

VOLUME III

RECYCLED WATER

SECTION 1 - RECYCLED WATER MAINS – GENERAL

1.01 RECYCLED WATER MAINS – GENERAL

- A. Under no circumstances will cross-connection between the potable water system and the recycled water system be allowed.
- B. Public recycled water mains may not be designed outside the street right-of-way without District's approval.
- C. In general, publicly maintained recycled water facilities will be designed only where they serve multiple ownership lots and where appropriate access for maintenance can be provided.
- D. Recycled water mains installed at a slope of 15% or greater will be designed with restrained joints as required. The Design Engineer shall submit plans and calculations and must provide adequate drainage measures to protect the trench from erosion.
- E. Recycled water mains installed outside of any roadway, called "cross-country mains," must have suitable access. In general, cross-country mains must be isolated with valves in the public right-of-way and must be identified with purple locating posts (Carsonite 492 CW-112 or approved equal) at approximate 500-foot intervals, at any angle point, and at the entrance to an easement. Stakes should have vandal-proof metal bottoms. Access requirements as established in the sanitary sewer standards (Volume II Section 10.26) may be imposed on a project based on site conditions.
- F. For purposes of leak detection and maintenance access, no reinforced concrete may be designed over publicly maintained recycled water facilities. Un-reinforced concrete will be allowed under special circumstances such as crosswalks.
- G. Extent of recycled water main improvements will be as follows:
 - 1. Any off-site recycled water main improvements needed to serve the project must be shown on the improvement plans.
 - 2. When the recycled water main will serve properties beyond the project limits, the recycled water main must be designed to cross the full property frontage or to the limits of the street improvements, whichever is greater.
- H. Should recycled water pumping stations or recycled water storage facilities be required, the developer shall notify the District to discuss design criteria for sizing and location.

- I. Recycled water mains shall not be designed with laterals for fire hydrants, wharf heads, or other appurtenances that would allow recycled water to be used for other than approved uses unless expressly approved by the District.
- J. Recycled water mains shall not be designed with temporary connections unless expressly approved by the District. When permitted, temporary connections shall be designed in accordance with these Standards.
- K. Prior to issuance of a permit by the District to construct recycled water improvements and/or connect to the District’s recycled water system, the User must enter into a Recycled Water User Agreement with the District.
- L. These recycled water design standards are intended for small private recycled water projects. Engineered designs shall be required for public systems, large, and/or complicated recycled water projects.

1.02 RESTRAINED JOINTS

- A. For pipes with diameters twelve (12) inches and greater, restrained joints shall be used at horizontal and vertical bends, at curves and at flanges. Restrained joints will also be used on piping on either side of a restrained or blocked bend to provide restraint utilizing soil friction. A rational method, such as the DIPRA design program, or Smith-Blair Restraint joint calculator, will be utilized to determine restrained lengths. Submit plans and calculations for restrained joints to the District.
- B. Restrained joints shall be ductile iron in accordance with the applicable requirements of the ANSI/AWWA C111/A21.11 and ANSI/AWWA C153/a21.53 of latest revision and shall be compatible with the type and pressure class of pipe used.
- C. Restrained joints are the preferred method for restraining the pipeline.

1.03 THRUST BLOCKS

- A. Thrust blocks, shall be used on pipe with diameters less than twelve (12) inches at horizontal bends in accordance with District Standards.
- B. Concrete anchor bolts for vertical bends in pipes with diameters less than twelve (12) inches shall be in accordance with District Standards.
- C. A combination of thrust blocking and restrained joints may be required in unique situations and/or as required by the District.

1.04 MATERIALS

A. LABELING

- 1. Buried pipes and service laterals used for recycled water shall be clearly identified by using purple pipe with continuous wording “RECYCLED WATER – DO

NOT DRINK" printed on opposite sides of the pipe. Where purple pipe cannot be used, the pipes shall be installed with warning tape or installed in a purple bag wrap.

