



DIVISION 7

Standards
for
Aggregates, Trenching, Backfill,
& Restoration

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7-1.000 GENERAL

The Contractor shall complete the installation of all furnished materials in accordance with the Construction Drawings and Standard Details, Specifications and in accordance with all State, District and other local regulatory authority requirements. The more stringent Standard or requirement shall apply unless agreed to by the District.

7-2.000 AGGREGATES

- A. Foundation Gravel: Comply with Section 9-03.17 of WSDOT Standard Specifications for Class "A".
- B. Bedding Material for Rigid Pipe (DI):
 - a. Sewer: Bedding shall be classified as pea gravel as shown in "Pea Gravel" this section.
 - b. Water: Bedding shall comply with Section 9-03.12(3) of WSDOT Standard Specifications.
- C. Bedding Material for Flexible Pipe (PVC, HDPE): For all sewer lines, pipe bedding shall be classified as pea gravel as shown below. For water lines, pipe bedding shall be classified as pea gravel as shown below, or Section 9-03.13 of WSDOT Standard Specifications as required by the District.
- D. Bedding Material for Copper Tubing: Shall be classified as clean, rock free sand.
- E. Bank Run Gravel for Trench Backfill: Bank run gravel for trench backfill material shall conform to Section 9-03.19 of the WSDOT Standard Specifications.
- F. Pea Gravel: Bedding shall consist of screened sand, gravel or other inert materials, or combinations thereof, from sources approved by the District, and shall have hard, strong, durable particles free from adherent coatings. The material shall be washed thoroughly to remove clay, loam, alkali, organic matter, or other deleterious substances and shall meet the flowing test requirements.

Sieve Size	Percent Passing
3/4"	100%
3/8"	80-100%
#8	0-10%
#200	0-3%

- G. Recycled Concrete: Recycled concrete products will typically not be allowed in District utility trench lines. Request to use recycled concrete shall include corrosivity/resistivity testing results, gradation of material proposed and compaction testing procedures must comply with District standards. Where significant ground water is present or above metallic pipe lines, the use of recycled concrete products is highly unlikely. Prior approval of use is required from the District and the jurisdictional authority.

H. Recycled Hot Mix Asphalt (HMA): Recycled HMA may be allowed as hot patch subgrade (not entire trench backfill) only if gradation and material, including compaction testing procedures comply with District standards. Prior approval of use is required from the District and the jurisdictional authority. Reuse of cold mix will not be allowed.

7-2.010 Control Density Fill (CDF)

CDF is a self compacting, cementitious, flowable material requiring no subsequent vibration or tamping to achieve consolidation. CDF shall be designed to have minimum 28-day strength of 50 psi and maximum 28-day strength not to exceed 300 psi. The CDF consistency shall be flowable (approximate slump 3 to 10 inches). A sample mix design can be found in Snohomish County's EDDS, Chapter 8, section 7.

For protection of metallic pipes beneath CDF refer to standard 7-03.070 (f) of this section.

7-3.000 TRENCHING AND BACKFILL

7-3.010 General

The following trenching and backfill specifications and requirements apply to all water and sewer utility installations within the District. These standards represent the minimum requirements. Jurisdictional or other requirements shall apply in all cases when those standards and requirements exceed these minimums.

The location of the pipe shall be shown on the Construction Drawings and field adjusted as approved by the District. During trenching, installation of pipelines and appurtenances and the placing of backfill, the trenches shall be kept free of water. The Contractor shall furnish all equipment necessary to dewater the trench and shall dispose of the water in such a manner as not to cause a nuisance or menace to the public and in accordance with State and local jurisdictional requirements.

All trench excavations shall have adequate safety systems for the trench excavation that meet the requirements of the Washington Industrial Safety and Health Act, Chapter 49.17 RCW. The Contractor shall be fully responsible for providing the necessary back sloping, shoring, cribbing, trench boxes, etc., as required to meet the specific safety requirements for the trench.

The Contractor's attention is called to the depth of the structures and pipe which may require special shoring and bracing. The Contractor shall furnish all shoring and bracing or sheeting required to perform and protect the trench and to safeguard the workers. The Contractor shall follow all Federal and State regulations for trenching and backfill. No timber bracing, lagging, sheathing or other lumber shall be left in any excavation.

The volume excavated that will be displaced by the pipe, bedding material and backfill shall be loaded, hauled and disposed of in a manner selected by the Contractor and approved by Snohomish County or other agency having jurisdiction. The Contractor shall be responsible for obtaining any City, County, State or other agency permits for such disposal sites and shall pay all fees and charges associated therewith.

