

CITY OF BENTON CITY
SECTION 3

STANDARD SPECIFICATIONS FOR:**SANITARY SEWER****3-1 SANITARY SEWER****3-1.01 DESIGN AND ACCEPTANCE**

These specifications cover the furnishing and installation of sanitary sewer pipe, manholes, cleanouts, and other appurtenances as shown on the plans or as directed by the Engineer. Sewer related standard drawings are contained in standard drawings Section 3 of these standard specifications. All construction shall be in conformance with SWSS Section 7-17, the Washington Department of Ecology Sewage Works Design Manual and these specifications. Where the existing mains will not support the service depth, required by Standard Drawing 3-6, the main line extension shall be kept as deep as possible. All extensions of sewer mains will be designed to a depth as required to serve all future areas that will be serviced by the main line, except that where existing sewer depths allow, the minimum sewer main line invert depth will be eight (8) feet. Sewers shall provide a uniform slope at the design grade and meet all test requirements. Manholes shall be spaced at a maximum 400 feet. Main line cleanouts may only be used on the ends of runs not exceeding 150 feet in length. The engineer may accept isolated "belly's" not to exceed 3/4-inch in depth. All variations from the above design requirements will be subject to approval of the City Engineer.

3-1.02 APPROVED PIPE AND JOINT MATERIALS

The sanitary sewer pipe shall be one of the types as indicated unless a different type and class of pipe is called for in the contract special provisions.

- A. ACRYLONITRILE-BUTADIENE-STYRENE (ABS) PIPE shall conform to the requirements of SWSS Section 9-05.14.
- B. POLYVINYL CHLORIDE (PVC) PIPE shall conform to the requirements of ASTM D3034, SDR35. The pipe laying length shall not exceed 14.0 feet.
- C. DUCTILE IRON PIPE shall conform to the requirements of ASTM A 21.51 or AWWA C-151 and shall be cement mortar lined, push-on joint and shall be Class 50.
- D. Jointing materials and fittings shall conform to the requirements of SWSS Section 9-05 for the type of pipe material installed. All repairs to PVC sewer pipe shall be made using gasketed PVC SDR35, ASTM D3034 couplings only.
- E. Piping material to be installed by the Contractor shall be one of the above unless otherwise specified in the contract Special Provisions.

3-1.03 MEASUREMENT AND PAYMENT

The unit contract price for each size of "Sewer Pipe", per linear foot, shall be full compensation for furnishing all labor, materials, 5/8-inch minus crushed rock bedding under the pipe, equipment, testing, connections to existing lines and all other incidentals necessary to perform the work in accordance with the plans and specifications or as directed by the Engineer.

3-2 PIPE BEDDING**3-2.01 GENERAL**

It is the intent of this contract to use select native material from the site for backfill around the sanitary sewer pipe. When unsuitable native material exists or is encountered during trench excavation, imported bedding material may be required by the Engineer, depending on type of pipe being installed and the type of materials encountered. Where directed by the Engineer, the

Contractor shall furnish and place imported pipe bedding. bedding material below the bottom of the pipe shall be 5/8-inch minus crushed rock.

3-2.02 5/8-INCH MINUS CRUSHED ROCK BEDDING

All sewer pipe shall be bedded below the bottom of the pipe with 5/8-inch minus crushed rock as per the City of Benton City Standard Drawing 4-7. Crushed rock shall be clean, 5/8-inch minus, well-graded, crushed rock and shall be subject to acceptance by the Engineer.

3-2.03 OVEREXCAVATION

Where over excavation occurs, the Contractor shall be required to bring the over excavated trench bottom back to grade with 5/8-inch minus crushed rock.

3-2.04 COMPACTION

The bedding material shall be placed and compacted in lifts not to exceed six inches (6"). The pipe bedding shall be compacted to not less than 95 percent of maximum density. Compaction shall be done in such a manner as to preclude future settlement.

