

WATER AGENCIES' STANDARDS

Design Guidelines for Water and Sewer Facilities

SECTION 4.3 RECYCLED WATER PLANNING

4.3.1 PURPOSE

This section outlines planning data to find average, maximum day, and peak hour recycled water demands, pipeline velocities, system pressures, pump station capacities, and reservoir storage volumes.

- A. The purpose of this section is to identify general public recycled water planning and pre-design information for use in developing AGENCY Capital Improvement Program (CIP) projects and developer projects. This section will help develop uniformity and consistency in projects and to assist in providing uniform and workable facilities including pipelines, pressure control facilities, pumping stations, and storage reservoirs.
- B. The Engineer of Work shall incorporate the planning criteria presented in this section as a basis for design. Sometimes the criteria are given in ranges, in which case the final criterion is selected within the indicated range. In other cases, specific criteria have been given and are to be followed by the Engineer of Work.
- C. If the Engineer of Work desires to deviate from the criteria presented in this section only the Engineer can approve the change.

4.3.2 UNITS OF MEASUREMENT

Units of measurement to be used in design calculations are listed in Appendix B.

4.3.3 GENERAL

It is the responsibility of the user of these documents to make reference to and/or utilize industry standards not otherwise directly referenced within this document. The Engineer of Work may not deviate from the criteria presented in this section without prior written approval of the Agency Engineer.

4.3.4 PLANNING AREA AND RECYCLED WATER DEMAND GENERATION

- A. Development Projects:
 - 1. Planning areas and other detailed information required for development projects shall be defined in SAMPs or may have been defined in an AGENCY's master plan. See Section 4.4 for undefined planning areas.
 - 2. In the absence of more refined demand data from the AGENCY, development projects shall use the Recycled Water Unit Demand Table 4-3-1 and if needed the Gross Acreage to Net Acreage Conversion Table 4-3-2.

B. AGENCY Capital Improvement Program (CIP) Projects:

1. For the majority of AGENCY CIP projects, the AGENCY has previously defined planning areas through master-planning or other means. When this is not the case for a CIP project, the AGENCY may have the Engineer of Work define the planning area.
2. In the absence of more refined demand data from the AGENCY, CIP projects shall use the Recycled Water Unit Demand Table 4-3-1 and if needed the Gross Acreage to Net Acreage Conversion Table 4-3-2.

4.3.5 LAND USE

The Engineer of Work develops existing and ultimate land use data for the geographic area to define the following land use categories: golf courses, agriculture, parks, streets/highways, institutional, multi-family, commercial, and industrial.

4.3.6 RECYCLED WATER UNIT DEMANDS AND GROSS ACREAGE TO NET ACREAGE CONVERSION

The Engineer of Work estimates the recycled water demand in the service area based on existing and ultimate allowable land use. Unless more accurate demand data is available from the AGENCY, the recycled water unit demand shall be estimated based on land use category in Table 4-3-1.

**Table 4-3-1
Recycled Water Unit Demands**

Land Use Category	Recycled Water Unit Demand
Golf Course (Turf)	3570 gallons/net acre-day
Agriculture, Landscaped Park, Street/Highway, Institutional, Multi-Family, Commercial, and Industrial	2150 gallons/net acre-day
Temporary Grading	20 gallons/cubic yard

In needed, the Engineer will generate recycled water unit demand data for land use categories that are not listed.

If net acres are not known for the land use categories, use Table 4-3-2 to convert gross acreage to net acreage.

**Table 4-3-2
Gross Acreage to Net Acreage Conversion**

Land Use Category	Gross Area	Net Area
Golf Course*	1	0.90-1.00
Agriculture	1	0.90-1.00
Landscaped Park**	1	0.40-1.00
Street/Highway	1	0.30-0.50
Institutional	1	0.10-0.15
Multi-Family	1	0.15-0.20
Commercial	1	0.10-0.15
Industrial	1	0.05-0.10

*Net area factor can be lower if golf course putting greens are watered with potable water.

