

Chapter 7

WASTEWATER

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7A GENERAL CONSIDERATIONS

7A.010 General

Sanitary sewerage refers to waste water derived from domestic, commercial, and industrial pretreated waste to which storm, surface, and ground water are not intentionally admitted. Pretreatment shall follow all the requirements as set forth by LOTT and Chapter 13.20 OMC.

The standards established by this chapter are intended to represent the minimum standards for the design and construction of wastewater facilities. Except as otherwise stated herein, these standards apply to all sewer pipe and facilities, regardless of whether final ownership is private or public.

Any extension of Olympia's sanitary sewer system must be approved by the Community Planning and Development Department and must conform to the current City of Olympia Wastewater Management Plan, Thurston County Health Department, Department of Ecology (DOE)'s Criteria for Sewage Works Design, and Washington State Department of Health (DOH) requirements.

[Abandonment of any of Olympia's sewer pipes must be in accordance with current WSDOT Standards.](#)

See Chapter 2 for definitions of specific types of sewers.

7A.020 Sanitary Sewer/Water Main Crossings

See Chapter 6, Section 6.130 for requirements regarding sewer and water separation.

7A.030 Surveying and Staking

All surveying and staking shall be performed ~~performed~~ as required in Chapter 3, section 3.056 of these Standards.

7A.040 Trench Excavation

See Chapter 6, Section 6.160 for requirements regarding trench excavation.

7A.050 Backfilling

See Chapter 6, Section 6.170 for requirements regarding backfilling.

7A.060 Street Patching and Restoration

See Chapter 4, Sections 4B.170 and 4B.180 for requirements regarding street patching and trench restoration.

7A.065 Pipe Repairs

Repair couplings shall be of the type with a stainless steel shear ring, meeting the ASTM C1173 shear resistance test and equal to Fernco 1000 RC or 5000 RC Series couplings. Unshielded repair couplings shall not be used.

7A.070 Testing

Prior to acceptance and approval of construction, the following tests shall apply to each type of construction:

A. Gravity Sewer

1. After the pipes have been cleaned, the gravity sewer pipe shall be subject to a low-pressure air test pursuant to the current WSDOT specifications. The contractor shall furnish all equipment and personnel for conducting the test under the observation of the City Inspector. The testing equipment shall be subject to the approval of the City.

The contractor shall make an air test for its own purposes prior to notifying the City to witness the test. The air test for acceptance shall be made after the trench is backfilled and compacted and the roadway section is completed to subgrade.

All wyes, tees, and end-of-side sewer stubs shall be plugged with flexible joint caps, or acceptable alternates, securely fastened to withstand the internal test pressures. Such plugs or caps shall be readily removable and their removal shall provide a socket suitable for making a flexible, jointed lateral connection or extension.

2. Testing of the sewer main shall include a television (video) inspection. The video inspection will be conducted by a contractor of the City's choosing, at the applicant's expense. All video inspections shall be performed in accordance with NASSCO's Pipeline Assessment and Certification Program (PACP) standards, and be compatible with Cues GNET software. The video inspection will use the unique identification number (IDN) assigned to each sewer pipe section and manhole by the City. If not already provided to the contractor by the City, the contractor shall request from the City assignment of these unique IDNs at least one week prior to completing the video inspections.

Video inspection shall be done after the air test has passed, the manhole has been channeled, and before the roadway is paved. Immediately prior to a video inspection, enough water shall be run down the line so it comes out the lower manhole and the line is flushed clean.

Two copies of the video and two copies of the written report shall be submitted to the City for review and approval. Acceptance of the pipeline(s) will only be made after the video inspection documents have been reviewed and approved by Public Works. No sags or bellies in the sewer pipe shall be greater than ½ inch in depth, per section 7B.030.D.

Any tap to an existing sewer main needs to be televised at the applicant's expense.

The City will televise the new line during periods of high groundwater within the first two years after construction and acceptance of the line. Any defects in the pipe material, installation, or conditions resulting in inflow and infiltration (I & I) will be considered a system failure that shall be repaired by and at the expense of the contractor. If repairs to the system are required within this period, the contractor shall reimburse the City for the televising and re-televising of the pipe, before and after the repair work respectively.

3. A vacuum test of all manholes is required prior to acceptance. The structure shall be tested in accordance with the latest edition of ASTM-C 1244-93. This test method covers procedures for testing cast in place or precast concrete manhole sections using the vacuum test method to demonstrate the integrity of the installed materials and the construction procedures.

Testing shall be done in the following manner:

- a. All lift holes and pipes entering into the manhole shall be plugged, taking care to securely brace each plug from being drawn into the structure.
- b. The test head shall be placed at the top portion of the structure in accordance with the manufacturers' recommendations.
- c. A vacuum of 10 inches of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop by 1 inch to 9 inches. The manhole will pass the vacuum test if the time is greater than the time shown in Table 1.
- d. If the manhole fails the initial test, necessary repairs shall be made by an approved method. The structure shall then be retested until a satisfactory test is obtained.
- e. If the manhole joint is displaced during the vacuum test, the manhole shall be disassembled, the seal replaced, the structure reassembled, and retested until compliance is obtained.
- f. Testing can be done either before or after backfill operations around the structure; however, if during backfill operations it is found that the structure has been disturbed and it is suspected that the integrity of the joint has been compromised, retesting shall be required.

g. All other requirements stipulated in Section 7-05 of the latest edition of the *Washington State Department of Transportation's Standard Specifications for Road, Bridge and Municipal Construction* that has been adopted by the City shall also be adhered to for final acceptance of the manhole structure.

Table 1 below gives allowable time loss in seconds; i.e., test section is acceptable if vacuum does not drop below 9 inches until after the times shown below have expired.

Table 1: Minimum Test Times for Various Manhole Diameters

Depth (ft)	Diameter in Inches										84	96
	30	33	38	42	48	54	60	66	72			
	Time in Seconds											
8	11	12	14	17	20	23	26	29	33		<u>38</u>	<u>44</u>
10	14	15	18	21	25	29	33	36	41		<u>47</u>	<u>55</u>
12	17	18	21	25	30	35	39	43	49		<u>53</u>	<u>66</u>
14	20	21	25	30	35	41	48	51	57		<u>62</u>	<u>77</u>
16	22	24	29	34	40	46	52	58	67		<u>71</u>	<u>88</u>
18	25	27	32	38	45	52	59	65	73		<u>80</u>	<u>99</u>
20	28	30	35	42	50	53	65	72	81		<u>89</u>	<u>110</u>
22	31	33	39	46	55	64	72	79	89		<u>98</u>	<u>121</u>
24	33	36	42	51	59	64	78	87	97		<u>107</u>	<u>132</u>
26	36	39	46	55	64	75	85	94	105		<u>116</u>	<u>143</u>
28	39	42	49	59	89	81	91	101	113		<u>125</u>	<u>154</u>
30	42	45	53	63	74	87	98	108	<u>121</u>		<u>134</u>	<u>165</u>

4. A mandrel test in accordance with Section 7-17.3(2)(G) of the WSDOT Standard Specifications shall be performed by and at the expense of the contractor on all sewers except laterals as defined in Chapter 2 of these standards when televising reveals a possible defect or belly in the pipe.

5. Any time that testing reveals problems that lead to repairs by the contractor, the City may require complete retesting of the entire system that was repaired. This work shall be required to ensure that the integrity of the system was not compromised during the repair work.

B. Force Main

1. Prior to road construction, the backfilled pressure line shall be subjected to a hydrostatic pressure test. The pressure test shall be pursuant to Section 7-09.3(23), Hydrostatic Pressure Test, in the *WSDOT Standard Specifications for Road, Bridge and Municipal Construction*. Any leaks or imperfections developing under said pressure shall be remedied by the contractor. The pressure test shall be maintained while the entire installation is inspected.

The contractor shall provide all necessary equipment and shall perform all work connected with the tests. Tests shall be made after all connections have been made and the lines have been backfilled, but prior to road construction. The contractor shall perform a test to assure that the equipment to be used for the test is adequate, in good operating condition, and the air in the line has been released before requesting the City witness the test.

2. A water test for all wet wells in accordance with the manhole water test for gravity sewer shall be required.
3. Verification of operating parameters such as pump operation, alarms, and an electrical inspection is required prior to acceptance of all lift stations. Upon request, the City will provide a final inspection checklist for all pump station components. All testing shall be performed in the presence of a City Inspector and a representative from the Public Works Department.

C. STEP/Grinder Pressure Main System

1. The pressure mainline and service lines shall be subject to a hydrostatic pressure test. The pressure test shall be pursuant Section 7-09.3(23), Hydrostatic Pressure Test, in the *WSDOT Standard Specifications for Road, Bridge and Municipal Construction*. The test shall be modified as follows: The hydrostatic pressure shall equal 100 psi in excess of operating pressure or in no case shall the test pressure be less than 200 psi. Any leaks or imperfections developing under said pressure shall be remedied by the contractor. The pressure test shall be maintained while the entire installation is inspected.

The contractor shall provide all necessary equipment and shall perform all work connected with the tests. Tests shall be made after all connections have been made. The contractor shall perform a test to assure that the equipment to be used for the test is adequate, in good operating condition, and the air in the line has been released before requesting the City witness the test.

2. A water test of the septic, STEP, or grinder tank at the factory and on-site after installation is required in accordance with the criteria outlined in Section 7E.060. The contractor shall perform the test and supply all necessary equipment and materials. The testing shall be conducted in the presence of a City Inspector.
3. Verification by City Inspector of all operating parameters, such as pump operation and alarms, and an electrical inspection is required prior to acceptance of any STEP system installation. Upon request, the City will provide a final inspection checklist for all STEP and grinder system components. All testing shall be performed in the presence of a City Inspector and a representative from the Public Works Department.

D. Side Sewers (Laterals) from Cleanout at Property Line to Sewer Main

Side sewers, or laterals, from the cleanout at the property line to the gravity sewer main, shall follow the testing and television inspection requirements of gravity sewer mains as described in 7A.070.A above.

7B GRAVITY SEWER

7B.010 General

All sewers shall be designed as a gravity sewer whenever physically and/or economically feasible or as outlined in the City of Olympia Wastewater Management Plan.

7B.020 Design Standards

The design of any sewer extension/connection shall conform to City Standards, Department of Ecology's *Criteria of Sewage Works Design* (most current edition), and any applicable standards as set forth herein.

The layout of extensions shall provide for the future continuation of the existing system as determined by the City. Sewer mains shall be sized for the ultimate development of the tributary area. Nothing shall preclude the City from requiring the installation of a larger sized main if the City determines a larger size is needed to meet the requirements for future service. Sewer lift stations shall be designed and located to optimize the service area to provide regional service. Temporary or interim lift stations will not be permitted. See Chapter 3 for utility extension information.

New gravity sewer systems shall be designed on the basis of an average daily per capita flow of sewage of not less than 80 gallons per day. See Table 2 below, Criteria for Sewage Works Design, for estimating flows for other facilities. When a deviation from these flow rates is requested, in addition to the criteria described in Section 1.050, a description of the procedure used for sewer design shall be included in the submittal to the City Engineer for review and approval.

The minimum size for sewer mains shall be 8-inch nominal diameter. The minimum size for a side sewer within the street right-of-way shall be 6 inches. See definitions in Chapter 2, Section 2.020.