Trench backfill material above the piping and bedding material shall be bank run gravel or select native material. Material shall require approval by the Contractor's geotechnical consultant and the District prior to using. Excavation and backfill compaction shall be performed in accordance

with standard construction practices to achieve the required compaction. Compaction and acceptance shall be subject to approval of the jurisdictional authority and the District.

Backfill compaction shall occur in sufficiently thin lifts to achieve the density requirements specified. Such compaction shall be performed to within 6-inches of existing road grade. In areas of existing pavement, after placing a tack coat on the existing asphalt edges, the final patch shall be constructed in accordance with Standard Detail TBR-2 using a minimum of 6-inches of hot mix asphalt (HMA) class ½ or ¾ inch, or 4-inches of HMA class 1 inch and 2-inches of HMA class ½ or ¾ inch placed in the trench up to finished grade or in accordance with jurisdictional requirements and whichever is more stringent shall apply.

Where the undisturbed conditions of natural soils are inadequate for support of the planned construction, excavation shall be extended 8-inches minimum below the structure or pipeline grades to permit the placing and compacting of foundation gravel. All natural soils inadequate for support of planned construction shall be removed to the depth of natural soils adequate for support.

Trench cross-sectional width shall conform to the trench details shown on the Construction Drawings and Standard Details.

Trench dams shall be installed across the entire trench section and to the full depth of all granular backfill materials in all areas where excessive amounts of water can enter and follow the trench line including steep slopes, stream and wetlands crossings and as determined by the District and other local governmental authorities. See Standard Detail TBR-4 in Division 7.

Testing frequency shall comply with section 7-3.040. Areas that fail to pass testing shall require retesting at locations determined by the District.

7-3.020 Evaluation of Native Soil

The Contractor's geotechnical consultant shall complete a thorough evaluation of native soil. Soil evaluations, sieve analysis and proctor tests shall be completed prior to and during construction for varying soil conditions as determined by the geotechnical consultant. The geotechnical consultant shall verify that material can achieve compaction under varying weather conditions. At any time native materials are determined to be unsuitable to obtain compaction or do not meet specified gradation, imported materials shall be provided in accordance with the specifications. Material source shall be provided and approved by the District. All acceptance tests shall be conducted from in-place samples. Compaction testing shall be accomplished using a nuclear densometer. Compaction testing results sent to the District shall include a copy of the material proctor results and the precise location of area tested by referencing the horizontal and vertical location on Construction Drawings.

Metallic pipe installed through sewer drain fields, live or abandoned, is required to be protected against corrosion. For protection of metallic pipes in these areas, refer to standard 7-03.070 (f) of this section.

7-3.030 Installation

Prior to excavation and installation, equipment capable of achieving adequate compaction shall be on site. Backfill and compaction shall be completed in conjunction with the pipeline installation. Prior to the District accepting the water and/or sewer mains for use and operation, compaction testing showing adequate compaction shall be verified by the District. The District highly recommends that compaction testing be completed in conjunction with the installation of backfill and compaction. Copies of compaction testing, reports, soils analysis and proctor tests shall be provided to the District to verify compaction requirements prior to pressure testing.

- A. Utility Trenches in the Existing Right-of-Way: Trench backfill material and compaction shall conform to the jurisdictional requirements of the Entity/Owner of the existing right-of-way or follow the District Standards, and whichever is more stringent shall apply.
- B. Utility Trenches in Proposed or Existing Traffic Areas, including Driveways Easements: All trench backfill shall be mechanically compacted to 95 percent of maximum density in accordance with ASTM 1557 (modified proctor).
- C. Utility Trenches in Non-Paved, Non-Structured Areas and Designated Wetlands: All trench backfill shall be mechanically compacted to 90 percent of maximum density in accordance with ASTM 1557 (modified proctor). Compaction testing as specified in Section 2-03.3(14) D of the WSDOT/APWA Specifications and as specified by the local jurisdiction, shall be required.
- D. Utility Trenches in Areas Near Structures: Existing and proposed structures located within a 1:1 slope from bottom of the trench excavation to the projection of the slope to finished grade shall be deemed as lying in the "Zone of Influence" of the excavation and the trench in the easement area within the zone of influence shall be backfilled with flowable CDF from the top of bedding to a depth that the structure is outside the zone of influence.
- E. Utility Trenches Under Existing Water Mains: Additional care must be taken when excavating around existing water pipe lines under pressure. Pipes must be supported during excavation adequately to prevent failure, sag, or breakage within the area of the new trench line. Existing cast iron pipe lines must have the trench below the pipe backfilled with flowable CDF to prevent future shear. Wrap the cast iron line in plastic sheeting with a minimum thickness of 8 millimeters and fill trench line to bottom of pipe but no higher than spring line.