2. The plastic warning tape shall be prepared with black or white printing on a purple field having the words, "RECYCLED WATER - DO NOT DRINK". The overall width shall be a minimum of three (3) inches and shall be installed twelve (12) inches above the pipe.
3. Warning tapes shall be installed eight (8) inches below and parallel to the finished surface. The warning tape shall be installed continuous for the entire length of the pipe and shall be placed with printed side up.
4. All above grade recycled water pipe and service laterals must be labeled with the words "RECYCLED WATER – DO NOT DRINK" and color coded purple to differentiate recycled water pipelines from potable and other water pipelines. If purple identification tape is used to label the pipe and/or color code the pipe, the tape must be adhesive, permanent, and resistant to environmental conditions. Purple bands may also be painted around the circumference of the pipe at 10-foot intervals. Purple PVC pipe is not acceptable for color coding in exposed environments because the color will fade in the sunlight.
5. No. 12 insulated copper wire shall be laid on top of and along entire length of all new buried pipes and shall be extended to the surface at all valve locations, blowoffs and meter boxes sufficiently for locator equipment to be attached.

B. RECYCLED WATER SERVICE LATERALS: 2-INCH DIAMETER AND SMALLER

Recycled water service laterals shall be fusible polyvinyl chloride (PVC) pipe, Schedule 40, or copper tubing, Type K minimum.

C. RECYCLED WATER SERVICE LATERALS: 2-INCH TO 4-INCH DIAMETER

Recycled water service laterals shall be gasketed joint or fusible PVC pipe, Class 315 or greater.

D. RECYCLED WATER MAINS: 4-INCH TO 12-INCH DIAMETER

Recycled water mains 4-12 inches in diameter shall meet the following criteria:

1. Be gasketed joint or fusible polyvinyl chloride (PVC) pipe, Pressure Class 165 minimum, per AWWA Standard C900.
2. Utilize ductile iron pipe (DIP) fittings, Pressure Class 350, per AWWA Standard C151.

3. Pipe and fittings shall be rated for 200 PSI minimum, when normal operating pressures exceed 100 PSI.
4. Ductile Iron Pipe (DIP) shall be used within delineated fault zones and extend to 100 feet outside each side of the delineated fault boundaries.
5. Fusible HDPE pressure pipe, per AWWA Standard C906 is the preferred pipe of choice for most trenchless technologies like horizontal direction drilling.

E. RECYCLED WATER MAINS: 16-INCH AND 18-INCH DIAMETER

Recycled water mains 16-18 inches in diameter shall meet the following criteria:

1. Be gasketed joint or fusible polyvinyl chloride (PVC) pipe, Pressure Class 165 minimum, per AWWA Standard C905.
2. Utilize ductile iron pipe (DIP) fittings, Pressure Class 250, per AWWA Standard C151.
3. Pipe and fittings shall be rated for 200 minimum, when normal operating pressures exceed 100 PSI.
4. Ductile Iron Pipe (DIP) shall be used within delineated fault zones and extend to 100 feet outside each side of the delineated fault boundaries.
5. Fusible HDPE pressure pipe, per AWWA Standard C906 is the preferred pipe of choice for most trenchless technologies like horizontal direction drilling.

F. RECYCLED WATER MAINS: 20-INCH DIAMETER AND LARGER

Recycled water mains 20 inches in diameter and larger shall meet the following criteria:

1. Be gasketed joint or fusible polyvinyl chloride (PVC) pipe, Pressure Class 165 minimum, per AWWA Standard C905.
2. Utilize ductile iron pipe (DIP) and fittings, Pressure Class 250 minimum, per AWWA Standard C151.
3. Pipe and fittings shall be rated for 200 PSI minimum, when normal operating pressures exceed 100 PSI.
4. Tape-wrapped Steel Pipe per AWWA Standard C200, design pressure of 150 PSI minimum.
5. Concrete cylinder pipe per AWWA Standard C303, design pressure of 150 PSI minimum.

6. Ductile Iron Pipe (DIP) shall be used within delineated fault zones and extend to 100 feet outside each side of the delineated fault boundaries.
7. Fusible HDPE pressure pipe, per AWWA Standard C906 is the preferred pipe of choice for most trenchless technologies like horizontal direction drilling.

