SECTION IV

SEWER SYSTEM DESIGN CRITERIA

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IV. SEWER SYSTEM DESIGN CRITERIA

A. GENERAL

Sewer system improvements proposed for inclusion into the District's service area shall be designed in accordance with the criteria set forth herein, unless otherwise approved in writing by the District.

The design shall take into consideration physical conditions known to exist at the time and place of each installation and the probable operating requirements. Where such conditions render sections of these Specifications inapplicable, alternate methods of design may be submitted to the District, and upon approval thereof, may be incorporated in the Plan.

B. LOCATIONS OF MAINS

1. Alignment:

    a. 6-foot north or east of centerline of street

    b. Horizontal curves are allowed on pipe sizes from 8-inch to 24-inch diameter. All curved sewers shall have a minimum radius of 288-foot, but no less than the radius recommended by the pipe manufacturer. For curved sewers with pipe size larger than 24-inch diameter, the minimum radius shall be per the 2021 Standard Specifications for the Public Works Construction, Section 306-7.4.2.4 entitled “Straight Non-Beveled Pipe on Curves” with the minimum threshold radius of 288-foot. No reverse curves allowed between manholes. Manholes shall be constructed at or near all BC's, EC's, PRC's, and PCC's.

    c. No vertical curves allowed

2. Depth: Minimum cover over pipe should be sufficient to service adjacent property by gravity, and cover shall not be less than 7.0-foot to finish grade of street, unless otherwise approved by District. In addition, sewer mains must be sufficiently deep in subdivisions to allow water lines to be set with 4-foot min. cover without interference from sewer laterals.

C. FLOW RATE COMPUTATIONS

1. All flows shall be computed on the basis that the area served by the extension or addition is completely improved to limits imposed by its present zoning required to allow construction of the proposed development.

2. Average Daily Rates:

    a. Residential Unit: Single Family Residential, Apartments, Condominiums, and Mobile Home: 240 GPD/Unit[1]

[1] One (1) EDU = One (1) Residential Unit = 240 GPD (gallons per day)

c. Schools, Retail, Commercial and Industrial: Projects proposing developments such as schools, retail, restaurants, commercial, industrial, storage, etc., wastewater generation computation shall be based on the following Table 1.

Table 1 – Equivalent Dwelling Units (EDU) Table of Values by Proposed Building Use

Tenant Type Description	Base Unit Description	Base Unit	EDU per Unit
AIRPORT HANGAR	HANGER	1	0.75
ANIMAL KENNELS / PET SHOPS	1000 SQ. FT.	1000	0.80
ANIMAL SHELTERS / ANIMAL ADOPTION CENTERS	1000 SQ. FT.	1000	2.74
AUDITORIUMS	1000 SQ. FT.	1000	1.30
AUTO SALES / REPAIR SHOPS	1000 SQ. FT.	1000	0.20
BARS	SEAT	1	0.07
BEAUTY / BARBER SHOP	SINK	1	0.25
BOWLING ALLEY / SKATING RINKS	1000 SQ. FT.	1000	0.80
BREWERY / TASTING ROOM	1000 SQ. FT.	1000	0.50
CAMPSITES (DEVELOPED)	SITE	1	0.25
CAR WASH - TUNNEL TYPE	1000 SQ. FT.	1000	14.00
CAR WASH - W/ RECYCLING UNIT	1000 SQ. FT.	1000	4.75
CAR WASH - WAND TYPE	1000 SQ. FT.	1000	2.65
CASINO	UNIT	1	1.00
CHILD / SENIOR DAYCARE FACILITY	PERSON	1	0.04
CHURCH / LIBRARY	1000 SQ. FT.	1000	0.20
CLUB HOUSE (APT/CONDO/TRACT)	UNIT	1	1.00
CLUBS	1000 SQ. FT.	1000	0.50
DEPARTMENT STORES	1000 SQ. FT.	1000	0.05
DIALYSIS CENTER	CHAIR	1000	1.20
DOCTOR / DENTIST / VET OFFICES	1000 SQ. FT.	1000	0.20
DRIVE-IN THEATERS	1000 SQ. FT.	1000	0.80
DRY CLEANERS - OFFICES	EMPLOYEE	1	0.07
DRY CLEANERS - PLANTS	MACHINE	1	1.62
DRY MANUFACTURER	1000 SQ. FT.	1000	0.04
FINANCIAL INSTITUTIONS	1000 SQ. FT.	1000	0.20
FIRE / POLICE STATION	EMPLOYEE	1	0.41