Table 2: Criteria for Sewage Works Design

Source: Washington State Department of Ecology

Discharge Facility	Design Units	Flow* (gpd)	BOD (lb/day)	SS (lb/day)	Flow Duration (hr)
Dwellings	per person	100	0.2	0.2	24
Schools with showers and cafeteria	per person	16	0.04	0.04	8
Schools without showers and with cafeteria	per person	10	0.025	0.025	8
Boarding schools	per person	75	0.2	0.2	16
Motels at 65 gal/person (rooms only)	per room	130	0.26	0.26	24
Trailer courts at 3 persons/trailer	per trailer	300	0.6	0.6	24
Restaurants	per seat	50	0.2	0.2	16
Interstates or through highway restaurants	per seat	180	0.7	0.7	16
Interstate rest areas	per person	5	0.01	0.01	24
Service stations	per vehicle serviced	10	0.01	0.01	16
Factories	per person per 8-hour shift	15-35	0.03-0.07	0.03-0.07	Operating Period
Shopping centers	per 1,000 square feet of ultimate floor space	200-300	0.01	0.01	12
Hospitals	per bed	300	0.6	0.6	24
Nursing Homes	per bed	200	0.3	0.3	24
Homes for the aged	per bed	100	0.2	0.2	24
Doctor's office in medical center	per 1,000 square feet	500	0.1	0.1	12
Laundromats, 9 to 12 machines	per machine	500	0.3	0.3	16
Community colleges	per student and faculty	15	0.03	0.03	12
Swimming pools	per swimmer	10	0.001	0.001	12
Theaters, drive-in type	per car	5	0.01	0.01	4
Theaters, auditorium type	per seat	5	0.01	0.01	12
Picnic areas	per person	5	0.01	0.01	12
Resort camps, day and night, with limited plumbing	per campsite	50	0.05	0.05	24
Luxury camps with flush toilets	per campsite	100	0.1	0.1	24

7B.030 Main Line Gravity

A. Main line sewers, unless otherwise approved by the City Engineer, shall be constructed using materials conforming to one of the following:

1. PVC pipe, 8-inch to 15-inch diameter, must meet either ASTM D 3034, SDR 35 solid wall pipe or ASTM F 794 for solid seamless profile pipe.
2. PVC pipe, 18-inch to 27-inch diameter, shall conform to ASTM F 679 Type 1 only.
3. All joints for PVC pipe shall conform to ASTM D 3212 with rubber gaskets conforming to ASTM F 477. Ribbed pipes shall not be allowed for use in the sanitary sewer system.
4. In cases where ductile iron is approved for use by the City Engineer, it shall conform to AWWA C151, pressure class 50, and shall be epoxy-lined, push-on, mechanical or restrained joint as appropriate. Joints shall be rubber gasketed, conforming to the requirements of AWWA C111.

B. Gravity sewer shall maintain a minimum depth of 5 feet, unless otherwise approved, to provide gravity service to adjoining parcels, adequate head room within manholes for maintenance personnel, future areas to be served, and vertical clearance between water and sewer lines. Gravity sewer mains and associated manholes shall not exceed a maximum depth of 20 feet at any point along its length.

C. All building sewer connections to the main shall be made with a sanitary tee (wye) connection. A cleanout assembly shall be provided at the edge of the right-of-way, as shown in Standard Drawing 7-19, for all new and rehabilitated sewer laterals. Backflow prevention devices shall be provided as required by the most recent edition of the U.P.C. All new mains connecting to existing mains, if not made at an existing manhole, shall require the installation of a new manhole.

D. All sewers shall be designed and constructed to give mean velocities of not less than 2.0 feet per second based on Manning’s formula using an “n” value of 0.013. Use of other practical “n” values may be permitted by the City if justified by a licensed Professional Engineer. Table 3 lists the minimum slope for gravity sewer main for the City of Olympia. Shallower slopes, less than those indicated in Table 3 but equal to or greater than minimum slopes for gravity sewer main as set forth in the Washington State Department of Ecology’s *Criteria for Sewage Works Design*, most current edition, may be considered if calculations submitted by a licensed professional engineer show that a shallower slope shall still provide a minimum 2.0 fps based on anticipated flows.

Table 3: Sewer Size and Minimum % Slope

Sewer Size (Inches)	Minimum % Slope % (Feet per 100')
8	1.00 (0.010 Ft/Ft)
10	0.50 (0.0050 Ft/Ft)
12	0.45 (0.0045 Ft/Ft)
14	0.35 (0.0035 Ft/Ft)
15	0.30 (0.0030 Ft/Ft)
16	0.28 (0.0028 Ft/Ft)
18	0.25 (0.0025 Ft/Ft)
21	0.20 (0.0020 Ft/Ft)
24	0.16 (0.0016 Ft/Ft)
27	0.15 (0.0015 Ft/Ft)
30	0.12 (0.0012 Ft/Ft)
36	0.10 (0.0010 Ft/Ft)

Under special conditions, slopes slightly less than those required for the 2.0 feet per second velocity may be permitted by the City Engineer. Such decreased slopes will only be considered where the depth of flow will be 30 percent of the diameter or greater for design average flow. Whenever such decreased slopes are proposed, the design engineer shall furnish with the plans ~~his/her~~ computations of the depths of flow in such pipes at minimum, average, and daily or hourly rates of flow. Larger pipe size will not be allowed to achieve lesser slopes.

Sewers shall be laid with uniform slope between manholes. The allowable tolerance for sags or bellies in a newly installed pipe shall be 0.5 inches or less.

E. Gravity sewers shall be designed with straight alignment between manholes, and located along the center of the street consistent with Standard Drawing 4-44. Exceptions to this will only be considered through the Deviation from Standards process outlined in Chapter 1, and approval of such a deviation request may include the requirement to install a sewer service line (lateral) stub-out to the property line for each parcel located along the alignment of the sewer main. All pipe and services shall be installed with continuous tracer tape installed 12 inches to 18 inches under the proposed finished subgrade. The marker shall be plastic, non-biodegradable metal core or backing, marked "sewer" that can be detected by a standard metal detector. Tape shall be Terra Tape "D" or approved equal.

Toning wire is also required for all gravity sewer mains and sewer service laterals. Toning wire shall be green, UL listed for direct bury, Type UF, HDPE or HMWPE-coated, 12-gauge copper taped to the top of the pipe to prevent movement during backfilling. Nylon PVC coated THHN wire shall not be used for toning wire. The wire shall be laid loosely enough to prevent stretching and damage. The wire shall be wrapped to manhole or cleanout rings on gravity sewers, or the cleanout cap at the property line on all sewer service laterals. Sufficient wire to allow a minimum of 2 feet (slack) above final grade shall be coiled/looped in structures to ensure the wire shall be accessible to hook up to a locator.

A 1-pound magnesium anode shall be buried with the pipe every 1,000 linear feet maximum for cathodic protection of the wire. Toning wire splices and connections to anodes shall join wires both mechanically and electrically and shall employ epoxy resin or heat-shrink tape insulation. Toning wire shall be tested prior to acceptance of the pipe system. A written notice from the contractor to the City at least two days prior to the test is required; such notice is to include information on the relevant experience of the company proposed to complete the testing. All costs incurred for the testing shall be the responsibility of the contractor. Contact the City of Olympia Water Operations Section at (360) 753-8333 for a copy of the City of Olympia Toning Wire Test Form, which shall be filled out during testing and submitted to the City before the work will be accepted.

7B.040 Connection of New Sewer Mains to Existing System

A. At connection to existing system, all new sewer connections shall be physically plugged until all tests have been completed and the City approves the removal of the plug.

B. Connection of new pipelines to existing manholes shall be accomplished by using cored holes drilled for the connection. New channels shall be constructed so as not to interrupt existing flow patterns. All connections shall utilize Kor-N-Seal fittings.

C. Connection of a pipeline to a system where a manhole is not available shall be accomplished by pouring a concrete base and setting manhole sections. The existing pipe shall not be cut into until approval is received from the City.

D. Connections to manholes requiring a drop shall follow the criteria as outlined in Section 7B.050.

E. Where a new sewer main is connected directly to a stubbed out section of existing sewer main, extending sewer along the same alignment, a repair coupling shall be used, of the type with a stainless steel shear ring, meeting the ASTM C1173 shear resistance test and equal to Fernco 1000 RC or 5000 RC Series couplings. Unshielded repair couplings shall not be used.

~~E.—Connections where an existing stub out is not available or where a new building sewer is the same size as the existing main shall be accomplished by the installation of a new manhole.~~

~~F. Taps shall be done by use of a core drill and to the service line shall not protrude into the existing main. A City Inspector shall be notified 48 hours (two working days) prior to any tap of a city sewer and shall be present to witness the tap. The inspector will collect all tapping cores from the contractor or shall be informed if the cores were washed into the sewer. Sewer saddles shall be Romac type CB.~~

~~GF.~~ See section 7B.080 for requirements when connecting side sewers (sewer service lines) to a sewer main.

7B.050 Manholes

Precast manholes shall meet the requirements of ASTM C 478 with either a precast base or a cast-in-place base made from 4,000 psi structural concrete. Manholes shall be Type 1, 48-inch diameter minimum. The minimum manhole frame opening shall be 24 inches. Joints shall be rubber gasketed, conforming to ASTM C 443 and shall be grouted from the inside. Lift holes shall be grouted from the outside and inside of the manhole. Manholes constructed of other materials may be approved by the City Engineer, provided they meet the requirements of ~~Chapter C1~~ of Department of Ecology's *Criteria for Sewage Works Design*. Material specifications need to be submitted for review before an alternate material will be considered. See Standard Drawings 7-1 and 7-2 for details.

Eccentric manhole cone shall be offset so the manhole cover shall not be located in the tire track of a travel lane.

Manhole frames and covers shall be cast iron casting marked "Sewer," conforming to the requirements of ASTM A-~~3045~~, Class 25, and shall be free of porosity, shrink cavities, cold shuts or cracks, or any surface defects that would impair serviceability. Repairs of defects by welding or by the use of smooth-on or similar material will not be permitted. Manhole rings and covers shall be machine-finished or ground-on seating surfaces so as to assure a nonrocking fit in any position and interchangeability. Manholes located in areas subject to inflow shall be equipped with East Jordan Watertite castings or approved equal.

Where lock-type castings are called for, the casting device shall be such that the cover may be readily released from the ring and all movable parts shall be made of non-corrosive materials and arranged to avoid possible binding. Lock-type manhole covers shall be required in all multi-family residential complexes, on school grounds, on manholes containing odor control devices and in any other locations as determined by City Engineer.

All castings shall be coated with a bituminous coating prior to delivery to the job site.

Safety steps shall be fabricated of polypropylene conforming to an ASTM D-4101 specification, injection molded around a 2-inch ASTM A-615, Grade 60, steel reinforcing bar or hot dipped galvanized bar with antislip tread. Steps shall project uniformly from the inside wall of the manhole. Steps shall be installed to form a continuous vertical ladder with rungs equally spaced on 12-inch centers.

Manholes shall be provided at a maximum of 400-foot intervals, at intersections and at changes in direction, grade, or pipe size. Manholes shall not exceed a maximum depth of 20 feet.

Slope through the manhole shall be a minimum 1/10 of 1 foot from invert in to invert out, unless otherwise approved by the City Engineer.

Where a smaller sewer joins a larger one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. An approximate method for securing these results is to place the 80 percent depth point of both sewers at the same elevation.

Pipe material shall be consistent between manholes. Straight grades between invert out of last manhole and connection to existing are preferred over drops whenever possible. Care must be taken when designing steep grades so as not to create a situation of excessive velocity or excavation. Grade changes associated with "sweeps" shall not be allowed.

The angle between the line(s) entering a manhole (inlets) and the line leaving (outlet) shall be no less than 90 degrees.

An outside drop connection will be provided for a sewer entering a manhole at an elevation of 24 inches or more above the manhole invert. Where the difference in elevation between the incoming sewer and the manhole invert is less than 24 inches, the invert shall be filleted to prevent solids deposition.

All manholes that are to be owned and maintained by the City shall be accessible at all times to operations and maintenance equipment and vehicles. At the discretion of the City Engineer, access drives may be required to provide a sufficient driving surface for City vehicles.

Inside drop connections will only be allowed when approved by the City Engineer. When approved, inside drops shall not exceed 8 inches in diameter and shall include a RELINER Inside Drop Bowl or approved equivalent.

Outside drop structures shall be constructed pursuant to Standard Drawing 7-4.

If an interior manhole coating is required, see section 7C.085.

