

CHAPTER IV - SANITARY SEWERS

SECTION 1. - General:

1. Sewage collection and treatment shall comply with the regulations imposed by State law and local ordinances, shall be approved by the City, and shall conform to City standards.
2. At no time shall storm water, groundwater, or other surface water be allowed to enter the sewer system. Failure to prevent inflow of storm water or other surface water into the sewer system is a violation of state and local ordinances, and is subject to penalties.
3. The subdivider/developer shall determine the adequacy of the existing sanitary sewer system to accommodate the proposed subdivision or development from the point of connection to a sanitary sewer interceptor. The City Engineer may require additional modeling and analysis for high discharge developments, or where sewer capacity is limited.
4. All sanitary sewers, inclusive of laterals, shall be constructed to a depth sufficient to allow for gravity flow to public sanitary sewers from all floors of residential or commercial structures, inclusive of basement areas. Alternative means may be approved on a case-by-case basis, and shall require the approval of the City Engineer prior to construction. Cost for any required easements or rights-of-way shall be included in the estimate.
5. Sanitary sewer lift stations shall be designed in accordance with the most recent edition of the City of Reno's Wastewater Lift Station Design Manual.
6. Sewer service laterals shall be installed to each lot. Laterals shall have the end capped on the private property side and marked per the City of Reno Supplemental Standard Details for Public Works Construction. The location of each lateral shall be permanently identified by stamping an "S" in the top of curb at the location where the lateral crosses the curb line. The end of each capped lateral shall be marked with a wood or plastic stake, nominally 2 inch x 2 inch, painted green, and marked with an "S".
7. Concrete collars shall be placed around all manholes, valves or other appurtenances within any right-of-way or easement. Such collar shall encircle all casting with a minimum width of one foot. Manhole collars shall conform to standard details; all others shall extend to a minimum depth of one foot.

Chapter 4 – Sanitary Sewers Section

8. Public sewerage facilities shall be installed within public street sections. No public sewerage facilities will be permitted along lot lines or other locations unless approved by the City Engineer, and appropriate public sanitary sewer easements and improved access in accordance with City standards are provided for maintenance purposes.
9. Sanitary sewer mains shall be extended with a subdivision or development to adjacent undeveloped property for future extensions in accordance with approved plans, unless otherwise approved by the City Engineer. A sanitary sewer manhole shall be placed at the terminus of the main line at the property line of the adjacent undeveloped property. Pipe extensions out of the base of the terminus manhole shall have the end properly capped and a mechanical plug installed in the manhole.

SECTION 2. - Capacity Requirements for Public Sewers:

DESIGN PERIOD

In general, sewer systems shall be designed for the estimated ultimate population of the tributary and consideration shall be given to the maximum anticipated flows from institutions, industrial parks, etc.

DESIGN FACTORS

In determining the required capacities of sanitary sewers, the following factors shall be considered:

1. Peak sewage flows.
2. Additional sewage or waste flow from industrial plants or institutions.
3. Tributary sewer drainage basin.
4. Topography of area to be sewered.
5. Location of waste treatment plant.
6. Depth of excavation.
7. Pumping requirements.

DESIGN BASIS

New sewer systems shall be designed in accordance with City standards, on the basis of the most recent zoning using the following per capita contributions:

**Chapter 4 – Sanitary Sewers
Section**

1. Mains (8 inches to 10 inches) - 350 gallons per capita per day (peak flow).
2. Trunk sewers (over 10 inches and under 18 inches) and interceptor sewers - (18 inches and over) - 250 gallons per capita per day (peak flow).

OCCUPANCY RATES

The following are minimum occupancy rates for dwelling units in computing sewage contributions:

- | | | | |
|----|---------------------------|-----|----------------------|
| 1. | Single Family Residential | 3.0 | capita/dwelling unit |
| 2. | Condominium | 2.0 | capita/dwelling unit |
| 3. | Mobile Home | 2.5 | capita/dwelling unit |
| 4. | Apartment | 2.0 | capita/dwelling unit |

QUANTITY OF SANITARY SEWAGE PER ACRE

The following are minimum quantities of sanitary sewage per acre for computing sewage contributions from non-residential sources:

- | | | |
|----|--|--|
| 1. | Office | 3,200 gal. per acre per day (peak flow) |
| 2. | Public Facility | 3,200 gal. per acre per day (peak flow) |
| 3. | Commercial | 10,000 gal. per acre per day (peak flow) |
| | Resort Hotels and Casinos | 650 gal. per day per room (peak flow) |
| | Motels | 500 gal. per day per room (peak flow) |
| 4. | Industrial
(unless water intensive usage is identified) | 3,000 gal. per acre per day (peak flow) |

The City Engineer may require different design quantities based on an individual case review.