Table 1 (continued)

Tenant Type Description	Base Unit Description	Base Unit	EDU per Unit
GOLF COURSE / CAMP / PARK BUILDINGS	RESTROOM / CONCESSION STAND	1	0.20
GROCERY STORE / SPECIALTY FOOD MARKET	1000 SQ. FT.	1000	0.50
HEALTH SPAS / FITNESS CLUBS W/ SHOWERS	1000 SQ. FT.	1000	0.50
HEALTH SPAS / FITNESS CLUBS WITHOUT SHOWERS	1000 SQ. FT.	1000	0.30
HOSPITAL	BED	1	1.00
HOTEL / MOTEL ROOMS WITH KITCHENETTES	ROOM	1	0.65
HOTEL / MOTEL ROOMS WITHOUT KITCHENETTES	ROOM	1	0.31
INDOOR THEATERS	1000 SQ. FT.	1000	0.30
INDUSTRIAL SPECIALIZED	1000 SQ. FT.	1	1.00
JAIL / DETENTION CENTER	PERSON	1	0.41
LAUNDROMAT	MACHINE	1	0.63
MORTUARIES / CEMETERIES	1000 SQ. FT.	1000	0.51
NIGHT CLUBS	1000 SQ. FT.	1000	1.30
NURSING HOMES	BED	1	0.79
OFFICE BUILDINGS	1000 SQ. FT.	1000	0.20
PRE-SCHOOL	STUDENT	1	0.04
RESERVATION CENTERS	1000 SQ. FT.	1000	0.42
RESTAURANT - FAST FOOD	SEAT	1	0.07
RESTAURANT - FULL SERVICE	SEAT	1	0.09
RESTAURANT - QUICK FOOD SHOP	SEAT	1	0.04
RV CAMPS WITH SEWER HOOK-UPS	SITE	1	0.50
RV PARK W/OUT INDIVIDUAL SEWER HOOK-UPS	DWELLING UNIT	1	0.45
SCHOOL - NO CAFETERIA / NO SHOWERS	STUDENT	1	0.01
SCHOOL - NO CAFETERIA / WITH SHOWERS	STUDENT	1	0.01
SCHOOL - WITH CAFETERIA / NO SHOWERS	STUDENT	1	0.01
SCHOOL - WITH CAFETERIA / WITH SHOWERS	STUDENT	1	0.01
SERVICE SHOPS / STATIONS / STORES / WHOLESALE OUTLETS	1000 SQ. FT.	1000	0.20
SPECIAL EVENTS CENTER	ATTENDEE	1	0.04
SPORT CENTER - INDOOR	1000 SQ. FT.	1000	1.30
STORAGE FACILITY	DWELLING UNIT	1	1.00

Table 1 (continued)

Tenant Type Description	Base Unit Description	Base Unit	EDU per Unit
SPECIAL TENANT TYPE	1000 SQ. FT.	1000	1.00
WHOLESALE WAREHOUSE STORES	1000 SQ. FT.	1000	0.21
Open Storage Facilities/Warehouse: Sewer EDU's used by tiering of the total square footage as follows:			
OPEN STORAGE (SMALL) FACILITIES / WAREHOUSES - LESS THAN 100,000 SQ. FT.	1000 SQ. FT.	1000	0.07
OPEN STORAGE (MEDIUM) FACILITIES / WAREHOUSES - BETWEEN 100,000 AND 1,000,000 SQ. FT.	1000 SQ. FT.	1000	0.03
OPEN STORAGE (LARGE) FACILITIES / WAREHOUSES - 1,000,000 SQ. FT. OR LARGER	1000 SQ. FT.	1000	0.02