7B.055 Manhole Sizing

~~Manhole sizing shall be determined by the following criteria:~~

~~A. 48 inch Manhole~~

- ~~1. Two connecting pipes, 8 inch to 12 inch diameter.~~
- ~~2. Three connecting pipes, 8 inch to 10 inch diameter, perpendicular.~~
- ~~3. Four connecting pipes, 8 inch diameter, perpendicular.~~

~~B. 54 inch Manhole~~

- ~~1. Two connecting pipes, 8 inch to 12 inch with more than 45o deflection.~~
- ~~2. Three connecting pipes, 10 inch to 12 inch diameter, perpendicular.~~
- ~~3. Four connecting pipes, 10 inch to 12 inch diameter, perpendicular.~~

~~C. 60 inch Manhole~~

- ~~1. Two connecting pipes, 15 inch to 18 inch diameter with less than 45o deflection.~~
- ~~2. Three connecting pipes, 15 inch diameter, perpendicular.~~
- ~~3. Four connecting pipes, 15 inch diameter, perpendicular.~~

~~In the above criteria, "deflection" refers to the angle between any two pipe channels in the manhole.~~

~~For other pipe configurations, the size of the manhole will be approved by the City Engineer.~~

~~Minimum manhole diameter shall be 48" and at least 38" greater than the largest connecting main.~~

~~Manhole diameter must be a multiple of 6" (48", 54", 60", etc.).~~

~~Each connecting main shall have at least 12" of manhole wall spacing between it and all other mains.~~

~~The angle between the main(s) entering a manhole and the main leaving shall be no less than 90 degrees.~~

The above configurations shall provide adequate shelves and room for maintenance and TV inspections of inlet and outlet pipes.

7B.060 High-Velocity Protection

Where velocities greater than 15 feet per second are expected, special provisions such as thrust blocking, pipe anchors, and piping materials shall be made to protect against displacement by erosion and shock and the presence of hydrogen sulfide gas.

7B.070 Sewer Main Cleanouts

Sewer main cleanouts are not an acceptable substitute for manholes; however, they may be used in lieu of manholes at the end of 8-inch-diameter lines of not more than 150 feet in length. Location of cleanouts for side sewers and building sewers are governed by section 7B.080 below, and the *Uniform Plumbing Code* as adopted.

Cleanouts on large diameter pipes are acceptable as a temporary structure for pipe lengths less than 150 feet. Requests for large diameter cleanouts will only be considered on the sewer lines that will be extended in the future. At no time shall a cleanout be substituted where a manhole is required as defined in Section 7B.050.

All cleanouts in City right of way shall be extended to grade. See Standard Drawing 7-5.

7B.080 Side Sewer

A side sewer refers to the extension from a building sewer, beginning 2 feet outside the outer foundation wall at the structure, to either (1) the sewer main for gravity sewer, (2) the STEP (see section 7E below), or (3) the grinder system service connection (see section 7F below). Side sewers from the sewer main to the right-of-way line shall be minimum 6-inch diameter. See Section 7B.030.E for tracer tape and toning wire requirements.

Each separate building on a parcel shall be served by an individual side sewer, except under the following conditions:-

1. A single-family residence with an accessory dwelling unit (ADU) may share a side sewer if they are in the same building. If they are in separate buildings, a separate side sewer is required from each building to the cleanout at the right-of-way line.
2. A duplex may have a shared side sewer for both units of the building. Alternatively, at the applicant's option, the units may have either (a) separate side sewers from each unit to the cleanout at the right-of-way line or (b) separate side sewers with separate connection at the sewer main.
3. Separate side sewers are required for cottages on the same parcel, from the building to the cleanout at the right-of-way line. If two cottages are attached to each other, they may share a side sewer from the building to the cleanout at the right-of-way line.
4. If a building has no inside plumbing fixtures, a side sewer to that building is not required.

~~In addition, both units of duplexes shall be served by separate side sewers. The configuration of side sewers does not affect the connection charges and fees due per OMC 13.08.~~ A cleanout shall be installed on all side sewers at the property line, as shown on Standard Drawing 7-19. Prior to the installation of a cleanout on an existing side sewer, a plumbing permit shall be obtained from the City.

Prior to connection of a side sewer to the public sewer, a connection permit must be obtained from the City. Side sewer pipe must meet either ASTM D 3034, SDR 35 solid wall pipe or ASTM F 794 for solid seamless profile pipe and meet design criteria covered by the Uniform Plumbing Code (UPC) as adopted.

The Public Works' Stormwater/Wastewater Operations Division shall be notified at least 2 working days prior physically connecting to a City sewer main.

If an existing sewer main with stubout(s) is located along one or more of the frontages of a proposed building requiring sewer service, then the building must be connected to the sewer system at ~~the an existing stubout~~, using a shielded repair coupling if a gasketed connection cannot be made. Repair couplings shall be of the type with a stainless steel shear ring, meeting the ASTM C1173 shear resistance test and equal to Fernco 1000 RC or 5000 RC Series couplings. Unshielded repair couplings shall not be used. Exceptions to this requirement (to connect to an existing stubout) include the following:

1. Site constraints that require ~~that~~ the building be connected to the sewer main at a different location than the stubout in order to maintain gravity flow from the building to the sewer main, or
2. The sewer main has been rehabilitated with cured-in-place-pipe (CIPP) material and the existing stubout was not reinstated (i.e. the CIPP material was not cut out at the stubout), or:

3. The existing stubout diameter is less than the diameter of the proposed side sewer.

The property owner or developer should contact Public Works to find out whether or not a sewer stubout is available to connect a proposed building to the sewer system.

If an existing stubout is not available to connect to, or one of the above exceptions applies, then the building shall be connected to the sewer main as shown in Standard Drawing 7-19. Taps shall be done by use of a core drill and to the service line shall not protrude into the existing main. A City Inspector shall be notified 48 hours (two working days) prior to any tap of a city sewer and shall be present to witness the tap. The inspector will collect all tapping cores from the contractor or shall be informed if the cores were washed into the sewer. Sewer saddles shall be Romac type CB.

Connections where a new building sewer is the same size as the existing main shall be accomplished by the installation of a new manhole. See Section 7B.040 above.

7B.090 Request for City Ownership of Private Sewers

The owner(s) of a private sewer system, as defined in Chapter 2(excluding side sewers), may request the City to assume ownership of a private system. The procedure for this request is as follows:

- A. The owner shall submit a written request to the Community Planning and Development Department identifying the private sewer system to be considered.
- B. The Community Planning and Development Department will process and review the request, analyze the system record drawings, and evaluate the public benefit received from City assumption of the private system.
- C. If the result of the private sewer system analysis shows City assumption provides public benefit, testing of the sewer will be conducted at the expense of the owner(s) of the private sewer. All tests applicable to new sewers shall be performed (refer to Section 7A.070). If it is determined that the public receives no benefit from the assumption of a private system, the City will provide a letter denying the request with specific information stating the reason(s) for denial.
- D. If the result of the testing shows the system conforms to current City Standards, the City will provide a letter of acceptance with directions to the owner to provide the City with the appropriate transfer documents; i.e., bill of sale and easements if necessary.
- E. If the inspection-testing reveals deficiencies with the system, the owner(s) of the private system ~~may elect~~ shall make the repairs specified by the City, at the expense of the owner(s) of the private sewer. After the owner(s) notifies the City of the repairs, the City will retest the system to verify that the line conforms to current standards before the City will process the transfer of ownership documents.

7C FORCE MAINS

7C.010 General

This section provides general information applicable to all force mains. Lift station force mains are addressed further in Section 7D. STEP systems are addressed separately in Section 7E. Grinder systems are addressed separately in Section 7F. Requirements for abandoning asbestos cement force mains are in section 6.210.

7C.020 Design Standards

The design of any sewer extension/connection shall conform to City standards, Department of Ecology's *Criteria of Sewage Works Design*, and any applicable standards as set forth herein and in Chapter 3, Sections 3.010 through 3.040.

The layout of extensions shall provide for the future continuation of the existing system as determined by the City. In addition, main extensions shall be extended to and across the side of the affected property fronting the main.

The system shall be designed at full depth of flow on the basis of an average daily per capita flow as shown on the table in Section 7B.020. A coefficient of friction of 120 shall be used for the Hazen-Williams "C" value, or 0.013 for Manning's "N" value.

New sewer systems shall be designed by methods in conjunction with the basis of per capita flow rates. Methods shall include the use of peaking factors for the contributing area, allowances for future commercial and industrial areas, and modification of per capita flow rates based on specific data. Documentation of the alternative method used shall be provided along with plans.

Privately owned pressure mains shall have a control valve installed on the main at the right-of-way.

Grinder system pressure mains shall not be combined with or connected to STEP pressure sewer mains. Grinder and/or STEP sewers may be allowed to connect to gravity sewer mains.

Minimum pressure sewer pipe size for lift stations shall be 4-inch diameter.

7C.030 Sewer Force Main

Sewer force mains, unless otherwise approved by the City Engineer, shall be constructed using materials conforming to one of the following:

1. Pressure polyvinyl chloride (PVC) pipe shall be rigid plasticized PVC suitable for use as a pressure conduit for conveyance of domestic sewage. PVC pipe shall conform to the requirements of ASTM D2241, pressure class 200 or better. The PVC pipe shall be in a white or green hue, not blue, yellow, or orange. Joints for pipe and fittings shall use sewage-resistant synthetic rubber gaskets conforming to the requirements of ASTM F477.
2. Pressure high density polyethylene (HDPE) pipe and fittings shall be PE 3608 HDPE meeting cell classification 345464C for black per ASTM D3350. HDPE pipe shall be manufactured in accordance with ASTM F714 and AWWA C906 (IPS), with a minimum wall thickness of DR11.
3. Depth. Force mains shall have a minimum 30 inches of cover to top of pipe. See Section 7A.020 for sanitary sewer/water main crossing requirements.
4. Velocity. The minimum velocity allowed is 3 feet per second (fps) at average dry weather flow. Three fps is required to scour settled solids. Maximum velocity allowed will be 6 fps.
5. Surge protection. PVC pipe is subject to fatigue failure due to cyclic surge pressures. Lift stations shall be constructed to minimize rapid changes in velocities and a properly sized surge tank and "soft start and stop" pump controls.
6. Pigging ports shall be required on all new force main installations
7. All pipe and services shall be installed with continuous tracer tape installed 12 inches to 18 inches under the proposed finished subgrade. The marker shall be plastic, non-biodegradable metal core or backing, marked "sewer" that can be detected by a standard metal detector. Tape shall be Terra Tape "D" or approved equal.

Toning wire is required for all force mains, and shall be green, UL listed for direct bury, Type UF, HDPE or HMWPE-coated, 12-gauge copper taped to the top of the pipe to prevent movement during backfilling. The wire shall be laid loosely enough to prevent stretching and damage. Nylon PVC coated THHN wire shall not be used for toning wire. The wire shall be wrapped to manhole or cleanout rings and valve body. Sufficient wire to allow a minimum of 2 feet (slack) above final grade shall be coiled/looped in structures to ensure the wire shall be accessible to hook up to a locator.

A 1-pound magnesium anode shall be buried with the pipe every 1,000 linear feet maximum for cathodic protection of the wire. Toning wire splices and connections to anodes shall join wires both mechanically and electrically and shall employ epoxy resin or heat-shrink tape insulation. Toning wire shall be tested prior to acceptance of the pipe system. A written notice from the contractor to the City at least two days prior to the test is required; such notice is to include information on the relevant experience of the company proposed to complete the testing. All costs incurred for the testing shall be the responsibility of the contractor. Contact the City of Olympia Water Operations Section at (360) 753-8333 for a copy of the City of Olympia Toning Wire Test Form, which shall be filled out during testing and submitted to the City before the work will be accepted.

7C.050 Air/Vacuum Valves

Air release valves and combination air/vacuum valves shall be constructed as shown in the Standard Drawings and located at the high points of the line within a manhole or approved vault that provides 18 inches of clearance on all sides between the assembly and the walls. Air release valves shall be fitted with an activated carbon canister as manufactured by Orenco Systems to prevent the release of disagreeable odors to the surrounding area. Grades shall be designed to minimize the need for air/vacuum valves when practical. Vehicular access to valve is required for maintenance.