**Assumes recycled water is being used for irrigation. For parks using potable water for irrigation, recycled water usage is zero.

4.3.7 AVERAGE ANNUAL RECYCLED WATER DEMAND

Average daily demands for recycled water are calculated by:

Average Daily Recycled Water Demand (gallons/day)=Net acres x Recycled Water Unit Demand (gallons/net acre-day).

4.3.8 PEAK RECYCLED WATER DEMANDS

Peak hour and maximum day recycled water demands are estimated using the peaking factors presented in Table 4-3-3.

**Table 4-3-3
Recycled Water Peaking Factors**

Condition	Peaking Factors
Peak Hour	Three times maximum day peaking factor
Maximum Day	2.6-2.8

Peak recycled water demands are calculated as follows:

- A. Peak Hour Demand = Average Day of Year Recycled Water Demand x Peak Hour Peaking Factor.
- B. Maximum Day Demand = Average Day of Year Recycled Water Demand x Maximum Day Peaking Factor.

4.3.9 HAZEN-WILLIAMS COEFFICIENTS

The Hazen-William's coefficients for recycled water pipelines shall be the same as for water pipelines refer to Section 4.1.

4.3.10 PRESSURE CRITERIA

A. Static Pressures:

1. Static Pressure is defined as the pressure in the system with no demand occurring in the distribution system.
2. A recycled water distribution pipeline static pressure of 80 psi is optimum for landscape irrigation controllers. However, the minimum static pressure desired in the distribution system is 60 psi.
3. Generally, it is undesirable to have a maximum static pressure that exceeds 150 psi. The maximum static pressure in reservoir systems is determined from reservoir overflow elevations and/or the discharge control setting on pressure reducing valves, whichever is greater. The maximum static pressure in pumped systems is determined from reservoir overflow elevations or pump shutoff head, whichever is greater. In some instances the AGENCY may require the developer to build a pressure reducing station and create a closed zone to meet the criteria. The AGENCY will be responsible for operation and maintenance of these stations.

B. Dynamic (Operating) Pressures:

1. In analyzing the supply to a pressure zone, the minimum hydraulic grade line elevation available from the recycled water source shall be used; a level that typically occurs during peak hour demand conditions.
2. Operating pressures under peak hour demand conditions shall not be less than 40 psi.
3. Recycled water systems shall be designed to meet a pressure of 20 psi with one reservoir out of service if two reservoirs establish the pressure zone.

C. System Pressure:

When possible, new recycled water systems shall be set up so that the pressure gradient is 10 psi less than the parallel water system. This will facilitate confirmation of cross connections between the water and recycled water systems.

4.3.11 VELOCITY CRITERIA

A. Transmission Pipelines:

The minimum and maximum velocity criteria for recycled water transmission pipelines shall be the same as water transmission pipelines refer to Section 4.1.

B. Distribution Pipelines:

The minimum and maximum peak hour velocity criteria for recycled water distribution pipelines shall be the same as water distribution pipelines refer to Section 4.1.

4.3.12 PUMP STATION CRITERIA

Recycled water pumping stations shall be designed to have the same capacity as water pumping stations. Refer to Section 4.1.

4.3.13 STORAGE CRITERIA FOR OPERATIONAL STORAGE RESERVOIRS

Recycled water reservoirs shall be designed to have one ultimate maximum day's volume.

4.3.14 REFERENCE

- A. Should the reader have any suggestions or questions concerning the material in this section, please contact one of the agencies listed.
- B. The publications listed below form a part of this section to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said publications unless otherwise called for. The following list of publications, as directly referenced within the body of this document, has been provided for the user's convenience. It is the responsibility of the user of these documents to make reference to and/or utilize industry standards not otherwise directly referenced within this document.
 - 1. Water Agencies' Standards:
 - a. Design Guide:
 - 1. Section 4.1, Water Planning
 - 2. Section 4.4, Sub Area Master Plans
 - 3. Appendix B, Units of Measurement

END OF SECTION