3. Peak Flow Rates:

   a. Residential Areas: $Q_{PEAK} = 2.5Q_{ADF}^{(0.91)}$
   Where Q_{PEAK} & Q_{ADF} are in millions of gallons per day (mgd)

   b. Commercial & Industrial: Investigate each installation

D. PIPE SIZING

Pipe sizing for gravity mains shall be determined as shown below:

1. For 8-inch diameter mains and smaller:

   a. n = 0.013;

   b. D/d (depth of water to pipeline diameter ratio) $\leq$ 0.50 (ie 50% $\pm$ full)

2. For 10-inch diameter mains and larger:

   a. n = 0.013

   b. D/d ratio $\leq$ 0.75 (ie 91% $\pm$ full)

3. Connection Laterals

   a. House Connection Laterals (at 2% slope, utilizing 45° connection at main)

b. Connection laterals for commercial and industrial developments shall have a minimum 2% slope and utilize 45° connection at main. The diameter of the lateral shall the calculated based on peak flow rate of 2000 gpd/gross acre of the project with minimum pipe size of 6-inch diameter. If the pipe sizing calculation require a lateral greater than 6-inch diameter, two manholes will be required. One manhole connecting to the existing sewer main and another manhole at the project's property line.

E. MANHOLES

1. Manhole Criteria:

   a. Manhole spacing shall not exceed 350' for all pipes; unless otherwise approved by District.

   b. Manholes shall be located at or near all BC's, EC's, PRC's and PCC's on curved sewers.

   c. Distance noted between manholes shall be measured to manhole centerlines.

   d. Minimum 48-inch inside diameter manholes shall be required for sewer diameters 12-inch and less. Minimum 60-inch inside diameter manholes shall be required for pipelines deeper than 15' and/or for sewer diameters 15-inch and larger. Minimum 72-inch inside diameter manholes shall be required for pipelines 30-inch in diameter and larger.

2. Inverts:

   a. Provide 0.1-foot fall through manholes for grades less than 2.5%. Show pipe flow line elevations at inlet and outlet of manhole. For grades greater than 2.5%, design grade may be continued through the manhole. Show pipe flow line elev(s). at centerline manhole station.

   b. Where manhole invert is formed in field, a drop of 0.1-feet on all bends 45 degrees or greater may be required.

   c. Unless otherwise approved by the District, junction manholes shall have the crowns (soffits) of the intersecting pipes at the same elevation where their projections intersect the manhole centerline.

   d. Connections to existing facilities shall be verified in the field during the design stage, or provisions made to verify them prior to construction.

3. Drop manholes may be utilized only upon prior approval by the District. Drops shall not be less than 3 feet. ("Steep" slopes from the first manhole upstream are preferred to drop manholes.)

4. Manholes shall not be buried except where approved by District. Manholes shall be raised above ground level where necessary to maintain them in selected areas such as farmed areas and in waterways.

5. Use of cleanouts on sewer mains are not permitted.

6. A manhole per District Standard Drawing No. S-7 shall be provided at the street right-of-way line for all laterals 6-inch in diameter and larger unless otherwise approved in writing by the District.

F. PIPE VELOCITIES

1. Minimum

   a. Sewer Mains: 2 - 2.5 fps

   b. Inverted Siphons: 3 fps

2. Maximum

   a. Sewer Mains: 10 fps

G. SLOPES

1. House Connection Laterals:

Pipe dia.	4 (in.)	6 (in.)
Slope	0.020	0.020

(0.010 Extreme Minimum with prior approval only)

2. Sewer Mains:

Pipe Diameter (in.)	Minimum Slope (ft/ft)
8	0.0040
10	0.0032
12	0.0024
15	0.0016
18	0.0014
21	0.0012
24	0.0010
27	0.0008
30	0.0007

Gradients should be set to 2 figures, evenly divisible by 4, wherever possible.

H. BEDDING

1. V.C.P. (extra-strength)

The following may be used as a guide only in determining the required class of bedding based upon maximum depth over top of sewer pipe. For other conditions of trench width, or for a wide trench condition, independent analysis must be made.

