

3.0 DESIGN CRITERIA FOR SEWER SYSTEM FACILITIES

The following design criteria shall be used for sewer systems to be included in Western's service areas. Exceptions and deviations from these specifications must be approved in writing from Western's staff. See Section 4.0 for Lift Station and Force Main guidelines.

3.01 SEWER CONVEYANCE FLOW RATE CRITERIA

Design flow rates shall be in accordance with the following criteria for sizing sewer conveyance flow rate (not treatment):

$$Q = \text{Peaked Average Daily Flow} + \text{Infiltration}$$

where infiltration corresponds to the maximum inflow of groundwater impacting the sewer system. The peaked average daily flow for residential development consists of a peaking factor applied to an average daily flow. (See Section 3.01.01). Average daily flows for residential areas are indicated as follows. Commercial and industrial sewers shall be determined on an individual basis.

Average Daily Flow For Residential Units

UNIT	GPCD	ASSUMED PERSONS/UNIT	GPD/UNIT
Retirement	80	2.5	200
Single Family	100	3.3	330
Multi-Family	100	3.3	330

GPCD = Gallons/capita/day GPD = Gallons/day

Commercial and Industrial

Commercial and Industrial dischargers will be investigated on a case-by-case basis.

3.01.01 AVERAGE FLOW RATES

AVERAGE FLOW RATES

Population	Peaking Factor	105	100	80	Population	Peaking Factor	105	100	80
		(1)	(1)	(1)			(1)	(1)	(1)
Avg. Daily Flow (MGD)					Avg. Daily Flow (MGD)				
100	2.50	0.011	0.010	0.008	4,800	2.01	0.504	0.480	0.384
250	2.50	0.026	0.025	0.020	5,000	2.00	0.525	0.500	0.400
500	2.50	0.053	0.050	0.040	5,200	1.99	0.546	0.520	0.416
750	2.50	0.079	0.075	0.060	5,400	1.98	0.567	0.540	0.432
1,000	2.49	0.105	0.100	0.080	5,600	1.97	0.588	0.560	0.448
1,050	2.48	0.110	0.105	0.084	5,800	1.96	0.609	0.580	0.464
1,100	2.47	0.116	0.110	0.088	6,000	1.95	0.630	0.600	0.480
1,150	2.46	0.121	0.115	0.092	6,200	1.94	0.651	0.620	0.496
1,200	2.45	0.126	0.120	0.096	6,400	1.93	0.672	0.640	0.512
1,250	2.44	0.131	0.125	0.100	6,650	1.92	0.698	0.665	0.532
1,300	2.43	0.137	0.130	0.104	6,900	1.91	0.725	0.690	0.552
1,350	2.42	0.142	0.135	0.108	7,200	1.90	0.756	0.720	0.576
1,375	2.41	0.144	0.138	0.110	7,500	1.89	0.788	0.750	0.600
1,400	2.40	0.147	0.140	0.112	7,800	1.88	0.819	0.780	0.624
1,450	2.39	0.152	0.145	0.116	8,100	1.87	0.851	0.810	0.648
1,500	2.38	0.158	0.150	0.120	8,400	1.86	0.882	0.840	0.672
1,550	2.37	0.163	0.155	0.124	8,700	1.85	0.914	0.870	0.696
1,600	2.36	0.168	0.160	0.128	9,100	1.84	0.956	0.910	0.728
1,625	2.35	0.171	0.163	0.130	9,600	1.83	1.008	0.960	0.768
1,650	2.34	0.173	0.165	0.132	10,200	1.82	1.071	1.020	0.816
1,675	2.33	0.176	0.168	0.134	10,500	1.81	1.103	1.050	0.840
1,700	2.32	0.179	0.170	0.136	11,500	1.80	1.208	1.150	0.920
1,750	2.31	0.184	0.175	0.140	12,300	1.79	1.292	1.230	0.984
1,800	2.30	0.189	0.180	0.144	13,000	1.78	1.365	1.300	1.040
1,850	2.29	0.194	0.185	0.148	13,800	1.77	1.449	1.380	1.104
1,900	2.28	0.200	0.190	0.152	14,500	1.76	1.523	1.450	1.160
1,950	2.27	0.205	0.195	0.156	15,300	1.75	1.607	1.530	1.224
2,000	2.26	0.210	0.200	0.160	16,000	1.74	1.680	1.600	1.280
2,075	2.25	0.218	0.208	0.166	16,700	1.73	1.754	1.670	1.336
2,150	2.24	0.226	0.215	0.172	17,400	1.72	1.827	1.740	1.392
2,225	2.23	0.234	0.223	0.178	18,100	1.71	1.901	1.810	1.448
2,300	2.22	0.242	0.230	0.184	18,900	1.70	1.985	1.890	1.512
2,375	2.21	0.249	0.238	0.190	19,800	1.69	2.079	1.980	1.584
2,425	2.20	0.255	0.243	0.194	21,700	1.68	2.279	2.170	1.736
2,500	2.19	0.263	0.250	0.200	22,700	1.67	2.384	2.270	1.816
2,675	2.18	0.281	0.268	0.214	23,800	1.66	2.499	2.380	1.904
2,775	2.17	0.291	0.278	0.222	25,000	1.65	2.625	2.500	2.000
2,850	2.16	0.299	0.285	0.228	26,400	1.64	2.772	2.640	2.112
2,925	2.15	0.307	0.293	0.234	28,000	1.63	2.940	2.800	2.240
3,000	2.14	0.315	0.300	0.240	30,000	1.62	3.150	3.000	2.400
3,100	2.13	0.326	0.310	0.248	32,200	1.61	3.381	3.220	2.576
3,200	2.12	0.336	0.320	0.256	34,600	1.60	3.633	3.460	2.768
3,350	2.11	0.352	0.335	0.268	37,200	1.59	3.906	3.720	2.976
3,500	2.10	0.368	0.350	0.280	40,000	1.58	4.200	4.000	3.200
3,600	2.09	0.378	0.360	0.288	43,000	1.57	4.515	4.300	3.440
3,700	2.08	0.389	0.370	0.296	46,000	1.56	4.830	4.600	3.680
3,800	2.07	0.399	0.380	0.304	50,000	1.55	5.250	5.000	4.000
3,900	2.06	0.410	0.390	0.312	55,000	1.54	5.775	5.500	4.400
4,000	2.05	0.420	0.400	0.320	60,000	1.53	6.300	6.000	4.800
4,200	2.04	0.441	0.420	0.336	70,000	1.52	7.350	7.000	5.600
4,400	2.03	0.462	0.440	0.352	85,000	1.51	8.925	8.500	6.800
4,500	2.02	0.473	0.450	0.360	100,000	1.50	10.500	10.000	8.000