3-2.05 MEASUREMENT AND PAYMENT

Select native materials which are acceptable and utilized as bedding and do not require truck haul, shall be considered as incidental and included in the "Trench Excavation and Backfill" pay item, and no additional payment will be made for their use as "Imported Pipe Bedding."

The unit contract price for "Imported Pipe Bedding", per linear foot, shall be full compensation for furnishing all labor, materials, equipment, and all other incidentals required to supply and place imported pipe, bedding material in accordance with the plans and specifications, or as directed by the Engineer.

5-8-inch minus crushed rock required to bring an over-excavated trench back to grade and 5/8-inch minus crushed rock used in Zone A as per City of Benton City Standard Drawing 4-7, shall be considered as incidental and included in the "Sewer Pipe", per linear foot pay item, and no additional payment will be made for its use as "Imported Pipe Bedding."

3-3 TRENCH EXCAVATION AND BACKFILL

3-3.01 GENERAL

Trench excavation for sanitary sewer pipe shall be in accordance with SWSS Section 7-17.3(1) A, except as herein modified and shall be to the depth as shown on the plans and as indicated in the proposal for the various depths required. Pipe zone and bedding shall be per City Standard Drawing 4-7 and Section 3-2. Pavement restoration shall be per City Standard Drawing 2-6 and Section 2-29 of these standards.

Trench excavation shall be unclassified unless rock excavation is listed as a pay item. Trench excavation shall include all excavation, disposal of surplus and unsuitable material, and all other work incidental to the construction of the trenches for gravity sewers, force mains, including manholes or other appurtenances, which are part of the pipeline.

The Contractor is advised that all water main lines have thrust blocks, typically located as shown on Standard Drawing 4-6. These thrust blocks have been found to be constructed of rocks, blocks, concrete or other materials. The Contractor shall take such precautions, shoring, etc. as required to protect and not disturb the existing thrust blocks.

3-3.02 ROCK EXCAVATION

Rock excavation shall include solid rock formations requiring systematic drilling and blasting with explosives and any boulders or broken rock larger than one-half (1/2) cubic yard in volume. Hardpan or cemented gravel, even though it may be advantageous to use explosives in its removal, shall not be classified as solid rock excavation.

The Contractor shall notify the Engineer at least 24 hours prior to any blasting. All blasting shall be done in accordance with local, county, and state regulations governing this class of work. Any damage to persons or property resulting from blasting operations shall be the sole responsibility of the Contractor and his surety.

3-3.03 COMPACTION

Trench backfill material shall be compacted per the requirements of City Standard 1-13, by means approved by the Engineer as required to preclude future settlement and to achieve a minimum of 95 percent maximum density when tested in accordance with SWSS Section 7-17.3(3) as herein modified.

As a minimum, all trenches which parallel the street centerline shall be compacted with a hoe-mounted or double drum, vibratory mechanical compactor.

Hand-operated jumping jacks or shoe-type mechanical tampers will not be approved.

3-3.04 TRENCH SAFETY

All trench excavation 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, cribbing, trench boxes, etc., as required to meet the specified safety requirements for the trench, manhole, dry well and related excavation, and including providing trench safety for city crews when taps are required to existing sewer mains. Sloping will not be allowed as an option to trench boxes and shoring, when the trench is within paved areas, or when sloping would damage adjoining paved areas.

3-3.05 AC WATER MAIN CROSSING REPAIR

When a sanitary sewer main line or storm sewer main line, will cross under a 6-inch or 8-inch AC water main, then prior to excavating under the water main, the section of AC water main, which is estimated to span the trench and to a minimum of three feet each side of the trench, shall be removed and replaced with a section of City Standard C900 PVC water main. After completion of the excavation and backfill, the repair couplings shall remain firmly on undisturbed ground, or the contractor will be required to replace the water repair.

3-3.06 MEASUREMENT

A. TRENCH EXCAVATION AND BACKFILL

Measurement for payment for "Trench Excavation and Backfill," shall be by the linear foot for the appropriate depth increment of trench excavation and backfill, including measurement through manholes.

