Chapter 7

GENERAL CONSTRUCTION SPECIFICATIONS FOR CONVEYANCE SYSTEMS

Chapter 7

GENERAL CONSTRUCTION SPECIFICATIONS FOR CONVEYANCE SYSTEMS

7.01 General Provisions

The specifications contained in this Chapter, together with Oregon Department of Environmental Quality and U.S. Environmental Protection Agency standards and any other applicable requirements of the District and City, shall govern the character and quality of material, equipment, installation and construction procedures for gravity flow portions of public sanitary sewer and storm systems. Each city or county which operates a Local Program may adopt regulations stricter than specified in this Chapter for their Local Program.

7.01.1 Scheduling

a. Sequence of Operations
The Contractor shall plan and execute construction work to cause a minimum of interference to the operation of existing District and City facilities. It may be necessary to do certain parts of the construction work outside normal working hours in order to avoid undesirable conditions, and it shall be the obligation of the Contractor to make this change to the work schedule. This scheduling, however, is subject to the District or City approval, and does not relieve the Contractor from making its work available for inspection.

Connections between existing work and new work shall not be made until necessary inspections and tests have been completed on the new work and it is found to conform in all respects to the requirements of the plans and specifications, unless otherwise approved by the District or City.

b. Progress of Construction
Construction shall proceed in a systematic manner that will result in minimum inconvenience to the public. Construction staking for the work being performed shall be completed prior to the start of excavation. The Contractor shall limit its operations to a small length of work area per crew. At no time shall the trenching equipment be farther than 300 feet ahead of the pipe laying crews, unless advance written permission is given by the District or City. The trench shall be backfilled so that no section of trench is left open longer than 24 hours. Trenches located in a right-of-way shall be completely backfilled before the Contractor leaves the site for the day unless the trench is adequately secured with steel plates.

Cleanup of all construction debris, excess excavation, excess materials, and complete restoration of all fences, mail boxes, ditches, culverts, signposts, and similar items shall be completed immediately following the

final backfilling of the trench.

Any area disturbed by the Contractor's operations inside dedicated easements shall be restored to its original condition. Any area that is disturbed by the Contractor's operations outside the dedicated easement shall be restored to the Property Owner's satisfaction.

7.01.2 Preservation, Restoration, and Cleanup

a. Site Restoration and Cleanup
The Contractor shall keep the premises clean and orderly at all times during the work and leave the project free of rubbish or excess materials of any kind upon completion of the work. During construction, the Contractor shall stockpile the excavated trench materials so as to do the least damage to adjacent lawns, grassed areas, gardens, shrubbery, trees, or fences, regardless of the ownership of these areas. All excavated materials shall be removed from these areas, and these surfaces shall be left in a condition equivalent to their original condition and free from rock, gravel, boulders, or other foreign material. The Contractor shall replace topsoil areas over all trenches with a minimum finished depth of 12 inches of topsoil. All existing drainage ditches and culverts shall be reopened and graded, and original drainage restored. All damaged irrigation and house drainage pipe, drain tiles, sanitary sewer or storm laterals, and culverts shall be repaired expeditiously. The finished surface shall conform to the original surface and shall be free-draining, free from holes, rough spots, or other surface features detrimental to a seeded area.

b. Preservation of Irrigation and Drainage Ditches
Following the backfill of the trenches, the Contractor shall restore all public and private irrigation and storm drain ditches that have been destroyed, damaged, or otherwise modified during construction to the condition equal to or better than the condition of the ditch before construction, and as approved by the District or City. Ditches shall be built in their original locations unless otherwise redesigned as part of the project.

c. Stream and Creek Crossings
The Contractor shall comply with all provisions of the permits required by the Oregon Division of State Lands, the U.S. Army Corps of Engineers, Washington County, the District and any other agencies having jurisdiction.

7.01.3 Interferences and Obstructions

a. General
Various obstructions may be encountered during the course of the work.