(1) GPD/Capita, Per Table 1

3.02 SEWER PIPELINE SIZING

Pipeline sizing for gravity pipelines shall be determined on the basis of the design flow rate and incorporating the following criteria:

<u>Pipe Diameter</u>	<u>Mannings Roughness Coefficient</u>	<u>D/d Max.</u>
8" to 12	0.013	0.50
15" or greater	0.013	0.75

Required velocities at design flow (Q) for sewer pipelines shall be minimum 2 fps and maximum 10 fps.

The maximum velocity at design flow allowed in any sewer pipeline is 10 fps.

Do not increase sewer sizes in flat topography, to justify use of flatter grades. Under minimal flow conditions, wastewater in larger pipelines can have velocities lower than that in smaller pipelines.

Head losses for force mains shall be approximately 5 feet per 1,000 feet of force main. The Developer's engineer shall evaluate the need for odor control facilities for all force mains.

3.03 LOCATION

Unless otherwise approved by Western, all sewers shall be located on the northerly or easterly side of the street, 6 feet from street centerline per the Riverside County Transportation Department standards. Location shall not interfere with other existing utilities.

Horizontal curves are allowed on all pipe sizes 8" and larger, but are not encouraged except where necessary to maintain the required clearance from water pipelines. The minimum curve radius for sewers shall conform to the manufacturer's minimum recommendations. Western's staff shall review, modify, and/or approve all proposed horizontal curved sewer designs.

Vertical curves are not permitted within sewer systems except when approved by Western's staff. Application for exceptions shall be in writing prior to plan check submittal and include justification.

The minimum depth of cover over the sewer pipeline should be sufficient to sewer adjacent properties, where practical. Minimum cover is 5 feet and minimum manhole depth from finished grade to flowline is 7 feet. Adequate depth shall be provided so that the sewer laterals will have a minimum cover of 5 feet at the property line.

All projects will be required to extend sewer pipeline facilities across the full extent of the frontage of the project parcel in a manner to facilitate the future extension and should include any necessary diameter over sizing and extra depth.

Sewer installation near water pipelines shall be in accordance with State Department of Public Health, Criteria for the Separation of Water Mains and Sanitary Sewers. If a variance to the

standard is requested, please contact Development Services. All variances with State Department of Public Health shall be coordinated through Western.

When crossing other utilities, a minimum vertical clearance of 1" shall be provided (outside to outside), unless otherwise approved by Western.