Measurement shall be the depth from the pipe design invert to original grade, except that where the sewer is constructed in conjunction with street construction, and unless excavation to subgrade is not allowed by the contract Special Provisions, measurement shall be from the pipe invert to the street design subgrade, regardless of when the Contractor chooses to excavate the street to subgrade.

B. TRENCH SAFETY SYSTEMS

The unit contract price for "Trench Safety Systems", per linear foot, shall be measured along the trench length through manholes, dry wells and catch basins.

C. ROCK EXCAVATION

When provided for in the bid proposal, Measurement for Payment for "Rock Excavation" shall include boulders exceeding one-half cubic yard in volume and solid rock, which requires systematic drilling and blasting. Rock Excavation will be measured on a cubic yard basis computed as follows:

- a. Length

Length will be the entire horizontal distance where rock is encountered, measured on a linear foot basis along centerline of the trench.

b. Width

The trench width for payment of Rock Trench Excavation shall be as follows:

Size of Pipe	Pay Width of Trench
4" - 15"	2.5 feet
18" - 36"	Outside pipe diameter plus 12"
42" & larger	Outside pipe diameter plus 24"

c. Depth

Measurement for depth will be the vertical distance from six inches (6") below the pipe invert to the top of the solid rock strata. Depth will be measured at intervals of 25 feet along centerline of trench, beginning at the first location that solid rock is encountered, and the average depth between measuring points will be the depth used for computing depth of rock.

D. **ROCK EXCAVATION FOR STRUCTURES**

Rock excavation quantities for sewer manholes and other sewer structures shall be computed on a cubic yard basis from the actual profile depth as above, multiplied by the area within a line parallel to and one-foot (1') outside of the actual dimensions of the manhole or structure base.

3-3.07 PAYMENT

A. **TRENCH EXCAVATION AND BACKFILL**

The unit contract price for "Trench Excavation and Backfill", per linear foot, for the various depths indicated in the proposal, shall be full compensation for the cost of excavation, backfill, furnishing all labor, equipment, and all other incidentals necessary to perform the work in accordance with the plans and specifications or as directed by the Engineer. All costs to complete the required extra trench depth below the pipe invert, as required to place the specified 5/8-inch minus crushed rock, shall be incidental to the trench excavation items included in the bid proposal. Unless provided for in the contract special provisions, all costs for labor, equipment and materials as required to replace sections of 6-inch and 8-inch AC water mains at all main line trench crossings, shall be considered incidental to the "Trench Excavation and Backfill" bid items as provided in the bid proposal.

B. **TRENCH SAFETY**

The unit contract price, as provided in the bid proposal, for "Trench Safety Systems", per linear foot, or per lump sum, shall be full compensation for furnishing all labor, equipment, materials and all other incidentals to meet the requirements of the Washington Industrial Safety and Health Act, Chapter 49.17 RCW, including all requirements at manholes.

C. **ROCK EXCAVATION**

When provided for in the bid proposal, the unit contract price for "Rock Excavation" will be based on the unit price, per cubic yard, and will be paid in addition to the payment for trench excavation and backfill at the various depths indicated in the proposal in which the rock is encountered. Payment for rock excavation shall be full compensation for all work required to excavate and dispose of the solid rock material. No payment will be made for rock excavated below required grade or outside the widths mentioned above.

3-4 SEWER SERVICE LINES

3-4.01 GENERAL

Side sewer service lines shall be installed and tested in accordance with the requirements of SWSS Section 7-18 as herein modified and City of Benton City Standard Drawing 3-6.

On existing sewer mains, the city will tap the main supply and install the sewer service insert a tee, or equal. The contractor will provide the required trench safety systems for the city crew.