7C.060 Force Main Drain

Provisions to drain a force main to facilitate repairs or to temporarily remove force main from service shall be provided. This may be accomplished through the use of a valved tee connected to a drain line at the low point of the line, with isolation valves on both sides of the tee along the main. A manhole shall be set over the force main at the valved tee.

7C.070 Thrust Blocking

Location of thrust blocking shall be shown on plans. Thrust block concrete shall be Class B, 3000 psi, poured against undisturbed earth. A plastic barrier shall be placed between all thrust blocks and fittings.

See Standard Drawings 6-14 and 6-15 in Chapter 6. Restraining joint systems may be allowed in lieu of thrust blocking when designed by a licensed engineer and approved by the City Engineer. Restraining joint brand, type, and size shall be specified on the plans.

7C.080 Force Main Termination

Hydrogen sulfide odors (H_2S) and the buildup of sulfuric acid (H_2SO_4) occur in the operation of a force main. To mitigate these conditions, some type of control method(s) shall be used. This may include chemical addition at the pump station and/or near the terminus.

The abatement of odors attributable to pressurized sewer systems is an ongoing problem throughout the City of Olympia. Citizens, rightfully, have the expectation to live in an environment, by and large, free of sewer odors. Therefore, to mitigate odors, development must anticipate the provision of odor control method(s). At a minimum, a preliminary design for odor control equipment addressing the potential method(s) shall need to be provided prior to permitting. Only proven technologies for the control of sewer odors will be approved by the City. The preliminary design shall need to discuss the feasibility of the method(s) proposed, provide construction design for any components to be installed beneath the paved areas, designate location(s) for placement of equipment and provide an engineer's estimate for the cost of designing, installing and maintaining the proposed odor control methods. The developer shall enter into an agreement with the City of Olympia Public Works Director to design and install odor control equipment, should it become necessary. A bond or other allowable security in an amount equivalent to 125 percent of the value estimated for the design and installation of the odor control equipment will be required by the City to guarantee the provision of the odor control equipment, should it become necessary. The necessity for installation of the odor control equipment will be predicated on whether complaints regarding odors are received from citizens and confirmed by City staff to be attributable to the pressurized sewer. The duration of the agreement and surety shall extend two (2) years beyond the occupation of seventy-five percent (75%) of the residences or commercial space served by the pressure sewer.

~~The outfall manhole (point of connection where force main discharges into gravity sewer) and the next downstream manhole on the gravity sewer shall be lined with PVC to protect the system against corrosion. Spray on coatings will not be accepted for new construction. The PVC lining shall be cast into the walls and floor of the manhole. No exposed concrete will be permitted. All work shall be done in accordance with manufacturer's recommendations and must be approved by the City. If a new outfall manhole and subsequent downstream structures are installed as part of the new system design, the configuration will be approved by the City. Spray on coating of existing manholes, if approved by the City, shall be a Spraywall system, including a moisture resistant primer coat. The downstream gravity sewer main connecting these manholes shall also be protected from the effects of hydrogen sulfide in a manner approved in writing by the City.~~

7C.085 Discharge Manhole Coating

The entire interior of the discharge manhole (point of connection where force main discharges into gravity sewer) and the next downstream manhole on the gravity sewer shall be lined or coated with one of the following systems to protect the concrete against corrosion.

1. Precast PVC Lining. The PVC lining shall be cast into the walls and floor of the manhole. No exposed concrete shall be permitted. All work shall be done in accordance with manufacturer's recommendations and must be approved by the City.
2. Spray-on Coating. For both new or existing manholes, if approved by the City, spray-on coatings shall be either a Spraywall system, including a moisture resistant primer coat, or Raven Lining 405 Epoxy. All work shall be done in accordance with manufacturer's recommendations and must be approved by the City. The ~~downstream~~ gravity sewer line pipe connecting these manholes, if concrete, shall also be protected from the effects of hydrogen sulfide in a manner approved in writing by the City.

7D LIFT STATIONS

7D.010 General

All lift stations shall be designed to serve the appropriate basin as identified in the Wastewater Management Plan or as determined by the City Engineer. All sewer lift stations shall be designed and located to optimize the service area to provide regional service. Temporary or interim lift stations will not be permitted. For basins that will serve more than 50 ERUs when fully developed to the zoned densities and that are unable to be served by gravity service, the Developer shall design and provide a lift station complying with the following minimum standards.

7D.020 Lift Station Design Report

If a lift station is determined to be necessary, the Developer shall perform a study prepared and stamped by a professional engineer licensed in the State of Washington, to determine that the lift station installation is sized to serve the overall sewage flows generated within the potential service area. The service area study shall include the Developer's plat boundary area and may include adjacent and future service areas as determined by the City. The final service area shall be the entire area which could be served by the installation of the lift station(s).

The design of any lift station shall conform to City of Olympia standards, Department of Ecology's *Criteria of Sewage Works Design*, especially Chapter C2 Sewage Pump Stations (most current edition), and applicable standards as set forth herein.

Four (4) copies of the Design Report shall be submitted to the City for review. At a minimum, the report shall include:

- Vicinity map and preliminary site plan layout
- Basin description, showing existing, new, and future planned development and improvement
- Analysis of existing flow, including I/I if there is flow data
- Population projection, flow projection, capacity requirements based on overall data collected
- Peaking factor (PF) from Battelle Laboratories Equation
- Pump selection based on system curve (TDH calculation) and pump curve analysis
- Run time calculation and cycle time
- Mechanical systems including HVAC
- Electrical system including lighting, power, communications, security, controls, instrumentation, and SCADA
- Force main size, length and material (see Section 7D.050)

- Force main flow velocities based on minimum and maximum head conditions
- Surge analysis and protection, if any
- Wet well sizing and details
- Wet well and dry well buoyancy analysis using site-specific soil and groundwater information
- Geotechnical analysis for wet well and lift station site and backfill and compaction specifications
- Connection point with downstream capacity
- Second power source or generator sizing
- Electrical requirements
- Odor and corrosion control
- Noise control
- For projects to expand or replace existing facilities: An approach and plan to maintain pump station operations during construction

7D.030 Lift Station Special Requirement

Unless the City Engineer determines that site-specific conditions require another type of pumping system, lift stations shall be factory-built Smith & Loveless Custom Series, wet well-dry well type. The lift station shall have, as a minimum, two vertical close-coupled, motor driven, non-clog sewage pumps with Smith & Loveless X-peller (when hydraulically possible) and single mechanical seals. The pumps shall have sufficient capacity and capability to efficiently handle the peak design flow with one pump out of service and to ensure a minimum velocity of 3 feet per second in the force main.

The following equipment and special modifications are standard requirements for all permanent wastewater lift stations constructed within the City of Olympia. City wastewater lift stations shall comply with City of Olympia landscaping standards. The following requirements are minimum standards and not all-inclusive.

A. The proponent is required to provide the City of Olympia a fee simple site outside existing right-of-way for construction of the lift station. The site shall have sufficient area with dimensions that allow for easy and safe access to the lift station. A chain link fence meeting the requirements shown on Standard Drawing 7-22I shall be installed around the entire lift station property, unless a smaller area to be enclosed is approved by the City Engineer as part of the lift station design.

B. A concrete slab a minimum of 6 inches in depth shall surround the pump station wet wells and dry wells and on-site generator, with a minimum of 2 feet side exposure for all openings. The slab shall be continuous between the wet well and the dry well and shall be installed at ground level as pursuant to Standard Drawing 7-18B.

C. Ingress and egress to perform preventative maintenance and repairs to wet wells and dry wells shall meet the turning radius requirements of AASHTO BUS-45. When performing routine or preventative maintenance access shall be such that a vehicle with an AASHTO BUS-45 rating will be clear of the vehicle travel lane and bike path. Any access roads longer than 150ft shall provide a turn around for a vehicle with an AASHTO BUS-45 rating.

D. Access roads, curb-cuts, etc., shall be designed with a driveway approach that meets current City of Olympia transportation and utility standards, and will accommodate vehicle ingress/egress requirements associated with AASHTO BUS-45.

E. If an access road is needed, a minimum 20-foot wide easement designed to support 20,000-pound axle loads throughout the year shall be provided from the nearest public road to the station to allow for maintenance of the station.

~~C.~~ An access road, with minimum 20-foot wide easement that shall support 20,000-pound axle loads throughout the year, shall be provided from the nearest public road to the station to allow for maintenance of the station.

~~DF.~~ Wet well shall be provided with full-depth (to bottom of cone) permanent, attached, internal stainless steel or polypropylene-coated (Lane International Corporation or approved equal) access ladder, impervious to corrosion.

~~EG.~~ Entry hatch to the station wet well shall be locking, aluminum, rated for H-20 loading, and pneumatically opened. The hatch shall be located over the full depth portion of the wet well closest to the access drive. The lift station shall be accessible at all times to operations and maintenance equipment and vehicles.

~~FH.~~ Entry lid to the station dry well shall be constructed of fiberglass or aluminum.

~~GI.~~ Station entry access shall be keyed to match all other City package stations. The Best Lock key system with single-key operation of the mechanism shall be supplied. For all other lock points and padlocks, a blank tumbler will be supplied, and the City will key to the desired code.

~~HJ.~~ Dry wells shall be a minimum of 9 feet in diameter with a forty-four inch (44") inside diameter entrance tube.

~~IK.~~ The dry well shall be vented with an exhaust fan to meet state safety standards and provide a minimum of six air changes per hour.

~~JL.~~ Dry wells shall be provided with an automatic sump pump plumbed to the lift station wet well.

~~KM.~~ Dry wells shall be provided with dehumidifier equipment appropriately sized to remove moisture from the dry well.

~~LN.~~ Safety guards shall be provided for all exposed drive lines and couplings.

~~MO.~~ Spare parts shall be provided as recommended by the manufacturer, with a minimum of two spare impellers (as designed), one complete set of seals, filters, and one set of volute gaskets. Two complete sets of operation and maintenance manuals and a list of the nearest dealers for spare parts and repair shall be provided. All replacement parts shall be readily available from a distributor in the U.S.A.

~~NP.~~ The pumps, motors, and wet well shall be in compliance with current engineering practices. They shall be fully compatible as an assembly and shall be engineered for the specific basin.

~~OQ.~~ The station shall be designed to have an isolation valve located in the discharge line between the station and the pumping bypass port no less than 12 pipe diameters from the dry well.

~~PR.~~ The station shall be designed to have a magnetic flow meter with remote transmitter and wall mounting. The flow meter shall be an ABB MagMaster MFF Series or City approved equal. The flow meter flow tube will typically be located in the bypass pumping port vault.

~~QS.~~ Hydrostatic level-measurement for pump control shall be provided by an ultrasonic transducer, installed as shown on Standard Drawing 7-22F.

~~RT.~~ City water ~~will~~shall be provided to the station for hose down. An approved backflow prevention device shall be provided on the water supply line outside the dry well and outside the perimeter lift station fence. The backflow device will be tested and certified by the City's Cross-Connection Specialist prior to acceptance of the system. The backflow device shall be installed inside an insulated enclosure to prevent freezing.

~~SU.~~ A 100-amp minimum 480/277-volt, 3-phase, 4-wire main service shall be provided pursuant to plans.

~~TV.~~ All electrical equipment shall be enclosed in a free-standing, vandal-proof, all-weather, NEMA 3R or better stainless steel traffic-control-type enclosure with factory-installed back panels and accessories. (Refer to Standard Drawing 7-18A.) Accessories should include internal fluorescent fixture, intrusion switch, panel heater and

thermostat, vents, thermostat-controlled fan, double-entry doors with three-point door latch system. Door latch shall be keyed to the City standard lock system, and able to be padlocked.

~~UW~~. A 100-amp minimum, 480-volt, 3-phase emergency power hookup shall be provided. The transfer switch shall be sized to accommodate the load with a 100-amp minimum. The receptacle shall be Crouse-Hinds AREA-10314 or Appleton ADR-1033 4-wire, 3-pole with male pins. See Section 7D.040 below for additional requirements.