Maps and information regarding underground utilities shall be obtained from the utility owning and operating such utilities, but the location of such utilities is not guaranteed. A minimum of 48 hours notice shall be given to all utility offices that may be affected by the construction operation. The contractor shall comply with the Oregon "locate law" ORS 757.557. If services of any utility are interrupted due to the construction operation, the proper authority shall be notified immediately.

b. Protection
The Contractor shall exercise all due care in protecting property along the route of the improvement. This protection shall include, but not be limited to, trees, yard, fences, drainage lines, mail boxes, driveways, shrubs and lawns. If any of the above has been disturbed, they shall be restored to as near their original condition as possible.

7.01.4 Permanent Survey Monuments

The Contractor shall not disturb permanent survey monuments, property corners, stakes or benchmarks without prior written consent of the appropriate county surveyor. It shall be the responsibility of the Contractor to protect such survey markers. Survey markers which are disturbed or lost shall be replaced by a registered land surveyor. When a change is made in the finished elevation of the pavement, or any roadway in which a permanent survey monument is located, the monument cover shall be adjusted to the new grade.

7.02 Trench Excavation and Backfill

7.02.1 Definitions

a. Trench Excavation
Trench excavation is the removal of all material encountered in the trench to the depths shown on the plans or as directed by the District or City.

b. Trench Foundation
The bottom of the trench on which the pipe bedding is to lie. The trench foundation provides the support for the pipe.

c. Pipe Bedding
The furnishing and placing of specified materials on the trench foundation to uniformly support the barrel of the pipe from the trench foundation to the springline of the pipe.

d. Pipe Zone
The full width of the trench from six inches above the top outside surface of the barrel of the pipe to the springline of the pipe.

e. Spring Line
Halfway up the sides of the pipe when it has been laid on the pipe bedding.

f. Trench Backfill
The furnishing, placing, and compacting 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 materials as directed.

g. Native Material
Earth, gravel, rock, or other common material free from humus, organic matter, vegetative matter, frozen material, clods, sticks, and debris, isolated points or areas, or larger stones which would cause fracture or denting of the structure or subject it to undue stress.

7.02.2 Materials

a. Trench Foundation
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 bedding and pipe. In those conditions, geotextile fabrics approved by the District or City shall be installed or the unsuitable material shall be removed as required and the trench backfilled with approved crushed aggregate.

b. Pipe Bedding
Pipe bedding material shall be clean crushed rock with a maximum size of 3/4 inch, uniformly graded from coarse to fine or as approved by District or City.

c. Pipe Zone
The pipe zone material shall consist of approved bedding material except when using reinforced concrete pipe, ductile iron pipe or C 900 pipe, where native material, i.e. earth, gravel, rock, or combination thereof may be used. All pipe zone materials shall be subject to the District or City approval.

d. Trench Backfill
Above the pipe zone will be divided into the following classifications:

1. Class A Backfill. Class A backfill shall be native or common material, which in the opinion of the Engineer meets the desired characteristics required for the specific surface loading.
2. Class B Backfill. Class B backfill shall be clean crushed rock with a maximum size of 3/4 inch, uniformly graded from coarse to fine or as approved by District or City.

e. Geotextile Fabric
The geotextile fabric used in trench stabilization shall be lightweight, nonwoven filter fabric, such as Mirafi 140N or equal, for unstable soil conditions. High strength woven filter fabric (Mirafi 600x or equal) may be used for highly unstable soil conditions. The Engineer shall select the appropriate fabric based on the soil conditions.

7.02.3 Construction

a. Excavation

1. Clearing the Right-of-Way
Clearing shall be completed prior to the start of trenching. Brush shall be cut as near to the surface of the ground as practicable and removed to a disposal site approved by the District or City. The Contractor shall observe all federal, state, and local laws relating to fire permits, burning materials and other requirements. Under no condition shall brush be covered by excavated materials prior to being cleared and removed.

Excavated material shall be placed at locations and in such a manner that it does not create a hazard to pedestrian or vehicular traffic, nor interfere with the function of existing drainage facilities.

2. Open Trench Limit
The length of the open trench shall always be kept to a minimum. The District or City shall determine the amount of open trench allowed based upon work conditions of the area. In normal cases, the open trench length shall not exceed 300 feet. Related trench construction such as pavement, road gravel, concrete restoration, etc., shall be completed within 800 feet of the open trench limit unless otherwise authorized.