SECTION 3. - Design and General Requirements:

1. Design Requirements for Public Sewers:

Chapter 4 – Sanitary Sewers Section

Manning's Formula is to be used in computing depth of flow and velocities of all sanitary sewer conduits, with the roughness coefficient "n" value equal to 0.014. Sewer lines shall be designed to give mean velocities of not less than 2 feet per second based on calculated peak or half-full flow, whichever yields the lower velocity. Sewers with less than 10,000 gallons per day shall be placed at not less than a one percent slope. For slopes less than 1%, velocity calculations shall be provided. Slopes less than those required for mean velocities of 2 feet per second during peak flows, may be permitted when approved by the City Engineer. Such decreased slopes shall be avoided whenever possible and the pipe diameter and slope shall be selected to obtain the greatest practical velocity to minimize settling problems. The Engineer shall submit computations of the mean velocities during peak flows. The depth of the design peak flow shall not exceed one-half full. Where velocities greater than 15 feet per second are attained special provision shall be made to protect against displacement by erosion and/or shock. Sewers on 20 percent slopes or greater shall be anchored securely with concrete anchors or equal, spaces as follows:

- a. Not over 36 feet center to center on grades 20 percent and up to 35 percent.
 - b. Not over 24 feet center to center on grades 35 percent and up to 50 percent.
 - c. Not over 16 feet center to center on grades 50 percent and over.
2. General Requirements:
- a. No public sanitary sewer main shall have a pipe diameter of less than 8 inches. All plastic pipe shall be solid wall and have a minimum stiffness of 46 psi.
 - b. All public sanitary sewers 8 inches and larger, located within the public right-of-way or easements, shall be constructed to City standards and be City owned and maintained.
 - c. Sewer pipe including mains and service laterals installed in a traveled way shall have a minimum coverage of 3 feet from the top of the pipe to the bottom of the asphalt or be reinforced, based on live loading.
 - d. Service laterals shall have a minimum pipe diameter of 4 inches with a minimum slope of 1/4 inch per foot (unless otherwise approved by Building Official) and be constructed to the property line. No cleanouts shall be permitted to be constructed on public right-of-

Chapter 4 – Sanitary Sewers Section

way. Laterals shall have a minimum coverage of 3.0 feet in the public right-of-way unless otherwise approved by the City Engineer. Private service laterals to a public main are to be provided for each individual parcel. Private service laterals shall not be connected to the manhole nor to the sewer main within 5.0 feet of the manhole. Private service laterals shall not be connected to the sewer main unless it is located in between two manholes.

- e. Sewer easements for public improvements shall be a minimum width of 15 feet. The final easement width shall be determined by pipe width, required trench clearance, and excavated trench side slopes not less than 1:1 horizontal to vertical, from top of pipe, unless approved by the City Engineer.
- f. Manholes shall be located at junction points, changes in horizontal and/or vertical alignment exceeding the minimum allowable pipe deflection, changes in conduit size and at the end of public lines unless approved otherwise by the City Engineer. Sanitary sewer pipe shall be installed in straight line segments. Vertical curves shall not be permitted. Horizontal curves shall not be used only unless specifically approved by the City Engineer. Manholes shall be spaced at intervals not greater than 350 feet for all lines smaller than 24 inches and 600 feet maximum for lines 24 inches and larger, unless otherwise approved by the City Engineer. Large diameter sewers (>30") shall be constructed so that angle points are 45° or less.
- g. Increasing Size - When a smaller sewer flows into a larger sewer, the invert of the larger sewer shall be sufficiently lower to maintain the same hydraulic gradient.
- h. Drop Manholes - A drop connection shall be provided for a sewer entering a manhole at an elevation 2 feet or more above the manhole invert. Drop manholes shall not be used without prior approval from the City Engineer. Drop manholes/connections shall not be permitted unless unusual circumstances are present and written approval is granted by the City Engineer.

When the difference in elevation between the incoming sewer and the manhole invert is less than 2 feet, the manhole invert shall be filleted and channeled to prevent deposition of solids. The drop connection shall be constructed in accordance with the standard detail requirements for manhole installation. The engineer shall present supporting calculations for hydraulic efficiency through manholes that do not meet the above requirements.

Chapter 4 – Sanitary Sewers Section

- i. A minimum of 16.5 feet of overhead clearance shall be provided at all manholes.
- j. Sanitary sewer pipe that is abandoned must be removed. Leaving sewer pipe in-place and filling with concrete slurry is not acceptable, unless approved by the City Engineer.
- k. Within sewer manholes, the difference between the invert elevations of the inlet and outlet pipes shall create a minimum fall of one tenth (0.1) of a foot. When smaller secondary inlet pipes are to be added to the manhole, these pipes shall be channelized and positioned for optimum flow, as approved by the City Engineer.
- l. Force main piping shall be installed with a metal tracer wire over the entire length of the run for future location via metal detection devices. GPS data shall be provided for all installed force main manholes, along with GPS data points at a minimum of every three hundred feet (300') along the force main piping run.
- m. Pipe inverts shall be positioned to provide maximum hydraulic efficiency and to prevent backwash & stall conditions.

SECTION 4. - Sewerage Report:

Required when the number of dwelling units exceed 10 or the number of fixture units exceed 200. The subdivider/developer shall determine the adequacy of the existing sanitary sewer system to accommodate the proposed subdivision or development from the point of connection to a major sanitary sewer interceptor. Normally the adequacy can be determined based on the developed area contributing to the existing facility. However, if infiltration is a factor, metering will be required.

The following shall be addressed in the sewerage report to substantiate the design of the system.

1. Area of project.
2. Tributary areas outside project.
3. Adjacent areas.
4. Contours as required by the City Engineer.

Chapter 4 – Sanitary Sewers Section

5. Line layout, pipe size, slope and material type.
6. Any non-domestic waste being introduced into system such as industrial process wastes, cooling waters, etc. and the types of pretreatment devices to be provided.
7. Calculations showing predicted average and peak flows at major junction points including flow coming from area outside the project area.
8. Direction of flow.
9. Cumulative flow.
10. Zoning used to predict flows.
11. Special areas such as hospitals, schools, large office buildings, etc.
12. Boundaries of areas within the project which are tributary to points of major flow.
13. Design calculations (hydrologics, trench design, pipe structural design, etc.).
14. Public vs. private piping.