1.05 PRESSURE

1. Pressure Criteria
 - a. Operating pressure under peak hour demand shall not be less than 40 PSI.
 - b. The maximum allowable static pressure is 150 PSI.
2. Pressure Regulation
 - a. Install pressure reducing valves where required by District to meet operating and static pressure standards.
 - b. All pressure reducing valves must be tagged with a recycled water identification tag with the words "RECYCLED WATER – DO NOT DRINK" on one side and "NO TOMAR AGUA" on the other. Identification tags shall be permanent plastic tags affixed to the valve designed to withstand exposure to weather, sunlight, and immersion.

1.05 CATHODIC PROTECTION

1. Metallic Fittings
 - a. All metallic fittings shall have cathodic protection.
 - b. Metallic Fittings shall be epoxy coated.
 - c. Cathodic protection shall be designed by a corrosion engineer or relevant NACE-certified professional.

SECTION 2 - CONNECTION TO AN EXISTING PUBLIC RECYCLED WATER MAIN

2.01 CONNECTIONS

- A. Under no circumstances will cross-connection between the potable water system and the recycled water system be allowed.
- B. Contact NapaSan prior to tapping to coordinate line isolation/depressurization.
- C. Indicate a "hot tap" for connection of recycled water service laterals 2-inch in diameter and smaller.
- D. Indicate connection of pipes 4-inch to 12-inch in diameter with a hot tap or a cut-in tee. Hot taps will be allowed only when no main line valves are required. When the existing pipe is restrained a cut in tee shall be utilized and installed with restraining joints.
- E. Tie-ins to the existing District recycled water system must be inspected by the District's Inspector and the improvement plans must be so annotated.
- F. Size-on-size taps are allowed up to 6-inch diameter mains.

SECTION 3 - ALIGNMENT

3.01 ALIGNMENT CRITERIA

A. HORIZONTAL

The separation of utilities as identified in the California Department of Public Health (DPH) Criteria for the separation of water mains and not-potable pipelines shall be used unless approved by the District and the potable water purveyor.

In general the horizontal pipe separation shall be as follows:

1. Except for crossings, a minimum horizontal distance of ten (10) feet clear shall be maintained between potable water mains and the recycled water mains and service laterals. If a 10-foot horizontal separation is not feasible, a separation of at least four (4) feet may be allowed subject to special construction conditions. Designers should consult the District for specific design requirements. In no case is horizontal separation of less than four (4) feet or construction in the same trench as potable facilities allowed.
2. The minimum horizontal separation from sanitary sewer, storm drains, gas, electrical, telephone and communications lines shall be four (4) feet clear except at crossings.
3. Recycled water mains shall be designed a minimum of five (5) feet clear from all structures, such as manholes or drop inlets.
4. Recycled water mains shall be designed a minimum of three (3) feet clear from the lip of gutter and five (5) feet clear from the edge of easements.
5. In the event that it is not possible to maintain the required separations and relative positions between recycled water mains and service laterals, potable water lines and sanitary sewer lines, special design shall be required and approved by the District.
6. Recycled water main crossings over or under other underground facilities will be designed as close to 90 degrees to the facility as possible.
7. Recycled water mains shall be designed with service laterals perpendicular to the main.

B. VERTICAL

The separation of utilities as identified in the California Department of Public Health (DPH) Criteria for the separation of water mains and not-potable pipelines shall be used unless approved by the District and the potable water purveyor.

In general the vertical pipe separation shall be as follows:

1. Provide a minimum of six (6) inches vertical separation from sanitary sewer, storm drains or other underground utilities such as telephone, communication, gas, or electrical conduit.
2. Pothole and survey utilities or other structures critical to vertical alignment.
3. Where it is necessary to lower or raise either the recycled water main or the existing potable water main because of a vertical conflict, the main that is smaller shall be chosen for the deviation; however, the deviation shall be such that the potable water main is placed above the recycled water main. If the recycled water main must go over an existing potable water main, approval from the District is required, and a continuous (no joints or valves) section shall be used. It shall clear the potable water main by twelve (12) inches and shall extend to ten (10) feet clear on either side of the potable water main.
4. Recycled water mains over or under other utilities shall be in accordance with District Standards, except that PVC pipe shall be allowed with ductile iron fittings.