3. Trench Width
The trench width at the surface of the ground shall be kept to a minimum necessary to install the pipe in a safe manner. In all cases, trenches shall be of sufficient width to allow for shoring, proper joining of the pipe, and backfilling of material along the sides of the pipe. The minimum trench width in the pipe zone shall provide a clear working space of six inches outside the maximum outside diameter of the pipe.

No maximum width of trench at the top of the pipe is specified in this Chapter. When required by design, the maximum trench width shall be shown on the plans. If the maximum width shown is exceeded by

the Contractor without written authorization, the Contractor will be required to provide pipe of a higher strength designation, a higher class of bedding, or both, as approved by the District or City. Excavation for manholes and other structures shall be wide enough to provide a minimum of 12-inches between the structure's surface and the sides of the excavation.

b. Installation

1. Shoring
The Contractor shall provide all materials, labor, and equipment necessary to adequately shore trenches to protect the work, existing property, utilities, pavement, etc., and to provide safe working conditions in compliance with all OSHA requirements. That portion of cribbing or sheeting extending below the springline of rigid pipe or below the crown elevation of flexible pipe shall be left in place unless satisfactory means of consolidating bedding or side support, disturbed by cribbing or sheeting removal, can be demonstrated. If a movable box is used in lieu of cribbing or sheeting and the bottom cannot be kept above the springline of the crown elevation of flexible pipe, the bedding or side support shall be carefully reconsolidated behind the movable box prior to placing backfill. The use of horizontal strutting below the barrel of pipe or the use of pipe as support for trench bracing will not be permitted.

2. Dewatering
The Contractor shall provide and maintain ample means and devices with which to promptly remove and dispose of all water entering the excavation during the time the trench is being prepared for the pipe, during the laying of the pipe, and until the backfill at the pipe zone has been completed. Groundwater shall be controlled such that softening of the bottom of excavations or formation of "quick" conditions or "boils" during excavation shall be prevented. Dewatering systems shall be designed to prevent removal of the natural soils, and maintained in such a manner that the groundwater level outside the excavation is not reduced to the extent that adjacent structures or property would be damaged or endangered.

3. Trench Foundation
When, in the judgment of the Engineer, the existing material in the bottom of the trench is unsuitable for supporting the pipe, the Contractor shall install geotextile fabrics or excavate below the pipe, as directed. The Contractor shall place trench foundation material to the bottom of the pipe bedding. The trench foundation material shall be placed over the full width of the trench and compacted in layers not exceeding six inches deep to the required grade.

4. Pipe Bedding
   Pipe bedding consists of leveling the bottom of the trench on the top of the foundation material and placing bedding material to the horizontal centerline of the pipe, unless otherwise specified. The Contractor shall spread the bedding smoothly to the proper grade so that the pipe is uniformly supported along the barrel, and excavate bell holes at each joint to permit proper assembly and inspection of the entire joint. Bedding under the pipe shall provide a firm, unyielding support along the entire pipe length. Particular attention shall be given to the area from the flow line to the horizontal centerline of the pipe or top of bedding to ensure that firm support is obtained to prevent any lateral movement of the pipe during the final backfilling of the pipe zone. Pipe bedding shall be placed the full width of the trench.

5. Grade
   The Contractor shall follow Standard Detail 590. The subgrade upon which the bedding is to be placed shall be firm, undisturbed, and true to grade. If the trench is over-excavated, the Contractor shall restore to grade with material of the type specified for pipe bedding and place the material over the full width of the trench.

6. Backfill
   Backfill shall not be placed in the trench in such a way as to permit free-fall of the material until a minimum of two feet of cover is provided over the top of the pipe. Under no circumstances shall the Contractor allow sharp, heavy materials to drop directly onto the pipe or pipe zone material around the pipe. If the required compaction density has not been obtained, the Contractor shall remove the backfill from the trench and recompact. This process shall be repeated until the Contractor has established a procedure that will provide the required field density. The Contractor will then be permitted to proceed with backfilling and compact the remainder of the pipeline under the approved procedure.