~~VX~~. The electrical equipment shall include a 5 KVA minimum transformer in the dry well for the 120-volt, single-phase equipment.

~~WY~~. Wiring shall be THHN stranded copper, labeled at each end.

~~XZ~~. Lift station telemetry shall consist of a RUGID PLC, as manufactured by RUGID Computer, with a direct current uninterruptible power supply (DC-UPS), Metriicom, Utilinet IWR Series II, 900 MHz radio, antenna cable with lightning arrestor, and 6dB gain stick antenna that shall be supplied and installed by the contractor. Alarm and station status points shall be pursuant to attached list. The telemetry shall be enclosed in a NEMA 1 enclosure within the electrical cabinet. Prior to ordering the above equipment, the contractor shall contact the Pump Stations Supervisor, City of Olympia Public Works, for complete ordering specifications for the above telemetry. Nominal lead time is 12 weeks.

~~YAA~~. Pump control system shall be of the solid state programmable logic controller (PLC) type, RUGID Model 9 or approved equivalent. The system shall include a 4-20mA solid state liquid level sensing device. The controller shall be compatible with all established city systems and shall be accessible for ease of maintenance.

~~ZBB~~. The program for the pump controls will be furnished and installed by City of Olympia personnel. For assistance contact the Pump Stations Supervisor at 753-8588.

~~AACC~~. Pump motors shall be 3-phase, 480-volt, and be provided with elapsed time meters.

~~BBDD~~. Inspection and verification of operating parameters and standard requirements by a representative from the Public Works Department in addition to an electrical inspection, is required prior to acceptance of all lift stations.

~~CCCE~~. Wet Well Sizing Criteria:

1. Provide wet well operating volume pursuant to DOE *Criteria for Sewage Works Design*, ~~Chapter C2~~most current edition. For constant speed pumps, the minimum volume between pump on and off levels can be calculated using the following general formula:

$V = tQ/4$, where

V = minimum volume (gallons)

t = minimum time between pump starts

Q = pump capacity (gallons/minute)

2. Provide for a minimum of 45 seconds pump run time per pump cycle and a maximum of six (6) pump cycles per pump per hour.

~~DDFF~~. Lift Station Emergency Storing Criteria:

1. Emergency storage shall be provided for 2 hours of design average flow using a peaking factor of 2. This calculation is to be submitted with the system design and approved by Public Works staff.

Note: The 2-hour time was determined as an average response time by a City crew. The peaking factor was set at 2, as opposed to 3 or 4, due to typical emergency being caused by power outage.

2. All volume below the hydraulic gradient may be used as emergency storage; i.e., wet well, conduit, manholes. This condition must be verified by calculation and submitted for approval by Public Works staff.

EEGG. All lift stations shall be provided with an on-site Cummins/Onan diesel emergency power generator in accordance with Section 7D.040.

FFHH. The program for the pump controls will be furnished and installed by City of Olympia personnel. For assistance contact a Remote Systems Technician at 753-8588.

GGII. Plans and specifications must be submitted and approved in writing prior to ordering a package lift station.

HHJJ. The contractor shall supply and install all sensors for the above alarm points and connect them with the appropriate wire size and label to an alarm terminal strip. The alarm points terminated on the terminal strip shall be identified by number and a label showing the number, and an alarm shall be provided adjacent to the terminal strip. From the terminal strip to the telemetry terminal strip, all points shall be connected by a single multiconductor-shielded cable encased in a single conduit. The following note shall be added to all lift station plans:

Cage#-card#-point# is required labeling. Labels must be installed at both ends of each wire: at the PLC and at the terminal blocks. An example label for a wire having an input point number of 7 and its slot/card number is 4 would be labeled "Slot4 Point 7" in two lines of text. Prior to ordering and wiring of telemetry components, the contractor shall contact the City of Olympia's Pump Stations Supervisor at 753-8318.

7D.040 Auxiliary Power System

General:

Diesel emergency power generation equipment (genset) designed with capacity and rating to safely carry the entire connected lift station load shall be provided at the lift station site and will operate the lift station in the event of a power outage. The Developer shall provide the City of Olympia the design load calculations during the submittal process. The diesel genset shall be manufactured by Cummins/Onan.

The auxiliary power unit shall include, but not be limited to, the following:

- A. Generator, control panel and circuit breaker.
- B. Engine, radiator and exhaust system.
- C. Fuel tank (capacity for 24 hours full load, plus 25% with minimum volume of 200 gallons). The tank shall be completely filled with diesel at the time of acceptance by the City.
- D. Locking generator enclosure, keyed with City of Olympia standard Best Lock key system with single-key operation of the mechanism. A blank tumbler shall be supplied, and the City will key to the desired code.
- E. Automatic transfer switch.
- F. Radiator protection (as approved by the City) or automatic louvers.
- G. Block heater connected to power supply and not generator.
- H. Battery and rack.
- I. Battery charger connected to power supply and not generator.
- J. Conduit, wire and piping.
- K. Coolant recovery system.

The generator set and transfer switch shall be Cummins/Onan, or City approved equal complying with the latest edition of Onan Corporation standard specifications and with City standards.

The generator set shall include the following:

Engine:

- Single phase, 1500 watt coolant heater - 115 volt or 240 volt sized accordingly for the engine and climate conditions

Generator Set:

- Mainline circuit breaker
- Weather-protective/sound dampening enclosure with mounted silencer (maximum noise level per OMC Chapter 18.40.080).
- 5-year basic power warranty

Accessories:

- Batteries
- Battery charger, 2 AMP, 12 VDC, 120 VAC input (Shall maintain a float charge)
- Vibration isolators, pad type

Control Panel:

- Annunciator relays (12)
- Run relay package (3)
- Low coolant level shutdown
- Anti-condensation space heater, 120 VAC
- Oil temperature gauge
- Emergency stop switch

Fuel System:

- Diesel

Alternator:

- Anti-condensation heater, 120 VAC

Exhaust System:

- Exhaust silencer (maximum noise level per OMC Chapter 18.40.080)

Control Features:

- Run-stop remote switch
- Remote starting, 12-volt, 2-wire
- Coolant temperature gauge

- Field circuit breaker
- DC voltmeter
- Running time meter
- Lamp test switch
- Oil pressure gauge
- Fault reset switch
- Cycle cranking
- 12-light engine monitor with individual 1/2-amp relay signals and a common alarm contact for each of the following conditions:
 - Run (Green Light)
 - Pre-Warning for low oil pressure (Yellow Light)
 - Pre-Warning for high coolant temp (Yellow Light)
 - Low oil pressure shutdown (Red Light)
 - High coolant temperature shutdown (Red Light)
 - Over crank shutdown (Red Light)
 - Over speed shutdown (Red Light)
 - Switch off (Flashing Red Light - indicates generator set not in automatic start mode)
 - Low coolant temperature (Yellow Light)
 - Low fuel (Yellow Light)
 - Two customer selected faults (Red Light)
- All lights shall be LED

AC Meter Package:

Order with NFPA 110 monitor to meet code requirements.

- AC voltmeter (dual range)
- AC ammeter (dual range)
- Voltmeter/ammeter phase selector switch with an off position
- Dual scale frequency meter/tachometer
- AC rheostat (panel mounted) for +5% voltage adjust

The transfer switch shall include the following:

- Sized for full station and auxiliary equipment load, plus 25%

Pole Configuration:

- 4 pole

Frequency:

- 60 Hertz

Application:

- Application - Utility to genset

System Operation:

- Three-phase, 3-wire or 4-wire

Enclosure:

- B002 Type 3R; Intended for outdoor use (dust proof and rainproof) with radiator grill protection or automatic louver system (as approved by the City)

Listing:

- Listing - UL 1008

Programmed Transition:

- Program Transition - 1-60 seconds

Suitable guards shall be provided on all electrical parts to minimize the personal shock hazard.

Generator shall be broken in sufficiently to permit application of full load immediately upon installation.

Generator supplier shall provide all tools for the generator set as recommended and required by the manufacturer.

Generator installation shall be checked by the supplier after installation to determine that the installation is correct. Written confirmation shall be provided to the City. Generator supplier shall perform a full load test for two (2) hours after installation is complete. Results from the start up load tests and generator checklists shall be provided to the City. Inspection and verification of operating parameters and standard requirements by a representative from the Public Works Department in addition to an electrical inspection, is required prior to acceptance of a generator.

Generator supplier shall provide a minimum of four (4) hours of training for City personnel at the station site during startup.

Generator manufacturer shall provide 2 copies of the maintenance and operation manual and 1 Adobe Acrobat Reader (.pdf) electronic version. These manuals shall be complete and shall include all information necessary to all City personnel to maintain the generator.

The Developer shall provide the following spare parts for the generator: one complete replacement set, combustion air filters, two complete replacement sets, lube oil filters, two complete replacement sets, fuel filter (if required), two complete replacement sets, coolant filters (if required), one complete replacement set, all V-belts, one complete replacement set, special tools for engine or generator.

Generator and fuel tank mounting pad shall be per the manufacturer's requirements.

7E STEP SYSTEM

7E.010 General

A Septic Tank Effluent Pump (STEP) system may be installed to serve residential and light commercial locations only where approved by the City. A STEP application with a proposed site plan is required for each individual on-site system.

Any new single-family subdivision designed with STEP sewers shall include an easement on the face of the plat for access to all lots.

A STEP system is a facility consisting of a tank or tanks for settling and digesting wastewater solids and a pressure piping system for conveying the supernatant liquid into the sewer system. Most of the wastewater solids remain in the STEP tank and are removed periodically.

Only sanitary wastewater shall be discharged into the tank. Roof drains and other stormwater sources shall be strictly excluded.

Operation and maintenance of the tank, pump, and pump controls will be the responsibility of the City only after the system has been inspected and approved and an easement is granted to the City and the warranty period of one year has expired. It is required by the City that the easements for a new development be granted on the plat; otherwise, an easement for each lot shall have to be granted at the time of connection. The contractor shall submit Record Drawings conforming to section 3.065 of these Standards for review and approval by the City. Service will not be provided to the customer until Record Drawings have been approved by the City.

Power and telephone service (when applicable) shall be provided and paid for by the customer. Property owners shall be responsible for the operation and maintenance of their generator transfer switch. The generator transfer switch for all STEP systems shall be accessible without opening the control panel. The customer shall be responsible for notifying the City when the control panel alarm buzzer is activated. All sewer pipe, drains, and plumbing between the tank and the building shall be the responsibility of the customer. The customer shall be responsible for curtailing water usage until City personnel respond to the customer's notification. The City will accept no responsibility for damages resulting from a plumbing backup, such as may occur if water usage is not curtailed during an alarm condition or if the alarm is disabled prior to the response of City personnel. The audible alarm may be silenced after City personnel have been properly notified of the alarm condition. Service shall not be provided in cases where the STEP tank and/or controls are made inaccessible by the installation of fences or other impediments.

Service shall not be provided to systems that have situations where a dangerous or potentially dangerous situation exists.

Currently, only the Orenco STEP Pump System shown in Standard Drawing 7-7 has been approved by the City. However, other suppliers of STEP system components will be considered if equal to the Orenco product. The specifications must be submitted to the City for review and approval.

7E.020 Design Standards

The design of any STEP sewer system shall conform to City standards, ~~Chapter C1 of the DOE Criteria for Sewage Works Design~~, and any applicable standards as set forth herein and in Chapter 3, Sections 3.010 through 3.040.

The layout of STEP force main extensions shall provide for the future continuation of the existing system as determined by the City. ~~In addition, main extension shall be extended to and through the side of the affected property fronting the main.~~ Individual service boxes shall be located near the right-of-way line at the property corner opposite to the location of water meter.

Pipeline sizing shall conform to the criteria as set forth in the most recent version of the Olympia Wastewater Management Plan.

Aerators may be required for each five residential installations or commercial/multifamily installations with 50 gpm or greater average discharge.