Sewer installation shall provide a minimum clearance of 50 feet from all potable, recycled, and water quality monitoring wells.

3.04 SEWER LATERALS

Sewer laterals shall have a minimum diameter of 4". Laterals shall have a minimum slope of 2% from sewer to property line and shall have a minimum cover of 5 feet at the property line.

Sewer laterals shall have a clean out per Western Standard Drawing W-1160.

3.05 MATERIALS AND INSTALLATION

Unless otherwise authorized by Western, all sewers and laterals 4"-12" shall be SDR-35 PVC. Sewers larger than 12' shall be reviewed by Western. Sewers larger than 20" in diameter shall be reviewed on a case by case basis. For sewers with more than 20' of cover, calculations for pipe deflection shall be submitted. All installations are to be as shown in Western's Standard Drawings.

ASTM Requirements: Pipe, fittings, couplings, and joints shall be in conformance with the size, material and performance requirements of ASTM D 3034, SDR 35, and shall have gasketed joints. Pipe shall be made of PVC plastic having a cell classification of 12454-B, 12454-C, or 13364-B as defined in ASTM D 1784. Fittings shall be made of PVC plastic having a cell classification of 12454-B, 12454-C, or 13343-C. All pipe shall be of solid wall construction with smooth interior and exterior surfaces.

3.06 PIPE SLOPE

Gravity sewers shall have the following slopes:

Pipe Diameter (in.)	Min. Slope (V=2 fps)	Max Slope (V=10 fps)
8	0.003 40	0.086
10	0.002 60	0.061
12	0.002 00	0.049

3.07 MANHOLES

All manholes with a depth less than 12' shall have a diameter of 48". All manholes with a depth of 12 feet or more shall have a diameter of 60", per Western's Standard Drawings.

Manholes shall be spaced at 450 foot maximum intervals for 8" sewers, 500 foot maximum intervals for sewers 10" and larger, and 400 foot maximum intervals for sewers with slopes 5% or greater. In addition, manholes shall be placed at all the following locations: grade breaks, changes in horizontal alignment, changes in sewer diameter, at street intersections, at sewer pipe intersections, at connections with laterals 6" or larger in diameter, and at the beginning of sewer runs such as a cul-de-sacs.

A drop of 0.2 feet for straight runs and 0.2 to 0.5 feet for 90° bends shall occur across manholes. Junction manholes shall be designed with the soffits of the intersecting sewer at the same elevation as the soffit of the upstream sewer.

A terminus manhole shall be installed at the end of a sewer pipeline.

Guard posts per Western's Standard Drawing W-1520 shall be required if manholes are to be installed outside of paved areas.

3.08 DROP MANHOLES

Drop manholes shall not be used without prior approval by Western's staff.

3.09 LIFT STATIONS AND INVERTED SIPHONS

Lift stations, inverted siphons or nonstandard construction should be avoided whenever possible. In situations requiring such installations, facilities shall be designed by Western's staff, a Western retained consultant, or the Developer's engineer and reviewed and approved by Western staff. Western's staff should be consulted in the early planning stages to assess the need for such installations and to develop the site-specific design criteria.

3.10 BACKWATER OVERFLOW VALVES

Backwater overflow valves shall be required wherever structures served by sewer laterals are subject to flooding in the event a sewer main stoppage causes the upstream manhole to overflow. Residences with slab elevations lower than street elevation and/or lower than the rim of the upstream manhole or near terminus of force main shall have backwater overflow valves installed according to Western's Standard Drawings.

Backwater overflow valves shall not be required wherever intermediate manholes can be placed to economically preclude the need for backwater valves (such spacing not to be less than 120 feet). Ordinarily, one additional manhole can be economically justified if four backwater overflow valves can be eliminated.

Backwater overflow valves should be in accordance with Western's Standard Drawings and installed at the shallowest location allowing for future inspection and maintenance.

The Design Engineer shall show all backwater overflow valves and their locations for installations on private property. These valves shall be indicated on both the location map (cover sheet) and the plan and profile sheets.

3.11 FEE TITLE CRITERIA

Sewers not located within public right-of-way must be located in fee title parcels granted to Western on Western's Grant of Deed forms. Fee title parcels shall have the following minimum widths:

<u>Sewer Flow line Depth (Ft)</u>	<u>Minimum Width of Fee Title Parcel (Ft)</u>
10 and less	30
11-15	35
16-20	45
21-25	50

Details for fee title parcels are included in Section 4.0 PLAN FORMAT AND REQUIREMENTS - WATER AND SEWER.

3.12 GENERAL NOTES FOR SEWER PIPELINES

See Section 5.07 for General Notes for Sewer Pipelines