   With approval of the District or City, the Contractor may substitute water settling as an alternate compaction method. Water settling shall be done only with approved jetting equipment and methods. Water settlement shall not relieve the Contractor of the responsibility for compaction of trench backfill as specified in this Chapter for standard compaction methods. The location and extent of trench water settling will be determined by the Engineer. The Contractor shall backfill the trench as specified to a point level with or slightly above the required grade to allow for settlement. After all structures are completed and all subsurface utilities have been restored to their original condition, the Contractor shall place water in the trench section in such quantities

and in such a manner that all portions of the backfill for the entire trench depth become saturated. The Contractor shall determine the procedures and provide the quantity of water required in every case to effect complete water settlement of the backfilled materials. Under no circumstances will the jetting pipe be inserted closer than two feet above the top of the pipeline. Any subsequent settlement of the trench during the warranty period shall be considered to be the result of improper water settlement or compaction and shall be promptly corrected.

The granular backfill within three feet of finished grade shall be compacted to not less than 95 percent relative compaction as determined by Method A of AASHTO T99. Backfill more than three feet from finished grade shall be compacted to not less than 90 percent relative compaction. Tests to determine compliance with the compaction requirements shall be provided as required by the District or City.

7. Impervious Zone
When installing sanitary sewers within a stream corridor or wetland area, an impervious zone of clay or other approved material shall be installed to prevent draining the wetland. The impervious zone shall be 2 feet thick parallel to the pipe, extending from 6 inches below the bottom of the pipe bedding to the top of the pipe zone, and extending one foot beyond each side of the trench wall. This zone shall be compacted to 90 percent relative compaction as determined by Method A of AASHTO T99.

7.03 Pavement Restoration

7.03.1 General

The stricter of the requirements of this section or the standards of the jurisdiction having authority over the road being repaired shall be followed.

7.03.2 Materials

a. Crushed Rock
The following rock specifications shall be required unless modified by the local jurisdiction.

1. Base Course Rock
Rock for the base course of the street shall be 1-1/2-inches and shall conform to the applicable portions of the standard specifications for highway construction of the Oregon State Highway Division for course aggregate base material.

2. Leveling Course Rock
   Rock for leveling course shall be 3/4-inch minus, conforming to the applicable portions of the Standard Specifications for Highway Construction of the Oregon State Highway Division for leveling course.

b. Asphalt Concrete

1. Prime Coat
   Materials for prime coat shall be emulsified asphalt type CMS 2 or approved equal.

2. Tack Coat
   Materials for tack coat shall be emulsified asphalt-type RS 1, CRS 1, or approved equal.

3. Base Course
   When more than two inches of asphalt concrete is required, the asphalt concrete shall be placed in two or more courses. The base course shall be Class B asphaltic concrete mix conforming to the Standard Specifications for Highway Construction of the Oregon State Highway Division.

4. Surface Course
   Asphaltic concrete for the surface course shall be Class C mix conforming to the Standard Specification of the Oregon State Highway Division. All surface course mix design is subject to final approval by the District or City.

7.03.3 Workmanship

a. Subgrade

The Contractor shall:

1. Bring the trench to a smooth, even grade at the correct distance below the top of the existing pavement surface, allowing for base rock, leveling rock and asphalt concrete.

2. Trim existing pavement so that the trench width plus 12-inches of asphalt is removed creating a "t" cut section as shown in Standard Detail 600.

3. Remove any pavement which has been damaged or which is broken

and unsound and provide a smooth, sound edge for joining the new pavement.