3.02 MAIN SIZING CRITERIA

- A. Recycled water mains will be sized based on a minimum peaking factor of 10 applied to the annual average demand rate, and a maximum velocity of five (5) feet per second. Peaking factor shall be determined based on AWWA M24.
- B. Recycled water mains shall be 4-inch diameter minimum.

3.03 MIMIMUM MAIN/LATERAL COVER

- A. Depth of cover is defined as the distance from the top of the pipe to the final finished grade measured directly over the pipe. Minimum depth of cover shall be as follows:

Recycled Water Main Pipe Diameter (Inches)	Minimum Cover (Inches)
All sizes in paved/street areas	48
2.5" and smaller	18
3"	24
4", 6", 8"	36
12"	42
16" and larger	14
Intermittent pressure lines	12

Service laterals shall have minimum cover as shown on District Standard Details.

- B. Where minimum cover is less than standard or greater than eight (8) feet, special permission from the District Engineer is required. Show mains with non-standard cover in profile on the Improvement Plans to be reviewed by the District. Where cover is less than the Standard, higher class pipe, ductile iron pipe, and use of controlled density fill may be required.

SECTION 4 - RECYCLED WATER VALVING

4.01 RECYCLED WATER VALVING

A. VALVES - GENERAL

1. A minimum of two (2) main line valves are required for “T” intersections.
2. A minimum of three (3) main line valves are required for cross intersections.
3. Any recycled water main that does not have a lateral connection will have valves at approximately 1,000-foot intervals.
4. Recycled water main valves must be located outside of concrete areas whenever possible to facilitate repairs.
5. Cross-country mains must be isolated with valves in the public right-of-way and must be identified with locating posts at 500-foot intervals, at any angle point and at the entrances to easements.
6. All valves must be tagged with a recycled water identification tag with the words “RECYCLED WATER – DO NOT DRINK – NO TOMAR AGUA”. Identification tags shall be permanent plastic tags affixed to the valve designed to withstand exposure to weather, sunlight, and immersion.

B. GATE VALVES

1. Gate valves shall comply with District Standard.
2. Gate valves shall be used for 12-inch diameter pipelines or smaller.
3. Gate valves shall conform to AWWA Standard C509 of the latest revision and shall be the resilient seat type with non-rising stem opening counter clockwise with O ring stem seal and suitable ends for connecting to the type of pipe or fitting used.
4. The working pressure rating of the gate valves shall meet or exceed the pressure rating of the pipe.
5. External bolts and nuts and washers shall be 316 Stainless.

C. BUTTERFLY VALVES

1. Butterfly valves shall comply with District Standard. Butterfly valves shall be used for pipelines over 12-inch in diameter. In general, butterfly valves will not be allowed without special permission from the District, and only when the depth of the main precludes the use of a gate valve.

2. Butterfly valves shall be flanged or mechanical joint type only and shall conform to AWWA Standard C504 of the latest revision and shall be the rubber seat type.
3. Valve discs shall rotate 90 degrees from the full open position to the tight shut position.
4. The valve seat shall provide a tight shut off at a pressure differential of 150 PSI upstream and 0 PSI downstream in either direction.
5. The valve operator shall be the traveling nut type.
6. Valve shall open with a counter-clockwise rotation of the operating nut.
7. External bolts and nuts and washers shall be 316 Stainless.

D. VALVE BOXES

1. The interior of valve boxes shall be purple or painted purple.
2. Valve stem riser shall be SDR 35 purple PVC pipe.
3. Valve boxes shall be purple and have a warning label permanently molded into the cover. Warning labels shall be constructed of a weatherproof material with the warning permanently stamped or molded into the label and having the words, "RECYCLED WATER - DO NOT DRINK – NO TOMAR AGUA".