- A. Pipeline design information/calculations. The following information shall be submitted to the City for review:
1. Map showing contributing area for each pipe.
 2. Flow generation assumptions, including

Units per acre

Gallons per capita per day

Population per unit

Average flow

Design flow - the minimum peak flow equal to or greater than the following:

$$Q = 15 + .5D \text{ or}$$

$$Q = 15 + .15P$$

Where:

Q = Design peak flow, gpm

D = Number of equivalent dwellings

P = Population

Peak flow is defined as an event that lasts about 15 minutes

Average and design flow velocities

Slope of hydraulic grade line (ft./ft.)

Total head loss (ft.)

Site-specific calculations verifying tank resistance to buoyancy forces

B. Commercial/multifamily STEP submission requirements:

All commercial/multi-family systems must meet or exceed all criteria set forth for single-family residential installations. All design calculations are required as part of the submittal. Tanks placed in series to provide the required storage capacity will be strictly prohibited. Tanks placed in parallel will be allowed when approved by the City. Electrical service shall be sized appropriately to serve the equipment installed.

A STEP tank shall contain detention volume, working volume, and storage volume. The minimum STEP tank size shall be 1,500 gallons. Detention volume is defined as the volume of liquid below the “OFF” switch (STEP). Tanks that serve multiple structures or structures with commercial wastewater discharge shall be sized in accordance with the following equations:

$$V = 1.5Q \text{ (residential strength waste)}$$

$$V = 2.0Q \text{ (nonresidential strength waste)}$$

Where:

V = Liquid volume (gallons)

Q = Peak day flow for the structure being served (gallons per day)

The equation provides the minimum liquid volume within the STEP tank. The tank shall also contain sufficient working volume and storage volume. Liquid volume shall be approximately 65 to 75 percent of the total tank volume.

Working volume is defined as the volume between the “ON” and the “OFF” switch. The working volume shall be greater than the difference between the peak influent flow and the discharge of the STEP or grinder pump over a period of time estimated to be the peak duration (typically 15 minutes).

STEP tanks shall have a minimum of 24 hours of emergency storage volume. Tanks without 24 hours of storage shall be installed with a power transfer switch with an emergency generator plug or other device for allowing emergency power connection, or shall have reserve volume provided with a separate vessel. Storage volume is defined as the volume between the “OFF” switch and the top of the tank.

The following information shall be submitted to the City for review:

Tank Sizing Calculations:

Maximum hydraulic gradelines (mainline, service line, and minor friction losses based on peak flow shall be no greater than the installed elevation of a STEP pump plus 85 percent of the total available head of the pump.

Pump Operation Criteria and Sizing Calculations:

Pump time per cycle

Total volume pumped per cycle

Pumping cycles per day

Total pumping time per day

Total dynamic head

Pump size

Standby or alternate pump requirements

Auxiliary power generating equipment requirements

7E.030 STEP Force Main

A. Mainline. The minimum pipe size used is 2 inches nominal diameter. This is based on maintenance requirements rather than flow. Pipe shall be PVC, ASTM D2241, SDR 21 (200) with rubber gasketed joints. Gaskets shall comply with ASTM D 1869. STEP mains shall have a minimum 36 inches of cover to top of pipe. See Section 7A.020 for sanitary sewer/water main crossing requirements. STEP main lines shall be the following diameters: 2, 3, 4, 6, 8, 10, 12.

The discharge manhole (point of connection where STEP main line discharges into gravity sewer) and the next downstream manhole on the gravity sewer shall be lined or coated with one of the systems described in section 7C.085. All work shall be done in accordance with manufacturer’s recommendations and must be approved by the City. If a new discharge manhole and subsequent downstream structures are installed as part of the new system design, the configuration will be approved by the City.

B. Service line. Service connection pipe shall be minimum 1-inch diameter, Schedule 80 PVC water pipe, solvent weld joint located at 90 degrees to the main line when possible. Solvent cements and primer for joining PVC pipe and fittings shall comply with ASTM D 2564 and shall be used as recommended by the pipe and fitting manufacturers.

Services shall have a minimum 24 inches cover to top of pipe. Pressure services crossing over any waterline shall follow Department of Ecology requirements.

C. Building sewer. The gravity building sewer between the building and the tank shall be designed and installed in accordance with the Uniform Plumbing Code as adopted by the City. The owner shall be responsible for maintenance of the building sewer.

D. All STEP mains and service lines shall be installed with continuous tracer tape installed 12 to 18 inches under the proposed finished grade. The marker tape shall be marked “sewer” and be plastic, non-biodegradable metal core or backing that can be detected by a standard metal detector. Tape shall be Terra Tape “D” or approved equal.

Toning wire is also required for all STEP mains and service lines. Toning wire shall be green, UL listed for direct bury, Type UF, HDPE or HMWPE-coated, 12-gauge copper taped to the top of the pipe to prevent movement during backfilling. Nylon PVC coated THHN wire shall not be used for toning wire. The wire shall be laid loosely enough to prevent stretching and damage. The wire shall be brought up and tied off at the inside top of valve boxes on STEP mains, or the cleanout cap on the house side of STEP tanks on all service lines. Sufficient wire to allow a minimum of 2 feet (slack) above final grade shall be coiled/looped in structures to ensure the wire shall be accessible to hook up to a locator.

A 1-pound magnesium anode shall be buried with the sewer line every 1,000 linear feet for cathodic protection of the wire. Toning wire splices and connections to anodes shall join wires both mechanically and electrically and shall employ epoxy resin or heat-shrink tape insulation. Toning wire shall be tested prior to acceptance of the pipe system. A written notice from the contractor to the City at least two days prior to the test is required; such notice is to include information on the relevant experience of the company proposed to complete the testing. All costs incurred for the testing shall be the responsibility of the contractor. Contact the City of Olympia Water Operations Section at (360) 753-8333 for a copy of the City of Olympia Toning Wire Test Form, which shall be filled out during testing and submitted to the City before the work will be accepted.

7E.035 Fittings

All pipe fittings shall have a minimum working pressure rating equal to 150 psi. Fittings shall be PVC 1120, rubber joint complying with ASTM D-1784, D-2466, or D-2467 for pipe larger than 1 inch. Solvent weld fittings for 1-inch pipe shall be socket-type Schedule 40 and shall comply with ASTM D-1784 and ASTM D-2466.

7E.040 Valves

A. Ball and gate valves. All 1-inch valves shall be PVC ball valves with preloaded EPDM stem seals, micro finished PVC ball, and self-adjusting polyethylene ball seat to compensate for wear and prevent over tightening. Valves shall be designed for use with corrosive fluids, for low-torque manual operation, and for a working pressure of 150 psi. One-inch valves shall be LT-1000-S as manufactured by KBI (King Brothers Industries) or GF500 as manufactured by George Fisher Signet, Inc.

Two-inch and larger valves shall be M&H Valve Company or American Flow Control Series 2500 resilient wedge gate valves with an epoxy coating to resist corrosion. A ball or gate valve shall be located at every intersection and at a maximum of every 500 feet. Valves may be installed in conjunction with required pigging ports.

B. Air/vacuum valves. Air release valves and air/vacuum valves shall be located at the high points of the line. Profiles for each pipe run shall be submitted with the hydraulic grade line for both static and dynamic flow conditions to show where the critical points are for air release valves. Vehicular access to air/vacuum valves is required for maintenance.

Because the air released by these valves will contain hydrogen sulfide, the valves and their enclosures have to be constructed of corrosion-resistant materials. The valve vaults shall also have insulated lids to prevent freezing. The air released from the valve will be quite odoriferous; thus, each vent shall be equipped with an odor-control system such as activated carbon filters impregnated with sodium hydroxide.

C. Check valves. Check valves used on service lines shall be a tee or wye pattern swing check, PVC. It will have a working pressure of 150 psi. Valves shall be designed for use with corrosive fluids. A check valve shall be installed at the end of the service stub-out at the property line and installed in a valve box pursuant to Standard Drawing 7-12, located near a front corner of the lot. Check valves shall be King Brothers, KSC, Spears, or approved equal.

D. Pressure-sustaining valve assembly. Pressure-sustaining valves are sometimes required in the design of STEP systems to keep the pipeline full during periods of low or no flow or when siphoning conditions exist.

The pressure-sustaining valve shall maintain inlet pressure at a predetermined set point, as determined by the City. It shall open as pressure starts to increase above the set point and close as pressure falls below the set point. In the open position, flow shall enter the valve in a direction axial to the pipe, turn radially outward through a slotted grillwork, and then inward to the former inlet axial direction. The valve shall be constructed of two parts; a 316

stainless steel body and an elastometric liner or control element. The valve shall be a Roll Seal Valve as manufactured by the Cla-Val Valve Company, or approved equal.

E. Pressure-sustaining valve vaults. Pressure-sustaining valve vaults shall be precast reinforced concrete vaults with spring-assisted hinged galvanized steel doors that open to a minimum of 36-inch by 60-inch clear opening and shall be marked “sewer.” The entire unit shall be rated for H-20 traffic load and have extensions as needed.

F. Pressure tank. The pressure tank shall consist of a steel tank containing a sealed-in-place heavy-duty diaphragm that separates air from the water. The portion of the tank where water is stored shall be coated with an FDA-approved fusion-bonded polymeric lining material that isolates water from the metal tank and protects the tank from corrosion. The tank shall be suitable for direct bury or continuous operation in a damp environment. The tank shall be similar in all respects to an Aqua-Air V-45B as manufactured by A.O. Smith, Consumer Products Division, Inc., or approved equal.

G. Pressure gauge. The pressure gauge shall be capable of measuring the pressure of water from 0 to 30 psi within a 1 percent full-scale accuracy. The gauge shall have a 22-inch face and shall be corrosion- and weather-resistant, suitable for outdoor installation.

H. Valve stand. Valve stands shall include, as the top portion, an adjustable stanchion type support with at least 4 inches of adjustment. They shall comply with Federal Specifications WW-H-171E (Type 39) and Manufacturers Standardization Society SP-69 (Type 38). They shall be similar in all respects to Figure No. 264, as manufactured by Grinnell, Inc., or equal approved by the engineer. The bottom portion shall be manufactured as shown on Standard Drawing 7-17.

I. Valve box lids. Valve box lids shall be specified to be marked with “sewer” so they can quickly be distinguished from valves in the water system.

All service connection boxes shall be Carson Model 1419 with hinged bolt-down cover and 1419E extension box as required, or approved equal.

All main line valve boxes shall be Rich No. 940, or approved equal.

7E.050 STEP/Grinder Pigging Ports

A pipeline pig is a projectile that is forced through the inside of a pipe to clean pressure pipelines. A pigging port is used as a point to send or retrieve the pig. Pigging ports shall be located outside the paved area but within right of way as shown in Standard Drawings 7-13 and 7-13A.

Pigging ports may be required:

- A. At a change in pipeline size;
- B. At the end of every dead end line; and
- C. No farther than every 3,000 feet.

These locations are subject to review and approval by the City.

7E.060 STEP System Septic Tank

~~The City maintains a list of approved STEP tanks. Proponents should submit plans specifying only approved tanks. The list is updated annually; submittals must be received by November 1 of the previous year. A STEP tanks may~~ shall be designed for a site-specific application and meet all requirements within this section.

Tanks for single-family residential use shall be rectangular precast concrete or fiberglass, two-compartment, and shall have been designed by a registered structural engineer. Tank liquid volumes shall be sized as follows:

Single Family Residential Homes or Duplexes: 1,500 gallons.

Tank sizes for applications other than those noted, including commercial uses, will be approved by the City.

STEP tank maximum depth shall be 4 feet (as measured by the pump riser length). Deeper installations, if required by local conditions and approved by the City, will require special access modifications.