3-4.02 CONSTRUCTION

Construction of sewer service lines shall conform to SWSS Section 7-18.3 and as herein modified. Wyes shall be gasket fitted and shall be installed at the 2:00 o'clock or 10:00 o'clock position. Other bends and fittings on 4-inch services shall be gasket or glue joint fitted for the manufacturer's pipe. No bends greater than 45° shall be used within the city right-of-way. All fittings shall be SDR 35 rated for use with SDR 35 sewer pipe. All service pipe joints and 6-inch and larger fittings shall be gasket-jointed. For 4-inch services, wye taps only will be permitted into the main sewer line, unless written approval is obtained from the Engineer. All services larger than 4-inches shall connect into a sewer manhole at the mainline connection. Where an existing service is being replaced, the alignment and grade of the replacement sewer may be revised from the old position as conditions require, provided that the existing abandoned wye is plugged or capped at the sewer main and that the new service alignment and grade otherwise meet the approval of the Engineer and the requirements of these specifications.

The minimum required pipe bury is one (1) foot and the minimum required pipe grade is 2 percent. (One-quarter inch (1/4") per linear foot or two feet (2') of drop per 100 feet of pipe.) With the approval of the engineer or building official, the grade may be flattened to 1%, if gravity sewer service could not otherwise be provided.

3-4.03 CLEANOUTS

Cleanouts are required on service laterals as required to meet the following requirements.

- A: At each 90° elbow (not required if two 45° elbows are used.)
- B: When a total of 135° bends have been made in the installation (after 3-45° bends.)
- C: Not more than 100 feet of line can be run without a cleanout being installed.
- D: A cleanout will be required where the connection is made near the building, unless an existing cleanout already exists just outside or just inside the foundation or basement.
- E: A cleanout is required immediately downstream of the sewer backflow device if a backflow device is required.

3-4.04 STUB MARKERS AND CAP

At all sewer service locations, the Contractor shall tie a 2-inch locator ribbon to the end of the stub and extend the tape vertically to the ground surface. The ends of new sewer service line stubs shall be capped to provide a watertight seal and shall be referenced with a two-inch by four-inch (2" x 4") eight (8) foot long steel stud reinforced with a ground contact pressure treated wood 2 x 4, inserted in the steel stud. When the depth of the service exceeds the reach of the reinforced steel post, then pressure treated 2 x 4's shall be used in the lower section of the trench as required to the service depth. In vacant lots, the post is to be painted green and left protruding two (2) foot above finished grade at the property line. In existing yards, bury the top of the steel post flush with the finish yard or landscape grade.

After back-filling and compacting the trench to within 24 inches of the top of the finished ground grade, the Contractor shall install a continuous two-inch (2") minimum width green plastic coated aluminum pipe locator ribbon over the top of the sewer service which shall be clearly marked, "CAUTION BURIED SEWER LINE," continuously along the length of the stubbed service. Curbs shall be marked with an "S". Services shall be stubbed to a depth as required by City of Benton City Standard Drawing 3-6.

3-4.05 MEASUREMENT AND PAYMENT FOR SEWER SERVICE LINE

Measurement shall be per linear foot horizontal measure, for each size of sewer service. Wye taps shall be measured per each for each size of wye, cleanouts will be measured per each.

The unit contract price for "Sewer Service Lines," per linear foot, for "Service Wye," per each, and for "sanitary sewer service cleanout" per each, shall be full compensation for furnishing all trench excavation and backfill, materials, labor, equipment, pipe bedding, end plugs, marker posts, cleanouts, testing, and all other incidentals required to construct side services in accordance with the plans and specifications or as directed by the Engineer. A separate measurement and payment will be made for pavement and concrete curb and sidewalk restorations and for "Trench Safety Systems".

3-5 STANDARD MANHOLE

3-5.01 GENERAL

Manholes are to be furnished and installed in accordance with the City of Benton City Standard Drawings 3-2, 3-3 and 3-5 and may have either a poured-in-place base or a precast base. Prior to construction, or placing excavated material in the street, impacted storm drain catch basins shall be protected with the City Standard Catch Basin Fabric Sock Protection. When in conjunction with street construction, sewer manhole channels shall be protected as required by Section 2-26 of these specifications.

