas completely free of excess fill materials.

### 3.4 TOLERANCES

- A. Top Surface of Backfilling under Paved Areas: Plus, or minus 0.04-feet (12mm) from required elevations.
- B. Top Surface of General Backfilling: Plus, or minus 0.08-feet (25mm) from required elevations.

### 3.5 FIELD QUALITY CONTROL

- A. Comply with Project Specifications and referenced sections.
- B. Compaction testing shall be performed in accordance with ASTM D1556, ASTM D1557, ASTM D2167, and ASTM D6938.
- C. If testing indicates that the Work does not meet specified requirements, remove the Work, replace, compact, and retest.
- D. Frequency of Tests: one (1) test per 100-feet (30m) of trench.

### 3.6 PROTECTION OF FINISHED WORK

- A. Protect finished work as per the Project Specifications and referenced sections.
- B. Reshape and re-compact fills subjected to vehicular traffic during construction.

### 3.7 SCHEDULE

- A. Water Feature Piping: Cover pipe and bedding with Type S2, in 8-inch (200mm) lifts, compacted to 95-percent.

END OF SECTION