All tanks shall be manufactured for acceptance of pump assemblies or effluent filters and have a precast groove 1-inch wide by 2 inches deep, 30 inches in diameter, to allow positive attachment of the riser. The manufacturer shall provide the structural design and certification to the City for review. Concrete or fiberglass manufacturers not yet approved or approved manufacturers seeking approval for a new tank design are subject to an independent structural analysis if required by the City Engineer. The manufacturer shall bear the expense of this analysis. The design or analysis shall be in accordance with accepted engineering practice. Tanks 0 to 4 feet in depth shall be designed for the following loading conditions:

- A. Top of tank 400 pounds per square foot.
- B. Lateral load of 62.4 pounds per square foot.
- C. The tank shall be designed to support a 2,500-pound wheel load.
- D. The tank shall be designed to withstand hydrostatic loading equal to the maximum depth of bury in addition to the soil loading. Maximum depth of bury shall be measured from the ground elevation to the invert of the sewer line entering the tank.

Deeper installations, if required by local conditions, will require special consideration, as will tanks located where a vehicle might be driven over them. Tanks approved as traffic-bearing tanks shall be designed to withstand an H-20 live load with a minimum soil cover of 18 inches.

All tanks shall be guaranteed in writing by the tank manufacturer for a period of two years from the date of City acceptance. Manufacturer's signed guarantee shall accompany delivery.

Systems installed on a site where an existing septic tank exists may not use the existing tank. The existing tank must be removed or abandoned pursuant to DOH and/or Thurston County Environmental Health Department requirements.

- E. All STEP tanks shall be located within 20 feet of the roadway fronting the home served by the system. Tanks shall be accessible at all times. Enclosing STEP tanks with fencing, shrubbery, or other obstructions is not permitted. An exception to this standard may be granted for sewerage existing structures where in the opinion of the City Engineer it is not practical or feasible to maintain the standard.

7E.062 Concrete Tank

Concrete material and construction shall meet the requirements of Section 6-02 of the *WSDOT/APWA Standard Specifications for Road, Bridge and Municipal Construction*, most current edition.

Walls, bottom, and top of reinforced concrete tanks shall be designed across the shortest dimension using one-way slab analysis. Stresses in each face of monolithically constructed tanks may be determined by analyzing the tank cross section as a continuous fixed frame. The walls and bottom slab shall be poured monolithically. Concrete shall achieve a minimum compressive strength of 5000 psi in 28 days.

Reinforcing steel shall be ASTM A-615, Grade 60, $f_y = 60,000$ psi. Details and placement shall be in accordance with ACI 315 and ACI 318. The concrete mix shall not be modified unless the mix design is reviewed and approved by the City.

Tanks shall be protected by applying a heavy cement-base waterproof coating, Thoroseal or equal, on both inside and outside surfaces.

Tanks shall be manufactured and furnished with an 18-inch-diameter access opening over each compartment. Modification of completed or existing tanks will not be permitted for structural, warranty, and liability reasons. Tanks shall be furnished without concrete access hole lids. In order to demonstrate water tightness, tanks shall be tested prior to acceptance. Each tank shall be tested at the factory by filling with water to the base of the riser and

letting stand. After 24 hours, the tank shall be refilled to the soffit and the exfiltration rate shall be determined by measuring the water loss during the next two hours. The two-hour water loss shall not exceed 1 gallon.

Tanks shall not be moved from the manufacturing site to the job site until the tank has cured for seven days and has reached two-thirds of the design strength.

7E.064 Fiberglass Tank

The tank shall be constructed with a glass fiber and resin content specified by the manufacturer and with no exposed resin-coated glass fibers. The manufacturer must be approved by Orenco Systems, 814 Airway Ave Sutherlin, Oregon 97479, and by the City Engineer. The manufacturer shall supply to the City, without charge, satisfactory evidence of testing by an approved laboratory showing compliance with IAPMO ICC 3-74, excepting as herein modified. Any metal part shall be 300 series stainless steel.

Inspections may be made by the City Inspector in the supplier's yard within the plant, upon delivery, and again after installation. The wall thickness shall average at least 3 inches for 1,000 gallons. When less than 3/16-inch in thickness, or if any delamination is suspected within any portion of the tank, the inspector may drill a 3/16-inch-diameter hole through the tank wall for inspection purposes. If the required minimum 3/16-inch thickness is not found, repair, if feasible, shall be the responsibility of the contractor. If repair is judged not feasible, the tank will be rejected. If the required minimum 3/16-inch thickness is found and no delamination is present, the repair will be the responsibility of the City.

Holes specified for the tank will be provided by the manufacturer. Resin shall be properly applied to all cut or ground edges so that no glass fibers are exposed and all voids are filled.

Ty-Seal neoprene gaskets or equal shall be used at the inlet to join the tank wall and the ABS inlet piping. ABS Schedule 40 pipe and fittings shall be used at the inlets.

Each tank shall be water tested on the project site after assembly and prior to backfill by the contractor and witnessed by the inspector. Every tank shall be assembled by the contractor and water raised to the brim of the access opening for a minimum of two hours. The tank shall show no leakage from section seams, pinholes, or other imperfection. Any leakage is cause for rejection.

Fiberglass tanks shall be handled, stored, and installed as recommended by the manufacturer. Backfill shall include a minimum 6-inch-thick envelope of pea gravel completely around the tank.

Concrete of sufficient volume to address buoyancies forces shall be placed above the gravel envelope between the riser ports on the top of the tank. A layer of 6-mil. plastic shall be placed between the concrete and the gravel to prevent bonding. The concrete cap shall be rough formed in sections not exceeding 10 cubic feet each. Adequate reinforcing steel shall be placed to form lifting handles in each section to allow removal to gain access to the tank for maintenance or replacement.

7E.066 General Installation

Tanks shall be bedded on 6-inch sand or pea gravel. Backfill for all tanks shall include a minimum 6-inch thick envelope of pea gravel completely around the tank to at least half way up the side of the tank. Sides shall be compacted in 1-foot lifts to the same or greater density than the surrounding area.

After the tanks have been set in place and the riser installed, but prior to backfilling, each tank shall be tested by filling the tank to 2 inches above the base of the riser for a 2-hour period. Water loss shall not exceed 1 gallon over the 2-hour period.

Tanks installed where groundwater levels are above tank bottom require precautions to prevent flotation. In general, tanks shall immediately be filled with water and shall not be pumped down more than 3 feet below top of tank.

Tank excavation shall be backfilled with select material free of boulders and compacted to a dry density equal to or greater than that of the adjacent, undisturbed soil. Finish grading, cleanup, and restoration shall be completed prior to final acceptance by the City.

7E.070 Tank Riser

Pump chamber risers shall be 30-inch-diameter fiberglass or ribbed PVC as manufactured by Orenco Systems, Inc., or approved equal. Solids compartment riser shall be as shown on the engineering drawings and have a diameter of 24 inches. Pump chamber risers shall be factory equipped with the following:

- A. Two 1-inch or one-3-inch-diameter (IPS) neoprene grommets, one for the pump discharge, installed between 8 to 12 inches from the top of the riser, and one for the splice box conduit.
- B. A PVC splice box with 4 cord grips and 1-inch outlet fitting, Orenco Model No. SB4i or approved equal.
- C. A lid shall be furnished with each riser. It shall be latching and shall be constructed of fiberglass with an aggregate finish. Riser and lid combination shall be able to support a 2,500 pound wheel load. This does not imply that PVC risers are intended for traffic areas. All valves and unions shall be no more than 12 inches deep in riser.
- D. Each riser shall be bonded to the top of the concrete tank with a two-part epoxy that shall be supplied with the riser by the manufacturer. The epoxy shall be applied in accordance with the manufacturer's recommendations. A generous bead of epoxy shall be laid completely around the bottom of the riser prior to mounting the riser on the top of the tank. After the riser is in place, a generous fillet shall be run completely around the inside base. The epoxy shall be allowed 4 hours curing time at 64o F; otherwise a greater time shall be allowed based on the manufacturer's recommendations before backfill is placed over tank. Care shall be exercised during the curing period to avoid dislodging the riser or disrupting the watertight seal between the riser and tank.

7E.080 Pumping Tank Equipment

Pumps shall be stainless steel, thermoplastic, or coated inside and out with baked-on epoxy paint, UL listed for use in effluent. All pumping systems shall be Orenco Systems Model Series P100511 High Head Pumping Assemblies or approved equal comprised of:

- A. Standard vault: 12-inch by 54-inch Biotube pump vault with external flow inducer, Orenco Model No. PVU 54-1819, with eight 1 3/8-inch-diameter inlet holes; 19 inches from base; with an 18-inch tall Biotube filter cartridge or approved equal.
- B. Hose and valve assembly: Includes 1-inch-diameter flexible PVC hose with quick-disconnect fittings and PVC ball valve. Orenco Model No. HV 100 BFC or approved equal.
- C. Mechanical float switches shall be mercury-free. See Standard Drawing 7-7 for information on float switch spacing, mounting, etc.
- D. Pump: OSI High Head, 1/2 hp, 115-volt, single-phase, Model P100511 high head, with 8-foot cord and 1/8-inch bypass orifice for effluent application, or approved equivalent. Higher head or discharge pumps may be allowed under certain circumstances with prior approval. Wiring to the control panel shall be #12 AWG THHN stranded wire as a minimum and follow the manufacturer's color coding.

All pumping systems shall be installed in accordance with the manufacturer's recommendations. Wire type and color shall conform to the control panel manufacturer's recommendations. Marking wire with tape or labels in lieu of recommended wiring colors will not be accepted. Pumps shall be accessible for operation and maintenance from ground level.

7E.085 Gravity Discharge Tank Equipment

Gravity discharge tanks shall be equipped with Orenco Systems Model FT1254-36 Effluent Filter, installed in conformance with the Standard Drawings and composed of the following components:

- A. PVC Vault: 12-inch diameter by 54-inch depth with eight 1 3/8-inch-diameter inlet holes, polyethylene effluent screen, 13-inch-diameter PVC intrusion pipe with overflow screen on top.
- B. 13-inch-diameter PVC discharge fitting with seep ring.
- C. 13-inch-diameter PVC 90 degree elbow for mounting on the bottom of the vault.

- D. 13-inch-diameter flexible PVC hose, a minimum of 60 inches in length, with quick-disconnect fittings on vault end.

7E.090 Controls and Alarms

All residential STEP systems shall be wired to a dedicated 25-amp breaker that supplies power to the STEP system control box only. This is required to avoid damage or overload to system and appliances. The homeowner shall be responsible for the operation and maintenance of the breaker and feeder wires that serve the STEP system. See Standard Drawing 7-25 for the control wiring layout. All buried power shall be installed with continuous tracer tape installed 12 inches above the buried power. The tracer tape shall be plastic non-biodegradable metal core backing marked "power."

Control panels shall be Orenco Systems Model S-IRODS (without redundant off) or approved equal with the following features:

- A. Rating: 1 HP/115 VAC, 2 HP/230 VAC, single-phase, 60 Hz. Motor start contact shall be rated for 25 FLA, single-phase, 60 Hz.
- B. Audible alarm panel mount with a minimum of 80 db sound pressure at 24 inches continuous sound. Alarm shall be located within sight from the tank and from the street when practical.
- C. Oil-tight visual alarm, red lens, with push-to-silence feature.
- D. Automatic audio alarm reset.
- E. 15-amp motor rated toggle switch, single pole, double throw with three positions: manual (MAN), automatic (AUTO), and center (OFF).
- F. NEMA 4X-rated fiberglass enclosure with gasketed, hinged cover and locking latch. Padlock will be furnished and installed by City at time of City's acceptance of the completed installation and will signify final acceptance.
- G. Alarm circuit shall be wired separately from the pump so that if the internal pump overload switch is tripped, the alarm will still function.
- H. The pump control panel shall be mounted on a pedestal near an exterior garage wall or facing street, within sight of the tank in all cases and in sight of the street where practical. The panel shall be between 4 feet and 5 feet above finished grade.
- I. There shall be a dedicated 20-amp circuit breaker serving the pump control panel.
- J. A lockable, weatherproof, covered 25-amp power disconnect assembly shall be installed in an enclosure within sight of the tank.

7E.095 Commercial/Multi-family Installations

All commercial/multifamily installations must meet or exceed all applicable residential standards and general conditions. Inspection and verification of operating parameters and standard requirements by a representative from the Public Works Department in addition to an electrical inspection, is required prior to acceptance of all commercial/multifamily installations.