4. Compact the top three feet of pavement subgrade to 95 percent relative density, ASTM D2049.

5. And accomplish supplementary compaction where required with approved mechanical vibrating or power tampers.

b. Base Aggregate Course and Leveling Course
The Contractor shall obtain approval of the subgrade by the District or City prior to placing any base course material on the subgrade. Workmanship in manufacturing, placing, compacting, and maintaining base, or leveling course, shall be in conformance with the requirements of the Standard Specifications for Highway Construction of the Oregon State Highway Division, except as modified in this Chapter.

c. Tack Coat
After the leveling course has been compacted, the Contractor shall apply the tack coat to the edges if the existing pavement and manhole frames at 0.06 to 0.12 gallons per square yard. The surface upon which the tack coat is applied shall be dry and clean of dirt, dust, and other matter inhibiting asphalt adherence.

d. Asphaltic Concrete

1. Weather Conditions
Asphaltic concrete shall not be placed when the atmospheric temperature is lower than 40 degrees F., during rainfall, or when the surface is frozen or wet. Exceptions will be permitted only in special cases and only with prior written approval of the District or City.

2. Base Course
If a base course of asphaltic concrete is required, the Contractor shall place the asphaltic concrete on the prepared subgrade over the trench to a depth of two inches. The Contractor shall spread and level the asphaltic concrete and compact it by rolling or by use of hand tampers where rolling is impossible. Power rollers shall be capable of providing compression of 250 pounds per inch of width.

3. Surface Course
The Contractor shall place the asphaltic concrete to the required depth; spread and level the asphaltic concrete with hand tools or by use of a mechanical spreader, depending upon the area to be paved; bring the asphaltic concrete to the proper grade and compact by rolling or the use of hand tampers where rolling is impossible; roll with power

rollers capable of providing compression of 250 pounds per inch of width; and begin the rolling from the outside edge of the replacement progressing toward the existing surfacing, lapping the existing surface at least one half the width of the roller. If existing surfacing bounds both edges of the replacement, the Contractor shall begin rolling at the edges of the replacement, lapping the existing surface at least one half the width of the roller, and progressing toward the center of the replacement area. Each preceding track shall be overlapped by at least one half the width of the roller and make sufficient passes over the entire area to produce the desired result, as determined by the District or City. The finished surface of the new compacted paving shall be flush with the existing surface and shall conform to the grade and crown of the adjacent pavement. Immediately after the new paving is compacted, all joints between new and original asphaltic pavement shall be painted with hot asphaltic or asphaltic emulsion and be covered with dry paving sand before the asphaltic solidifies.

e. Protection of Structures

The Contractor shall provide whatever protective coverings may be necessary to protect the exposed portions of bridges, culverts, curbs, gutters, posts, guard fences, road signs, and any other structures from the paving operations. All oil, asphalt, dirt, or other undesirable matter that may come upon these structures by reason of the paving operations shall be removed.

Existing and new water valve boxes, manholes, catch basins, or other underground utility appurtenances shall be made level with the finish asphalt grade. The District or City or other appropriate authority shall be contacted prior to any facility adjustments for guidance as to the appropriate procedures, standards and materials to be used. All covers shall be protected during asphalt application.

f. Rock Surfacing

Where so directed by the District or City, the Contractor shall place a minimum of two inches of level course rock, as specified in this Chapter, for the full width of all streets, driveways, parking areas, street shoulders, and other areas disturbed by the construction.

g. Contractor's Responsibility

The Contractor shall repair all settlement of pavement over trenches within the warranty period at no charge to the District or City.

h. Driveways

Driveways shall be replaced to original conditions following the work. Such replacement shall be done in accordance with all applicable legal standards for road shoulders within the limits of the work.

7.04 Bores

7.04.1 General

The carrier pipe in all bores shall be installed within a steel case, unless otherwise approved by the District or City.

7.04.2 Installation

a. Casing
The casing shall be smooth steel of a size to permit proper construction to the required line and grade. The steel casing shall be fabricated in sections for field welded joints. The casing wall thickness shall be a minimum size of 1/4-inch or in accordance with the requirements of the jurisdiction of the right of way.

b. Pipe Supports
The sewer pipe shall be supported on three sides by pipe supports. Pipe supports shall be No. 2 Western Red Cedar or pressure treated Western Douglas Fir, or approved equal.

c. Placing Fill in Casing
The annular space shall be filled between the casing and pipe completely with lean grout or sand to prevent pipe flotation.

d. Concrete Seals
After the sewer pipe has been tested and approved, concrete plugs shall be poured at each end of the casing.