Construction of manholes shall conform to SWSS Section 7-05, except as herein modified. The following provisions shall apply to the construction of all manholes:

- A. Manhole steps shall be co-polymer polypropylene steel reinforced steps. The steel core shall be a minimum one-half inch steel bar fully enclosed in the co-polymer polypropylene. Steps shall meet all requirements of ASTM C-478 and shall be rated for a minimum 300-foot pound concentrated load and meet the latest OSHA requirements.
- B. Precast concrete cones shall be eccentric.
- C. All manhole joints shall be made with flexible gaskets or a positive self-sealing mastic.
- D. Where installed in conjunction with street construction, the channelization and manhole bases shall be covered by a rigid material such as 3/4-inch plywood or better. This cover shall remain in place until street construction is complete and the manhole castings are grouted and then shall be removed along with all the debris prior to acceptance of construction.
- E. Pipe to new and existing manhole connections shall be made in accordance with the requirements of SWSS Section 7-05.3 and 7-05.3(3).
- F. Manhole sections installed below the high static groundwater level shall be infiltration tested. A water infiltration allowance of 0.20 gallons per hour, per foot of static head above the lowest manhole invert, shall be considered as a satisfactory manhole test.

3-5.02 MEASUREMENT AND PAYMENT

3-5.02.01 STANDARD 48-INCH MANHOLE

The unit contract price for "Standard 48-Inch Manhole, (10' deep)" per each, shall be full compensation for furnishing all labor, materials, frames, covers, ladder rungs, including adjusting the manhole ring and cover to finished grade, and all incidental work required to construct a standard manhole up to a depth of ten (10) feet, complete and in place in accordance with the plans and specifications. When constructed in conjunction with a paving project, a separate payment will be made for adjusting to grade, after completion of paving, as per Standard Drawing 3-4.

3-5.02.02 ADDITIONAL MANHOLE DEPTH

The unit contract price for "Additional Manhole Depth," per vertical foot, shall be full compensation for all labor, equipment and materials as required to construct the manhole section, which exceeds ten feet in depth. Measurement for "Extra Depth Manhole" will be from the sewer invert to the cover finish grade, less ten feet (10').

3-5.02.03 DROP CONNECTIONS

Payment for drop connections shall be in accordance with the unit contract price for "___ inch Drop Connection", per vertical foot, as measured from the cleanout rim to the invert in near the manhole

base , and shall be full compensation for furnishing all labor, materials, and equipment required to construct the drop connection in accordance with the plans and specifications or as directed by the Engineer.

3-6 CLEANOUT

3-6.01 GENERAL

Where shown on the plans, the Contractor shall install cleanouts in accordance with SWSS Section 7-19 as herein modified, and the City of Benton City Standard Drawing 3-1.

3-6.02 MEASUREMENT AND PAYMENT

Measurement and payment for each size of "Sewer Cleanout," per each, shall be full compensation for furnishing all labor, materials, equipment, and all other incidentals required to install the cleanout, complete and in place, in accordance with the plans and specifications including adjusting the cleanout cover to the finished grade or as directed by the Engineer.

3-7 SANITARY SEWER PIPE PLUGS

3-7.01 GENERAL

All stubbed out sewer main lines shall be closed with a watertight stopper or plug fastened in place. The end of the plug shall be referenced as specified for sewer services, Section 3-4.04.

3-7.02 MEASUREMENT AND PAYMENT

The unit contract price per each, for each size of end cap, shall be full compensation for all labor, equipment and materials to complete the end cap and marker, as required to supply, install and mark the mainline sewer stub as specified.