The following features shall be added and provided by the proponent:

- A. Telemetry. Commercial STEP system telemetry shall consist of a RUGID PLC, as manufactured by RUGID Computer with a [Altech Corp CBI123ASCADAMAX Powerfly](#) DC-UPS, [Landis+Gyr Cellnet Technology Gridstream Series 4 IWR](#)~~Metricom, Utilinet IWR Series II~~, 900 MHz radio ([Model: DCIWR](#)), antenna cable with lightning arrestor, and 6dB gain stick antenna that shall be supplied and installed by the contractor. Alarm and station status points shall be pursuant to Section 7D.030 (HH). The telemetry shall be enclosed in a NEMA 1 enclosure within the electrical cabinet. Prior to ordering the above equipment, the contractor shall contact a Remote System Technician, City of Olympia Public Works Department, for complete ordering specifications for the above telemetry. Nominal lead time is 12 weeks.

B. Pump control system shall be of the solid state programmable logic controller (PLC) type, RUGID Model ~~5-9~~ or approved equivalent. The system shall possess a solid state ~~KPSI 705 Level Transducer~~ liquid level sensing device of the 4-20ma analog design. The controller shall be compatible with all established city systems and shall be accessible for ease of maintenance.

The program for the pump controls will be furnished and installed by City of Olympia personnel. For assistance contact the Pump Stations Supervisor at 753-8588.

C. Alternate power source. Property owners are responsible for providing an alternative power source for commercial STEP systems during power outages. An approved, dedicated generator set is recommended. If building being served has emergency power generators, they shall be wired to the STEP system. The transfer switch shall be SD Type 1, Class 3140, double throw or equivalent. If equipped, the motor base receptacle shall be NEMA L14-20, Bryant Catalog #71420-MB and #71420-NC or the equivalent. The property owner shall sign a maintenance agreement indicating their responsibility to curtail water usage and supply, and own and maintain an alternative power source in the event of a power outage. The maintenance agreement shall be recorded at the Thurston County Auditor's Office. The maintenance agreement shall run with the land and be transferred automatically to all subsequent owners.

D. Electrical enclosures:

1. Electrical enclosures shall be of satisfactory dimensions to install and contain the required equipment. (See Standard Drawing 7-20.)
2. Enclosures shall be vandal-proof, all-weather, NEMA 3R or better, constructed of stainless steel with intrusion switch, panel heater and thermostat and double-entry doors.
3. Alternative power source transfer switch and receptacle shall be installed within its own electrical enclosure separate from pump and telemetry controllers.
4. Posts or pedestals necessary to support electrical enclosures shall be of galvanized steel construction.
5. Electrical enclosures shall open in direct line of site with the tank and pump chamber risers.
6. The enclosure latch will be keyed with City of Olympia standard Best Lock key system with single-key operation of the mechanism, a blank tumbler will be supplied, and the City will key to the desired code.

E. Electrical service. Electrical service shall be sized appropriately to meet the requirements of the installation and the current NEC. Electrical services other than single-phase, 110-volt must be approved by the City.

F. Splice boxes ~~shall not be installed in the pump chamber, but -Pump chamber splice boxes-~~ shall be installed within 12 inches of finished grade or external to the riser.

G. Access. Commercial STEP systems shall be accessible at all times to operations and maintenance equipment and vehicles. STEP systems located within parking lots shall be placed where it is acceptable for vehicle traffic to be restricted for extended periods during the business day. Tank and pump chamber risers shall not be located within parking stalls. STEP systems located within fenced enclosures must be accessible via a City lock. Service will not be provided in cases where the STEP tank and/or controls are made inaccessible by parked vehicles or other impediments.

7F GRINDER PUMP SYSTEM

7F.010 General

Grinder pump system may be installed to serve one or multiple residential and commercial user(s) only where approved by the City. A grinder pump application with approved site plat is required.

A grinder system is a facility consisting of a holding tank, grinder pump, and pressure piping system for conveying the wastewater and solids into the sewer system.

Power, including auxiliary power in the event of a power outage, shall be provided and paid for, as well as owned and maintained, by the customer.

All sewer pipe, drains, and plumbing between the building and force main before discharging to the sewer main shall be the responsibility of the customer.

Currently, the City will only accept the Environmental-One (E/One) Grinder Pump System for connection to City-owned gravity or pressured sewer mains.

Commercial grinder systems that have kitchen or cooking facilities, such as churches, community gathering places, restaurants, schools, etc., shall require installation of a grease trap.

Only sanitary wastewater shall be discharged into the tank; roof drains and other stormwater sources shall be strictly excluded.

~~When a property served by a grinder system has a transfer of ownership, the grinder system shall be pumped out and inspected in the presence of City personnel prior to the transfer of ownership. This work shall be conducted at the owner's expense.~~

7F.020 Design Standards

The developer or builder shall submit a grinder system designed by a licensed engineer for the City's approval. The design of any grinder system shall conform to City standards, Department of Ecology *Criteria for Sewage Works Design*, ~~Chapter C1~~ and any applicable standards as set forth herein and in Chapter 3, Sections 3.010 through 3.040.

The layout of grinder system force mains shall provide for the future continuation of the existing system as determined by the City. ~~In addition, main extension shall be extended to and through the side of the affected property fronting the main.~~ Individual service boxes shall be located near the right-of-way line at the property corner opposite to the location of water meter.

Grinder system tanks shall have a minimum of 24 hours of emergency storage volume (70 gallons per ERU served). Tanks without 24 hours of storage shall be installed with a power transfer switch with an emergency generator plug or other device for allowing emergency power connection, or shall have reserve volume provided with a separate vessel. Storage volume is defined as the volume between the "OFF" switch and the top of the tank.

The following information shall be submitted to the City for review:

- A. Map showing contributing area for each grinder system force main.
- B. Flow generation assumptions, including:

Total units served

Gallons per capita per day

Population per unit

Average Flow

Design Flow - the minimum peak flow equal to or greater than the following:

$$Q = 15 + .5D \text{ or}$$

$$Q = 15 + .15P$$

Where:

Q = Design peak flow, gpm

D = Number of equivalent dwellings

P = Population

Peak flow is typically defined as an event that lasts 15 minutes

Average and design flow velocities

Slope of hydraulic grade line (ft./ft.)

Total head loss (ft.)

Site-specific calculations verifying tank Resistance to buoyancy Forces

7F.030 Grinder System Force Main

A. Mainline. The minimum pipe size used is 2 inches nominal diameter. This is based on maintenance requirements rather than flow. Pipe shall be PVC, ASTM D2241, SDR 21 (200) with rubber gasketed joints. Gaskets shall comply with ASTM D 1869. Mains shall have a minimum 36 inches of cover to top of pipe. See Section 7A.020 for sanitary sewer/water main crossing requirements. Main lines shall be the following diameters: 2, 3, 4, 6, 8, 10, 12.

B. Service line. Service connection pipe shall be minimum 1-inch diameter, Schedule 80 PVC water pipe, solvent weld joint located at 90 degrees to the mainline when possible. Solvent cements and primer for joining PVC pipe and fittings shall comply with ASTM D 2564 and shall be used as recommended by the pipe and fitting manufacturers.

Services shall have a minimum 24 inches cover to top of pipe. Pressure services crossing over any waterline shall follow Department of Ecology requirements. A ball valve and check valve shall be installed at the end of the service stub-out at the property line and installed in a valve box pursuant to Standard Drawing 7-24, located near a front corner of the lot. Check valves shall be Spears, or approved equal.

C. Building sewer. The gravity building sewer between the building and the tank shall be designed and installed in accordance with the *Uniform Plumbing Code* as adopted by the City. The owner shall be responsible for maintenance of the building sewer.

D. All pipe shall be installed with continuous tracer tape installed 12 to 18 inches under the proposed finished grade. The marker tape shall be marked "sewer" and be plastic, non-biodegradable metal core or backing that can be detected by a standard metal detector. Tape shall be Terra Tape "D" or approved equal. In addition to tracer tape, install 14-gauge, green-coated copper wire meeting the requirements of Section 7E.030, wrapped around the pipe, brought up and tied off at the valve boxes.

A 1-pound magnesium anode shall be buried with the sewer line every 1,000 linear feet for cathodic protection of the wire. Toning wire splices and connections to anodes shall join wires both mechanically and electrically and shall employ epoxy resin or heat-shrink tape insulation. Furnishing and installing the tracer wire and anodes shall be incidental to pipe installation.

E. Pigging ports shall be provided in accordance with Section 7E.050.

7F.040 Grinder Main Termination

Hydrogen sulfide odors (H₂S) and the buildup of sulfuric acid (H₂SO₄) occur in the operation of a force main. The outfall manhole (point of connection where force main discharges into gravity sewer) and the next downstream manhole on the gravity sewer shall be lined with PVC to protect the system against corrosion. Spray-on coatings will not be accepted for new construction. The PVC lining shall be cast into the walls and floor of the manhole. No exposed concrete will be permitted. All work shall be done in accordance with manufacturer's recommendations and must be approved by the City. If a new outfall manhole and subsequent downstream structures are installed as part of the new system design, the configuration will be approved by the City. Spray-on coating of existing manholes, if approved by the City, shall be a Spraywall system, including a moisture resistant primer coat. The downstream gravity sewer main connecting these manholes shall also be protected from the effects of hydrogen sulfide in a manner approved in writing by the City.

Appendix 1: List of Standard Drawings

Title	Drawing No.	File Type (DWG includes all drawings in chapter)
	Chapter 7 – All	PDF DWG
Type 1 Manhole	7-1	PDF DWG
Shallow Manhole	7-2	PDF DWG
Manhole Collar	7-3	PDF DWG
Outside Drop Connection	7-4	PDF DWG
Inside Drop Connection	7-4A	PDF DWG
Cleanout	7-5	PDF DWG
1500 Gallon STEP System	7-7	PDF DWG
STEP System Air Release Assembly	7-8	PDF DWG
Combination Air/Vacuum Relief Valve Assembly	7-8A	PDF DWG
Typical STEP Air Release Manifold Connection Plan Detail	7-9A	PDF DWG
Typical STEP Air Release Manifold Connection Section Detail	7-9B	PDF DWG
Typical STEP System Service Connection	7-12	PDF DWG
Pigg Port Cross Section	7-13	PDF DWG
Pigg Port Plan View	7-13A	PDF DWG
Terminus Pigg Launch Port	7-14	PDF DWG
Typical STEP Main/Force Main Gate Valve 2" or Greater	7-15	PDF DWG
6" and 8" Pressure Sustaining Device Plan View	7-16A	PDF DWG
6" and 8" Pressure Sustaining Device Section View	7-16B	PDF DWG
Typical Valve Stand	7-17	PDF DWG
Standard Lift Station Control Layout	7-18A	PDF DWG
Standard Lift Station Layout	7-18B	PDF DWG
Sanitary Sewer Lateral Service Connection	7-19	PDF DWG
Commercial/Multi-family STEP System Electrical Cabinet Layout	7-20	PDF DWG
Typical Riser Conduit Plan for Commercial/Multi-family STEP Systems	7-21	PDF DWG
Lift Station Emergency Bypass Pumping Port	7-22	PDF DWG
Lift Station Dry Well and Wet Well Profile	7-22A	PDF DWG
Lift Station Top View	7-22B	PDF DWG
Lift Station Valves Vault	7-22C	PDF DWG
Lift Station Electrical Layout	7-22D	PDF DWG

Title	Drawing No.	File Type (DWG includes all drawings in chapter)
Lift Station PLC Telemetry Panel	7-22E	PDF DWG
Lift Station Wet Well Detail	7-22F	PDF DWG
Lift Station Miscellaneous Details	7-22G	PDF DWG
Lift Station More Miscellaneous <u>Antenna</u> Details	7-22H	PDF DWG
Lift Station Fence Details	7-22I	PDF DWG
Typical Grinder System Service Connection	7-24	PDF DWG
1500 Gallon STEP System Wiring	7-25	PDF DWG