Bedding Class Guideline Table

Pipe Diameter (inch)	Maximum Trench Width (inch)	Depth Over Top of Sewer Pipe[1] (feet) Class B-2 Bedding[2] [3]
8	32	30.1 +
10	34	28.1 – 30.0
12	38	18.1 – 30.0
15	42	19.1 – 30.0
18	46	19.1 – 29.0
21	50	20.1 – 30.0
24	54	20.1 – 30.0
27	56	22.1 – 30.0

(1) Engineer shall be required to provide structural loading calculations for pipeline installations deeper than 30-feet.
(2) Refer to ECSD Std. Dwg. No. S-1
(3) Assumptions: Ordinary clay backfill @ 120 lbs./CF; F.S. = 1.5, Kμ' = 0.1; and Load Factors Class B-2 = 2.2

2. PVC (SDR 26 or 35)

The trench width and pipe bedding requirements shall be per ECSD Standard Drawing No. S-1A based on the proposed pipe diameter. Pipe thickness is dependent on depth cover over top of pipe. For pipes installed with less than 14-feet of cover, pipe thickness to be minimum of SDR 35. For pipes installed with greater than 14-feet but less than 25-feet of cover, pipe thickness to be minimum of SDR 26. For other conditions such as deep cover (greater than 25-feet), ground water, additional live loads beyond H20 loading, other trench conditions, wide trench conditions, independent analysis must be conducted. The following assumptions apply:

a. Minimum Live Load: H20 Traffic Loads;

b. Unit Weight of Soil 120 lbs./ft^3;

c. Embedment Stiffness (E'): 1,000 lbs./ft^2;

d. Pipe Bedding: Class "I" (Full Crushed Rock);

e. Maximum Diametric Deflection: 7.5%;

f. Min. Factor of Safety: 2;

g. Conduct independent analysis for pipes 18-inch dia. and greater;

h. Refer to AWWA M23 for additional requirements.

I. BACKWATER VALVES

Backwater valves shall be required in accordance with the Uniform Plumbing Code, Latest Edition.

The backwater valves, where required, shall be installed in accordance with the City of Moreno Valley Building and Safety Department's requirements and shall be installed at shallowest location allowing access for future inspection and maintenance. Where backflow valves are required, they shall be installed on private property by the property owner or tract developer and are to be maintained by property owner.

J. SEWAGE INJECTORS

1. In some extreme circumstances, the ability to sewer an individual lot by gravity may be uneconomical based on excessive depths of the mainline sewer. The definition of these circumstances shall be determined by the District. Should the District determine these conditions exist for a lot, and upon District approval only, an individual sewage injector may be used.

2. The injector shall be constructed to District specifications for installation on private property by the property owner or tract developer. Maintenance of the injector shall be the responsibility of the property owner.

K. LATERAL CONNECTIONS TO MAIN

1. Direct connections of 4-inch and 6-inch diameter laterals to the mainline shall only be allowed when the sewer main has a diameter less than 15-inch and the connection is made per Standard Drawing No. S-2, S-5, or S-6 and S-8. Direct lateral connections to 18-inch diameter sewer lines and larger shall be allowed at the discretion of the District and only if approved in writing by the District.

2. All mainline connections, 8-inch and larger, shall be made with the installation of a manhole.

L. INDUSTRIAL WASTE PROVISIONS

The developers of all commercial/industrial projects shall provide the District with detailed information concerning the project's expected wastewater quality and quantity. The District will review this information and determine which of the following facilities are required.

1. Gravity Separator
2. Industrial Waste Clarifier
3. Pretreatment Facilities
4. Sewer Sampling Wye

Additionally, a separate irrigation meter and service shall be required to segregate the water quantity used for irrigational purposes so that equitable sewer user fees can be charged.

M. SEPARATION

For separation requirements and guidelines refer to the California Waterworks Standards, California Code of Regulations (CCR), Title 22, Division 4, Chapter 16, Section 64572, latest edition for establish criteria for separation of water mains from non-potable pipelines. For installations of pipelines with less separation distance than what is required by the regulations, alternatives may be proposed pursuant to CCR, Title 22, Section 64551.100. Refer to the December 14, 2017 State Water Resources Control Board Division of Drinking Water Request for Alternatives Letter. A copy of this letter is provided in Appendix O of Section VII.

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