7-3.040 Frequency of Testing

- A. Horizontally: Minimum of two locations every 200 feet of trench, or a minimum of two locations per day or a minimum of 2 locations per pipe run between manholes and/or valves whichever is more frequent shall apply.

Additional tests may be required when variations occur due to the Contractors operations, weather conditions, site conditions, etc.

- B. Vertical testing shall use the deepest portion of the trench line to determine minimum testing depths as follows

For trenches 12-feet and under; complete a minimum of one test at approximately one half of the trench depth and an additional test at or near the surface

For trenches 12-feet to 16-feet deep; complete one test at approximately 4-feet above the pipe, one test at or near the surface and one test approximately halfway in between.

For trenches greater than 16-feet deep; complete tests at approximately four foot intervals above the pipe to the surface (four tests required) or as directed by the District.

Structured areas, such as an easement near a building, shall require additional testing in the zone of influence from the licensed geotechnical consultant such that the compaction shall not adversely affect the nearby or surrounding structures.

If compaction does not meet the minimum standards required, additional excavation and testing as directed by the District shall be completed. The District reserves the right to require additional testing in areas that are questionable.

Compaction testing costs are the responsibility of the Contractor. Copies of all testing reports shall be provided to the District for verification and project records and jurisdictional approvals.

7-3.060 Restoration

The Contractor shall prepare and restore all test sites with his own equipment, labor and materials. All costs incidental to the preparation and restoration of all test sites shall be at the Contractor's expense. The Contractor shall remedy, at his expense, any defects that appear in the backfill prior to final acceptance of the work.

Upon completion of work each day, all open trenches shall be completely backfilled and leveled. In paved areas, temporarily patch with 3 inches of cold mix asphalt concrete (or as specified by the regulatory authority) except in areas designated for Control Density Fill (CDF). Where CDF is used it shall be placed in accordance with the jurisdictional authority. Trenches not backfilled at the end of the day may be covered with steel plates or other materials providing safety and protection for the public and as approved by the jurisdictional authority. Prior to placing CDF over ductile iron pipe or fittings, the pipe bedding material around the pipe shall be placed and compacted.

7-3.070 Soil Amendments

Use of soil amendments in District utility trenches shall be approved by the District prior to placement. The District reserves the right to deny use of soil amendments at the District's discretion. Soil amendments used without prior approval from the District shall be removed at the Contractor's cost.

Amendments to soil such as kiln dust will be considered by the District if:

- a. The recommendation is made by the Contractor's geotechnical consultant.
- b. The amendment shall be used the entire trench depth. (Bridging lower portions of trench line shall not be allowed).
- c. The metallic pipes shall be wrapped using American V-Bio Poly Encasement or equal and the pipes bedded (covered) with 6" of untreated material under the amended soils or CDF and in areas of abandoned or live sewer drain fields.

- d. The geotechnical consultant verifies the proposal complies with the jurisdictional authority requirements if applicable.
- e. The Contractor takes full responsibility for any impacts placed on surrounding areas.
- f. Results of a corrosivity/resistivity test on native soil with the proposed amendment ratio are provided to the District. Results of this test may require additional measures to protect metallic pipes from corrosion such as cathodic protection.

If amendments are approved by the District, the geotechnical consultant shall witness and document the mixture of the additive. Compaction tests that meet these standards shall be required at the frequency and depths specified.

Quarry spall and fabric are not an approved soil amendment.

7-4.000 PERMANENT PAVEMENT REPAIR

Pavement repair shall follow the governing jurisdictional authority when in the right-of-way. The District's standards are to be followed in the easements. Where Standards differ, the most stringent shall apply as determined by the District.

- A. Asphalt Concrete Pavement Repair. Asphalt concrete pavement repair shall be asphaltic concrete pavement HMA class $\frac{1}{2}$ or $\frac{3}{4}$ and shall conform and be placed in accordance with the requirements of Section 4-06 and 5-04 WSDOT. Before pavement is placed, all edges and joints of asphaltic concrete pavement shall be tacked with:
 - 1. Asphalt Sealer SS 1 or equal.
 - 2. After pavement is in place, all joints shall be sealed with hot asphalt cement, AR 4000 Grade and sand placed on sealant to prevent tracking by vehicles.