3-8 CONNECT TO EXISTING MANHOLE

3-8.01 GENERAL

Where shown on the plans, the Contractor shall connect the new sewer line into the existing manholes by core drilling the manhole wall. Hammering, chipping and similar wall penetration procedures will not be used. Connection will be by an "O" ring rubber gasket meeting ASTM C-478 in a manhole coupling equal to the Johns-Manville asbestos-cement collar, or utilizing a conical type flexible seal equal to Kore-N-Seal. The existing base shall be chipped out and new channels formed as required to form channels similar to those shown in Standard Drawing 3-2. The new channel shall provide a smooth uniform transition for the new sewer pipe into the existing channel flows. The connection shall be completed in accordance with the requirements of Section 3-5 of these specifications.

3-8.02 MEASUREMENT AND PAYMENT

The unit contract price for "Connect to Existing Manhole," per each, shall be full compensation for furnishing all labor, equipment, materials, and all other incidentals as required to core drill, connection seal, connect to and rechannel the existing manhole in accordance with the specifications or as directed by the Engineer.

3-9 ADJUST EXISTING CASTING TO GRADE

3-9.01 GENERAL

When the sewer construction is proceeding as a separate project, all manholes in pavement restoration areas shall be set to finish grade prior to patching the trench. Adjustment rings shall be grouted between each ring and finished smooth in and out. In lieu of grouting between each adjustment ring, a concrete collar may be poured per the requirements of Standard Drawing 3-4. All manholes located outside of the pavement area shall be adjusted in accordance to the requirements of Standard Drawing 3-4. Unless otherwise provided for in the contract bid proposal, a separate measurement and payment will not be made for adjustments and all costs shall be incorporated into the unit price per each for the sewer manhole, or clean out.

When the sewer system is constructed in conjunction with a street construction project, all new and existing manholes, cleanouts, and all other such sewer structure castings, which are required to be adjusted to finished grade, shall be adjusted, measured and paid in accordance with the requirements of Section 2-18 of the City of Benton City's Standard Specifications for Roadway, to which the Contractor's attention is hereby directed.

3-10 ABANDONED CONDUITS

All pipes, conduits, and other openings determined to be abandoned, which are cut or opened during the sewer installation, shall be capped or concrete plugged prior to backfilling of the trench. Measurement and payment for required pipe cuts, and all labor, equipment and materials required to complete the specified plugs shall be included in the unit bid price for the pipe installation pay items.

3-11 FLUSHING AND TESTING

Sewer lines shall be tested for acceptance in accordance with SWSS Section 7-17.3(4). The Contractor may, at his option, either air test or water test the sewer lines. The Engineer shall be notified prior to testing and be present during testing. All sewer lines will be subject to television inspection by the City, prior to acceptance. Sewer lines shall be televised prior to paving.

Prior to televising by the City, the Contractor shall place a 90 degree, SRECO, UEMSI, or Equal "stove pipe" sand trap, the same size as the sewer main line, in the downstream invert of the next downstream manhole, and flush the new sewer main until it is clear of debris. Following flushing, the Contractor shall visually inspect the sewer by "lamping" to assure that the sewer main is clean and ready for televising. The City crew requires a minimum two-work days notice in order to schedule televising.

The cost of one television inspection of new sewer lines has been included in the permit fee or contract schedule. If City crews are scheduled and are unable to complete the inspection, due to debris in the pipe, buried or inaccessible manholes or other causes attributable to lack of preparation by the Contractor, the cost of all subsequent television inspections will be billed to the Contractor.

Within the one year project warranty period, the city reserves the right to reinspect the sewer lines by televising, or other means. When identified within the warranty period, all sewer lines found to be defective through pipe foundation settlement, material defects, or workmanship shall be removed, replaced, or repaired by the Contractor at the option of the Engineer. The costs for such removal, replacement, or repair will be borne by the Contractor.

3-11.01 MEASUREMENT

All costs for labor, equipment and materials as required to complete the flushing and testing as specified, shall be incorporated into the linear foot measurement and payment for each size of pipe installed.