4.02 SPECIALTY VALVES AND RECYCLED WATER SAMPLING STATIONS

- A. Recycled water sampling stations may be required to provide representative sampling where required by the District. The above grade cabinet must have a warning label affixed onto it with rivets, bolts, etc. Warning labels shall be constructed of a weatherproof material with the warning permanently stamped or molded into the label and having the words, "RECYCLED WATER - DO NOT DRINK- NO TOMAR AGUA".
- B. Air release and vacuum relief valves are required at substantial high points in the system such as hilltops, bridge crossings, and the upper end of dead legs. Air valves may be located below grade with below grade vent piping as shown on District Standard Details.
- C. Blowoffs shall be installed at substantial low points to facilitate draining of the system and shall be located within 150 feet of a sanitary sewer manhole. Local low points, such as utility crossings, will not require blowoffs. Blowoffs shall be in accordance with District Standard Detail RW-6.

- D. All manual control valves, electrical control valves, and pressure reducing valves shall be installed below grade in a valve box. Air release valves can be vented below grade.
- E. All specialty valves and water sampling stations must be tagged with a recycled water identification tag with the words “RECYCLED WATER –DO NOT DRINK – NO TOMAR AGUA”. Identification tags shall be permanent plastic tags affixed to the valve designed to withstand exposure to weather, sunlight, and immersion.

SECTION 5 - HYDROSTATIC TEST

5.01 TESTING

- A. The test shall be performed after the line has been laid and all backfill placed and compacted as specified elsewhere in these specifications. The Contractor, at his/her option, may test the line at any time during construction. However, the final test for acceptance shall be made only after all backfill is in place. Each valved section of pipe, or combined sections, as approved by the District, shall be subjected to a hydrostatic pressure of not less than 50 PSI above working pressure and not less than 150 PSI at any point on the main. The duration of each pressure test shall be two hours. Valves on existing mains in service which are required to be operated in connection with the new pipe shall be operated only by the District Inspector. Each section of pipe shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a satisfactory manner. The pump, pipe connection, and all necessary apparatus except gauge and measuring devices shall be furnished by the Contractor. The Contractor will furnish the gauge and measuring devices for the test. The pressure gauge shall be calibrated within one week prior to the test. The Contractor shall make the taps into the pipe and shall furnish all necessary assistance for conducting the tests. Before applying the test pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made, if necessary, at the points of the highest elevation, and afterwards tightly plugged.
- B. Suitable means shall be provided by the District for determining the quantity of water leakage under the test pressure. No pipe installation will be accepted until or unless this leakage is less than 40 U.S. gallons per 24 hours, per mile of pipe, per inch nominal diameter of pipe. Should any test of combined sections of pipe laid disclose leakage per mile of pipe greater than that water specified, or if individual sections show leakage greater than the specified limit, the Contractor shall, at his/her own expense, locate the cause and repair the defect until the leakage is within the specified allowance.
- C. Leakage is defined as the quantity of water lost by the newly laid pipe, or any valved section of it, at test pressure after the pipe has been filled with water and the air expelled. The engineer shall designate the time at which the tests shall be made.
- D. The Contractor shall repair any obvious leaks even though the hydrostatic test results are within the prescribed limits above.
- E. If recycled water is used for testing, test water may be discharged to the sanitary sewer system only with approval by the Engineer.
- F. Final connections to existing recycled water systems shall be visually tested at line pressure. After successful completion of the hydrostatic test, the Contractor shall

connect to the existing system. The District will perform a visual test of the connection. The Contractor shall notify the District at least 24 hours prior to the connection. The entire circumference of the connection shall be clear of backfill material during the visual test. After completion of the visual test, the connection may be backfilled.

SECTION 6 - SERVICE LATERALS AND METERS FOR IRRIGATION SERVICE

6.01 SERVICE LATERALS

- A. Under no circumstances will cross-connection between the potable water system and the recycled water system be allowed.
- B. All service meters must be tagged with a recycled water identification tag with the words "RECYCLED WATER – DO NOT DRINK" on one side and "NO TOMAR AGUA" on the other. Identification tags shall be permanent plastic tags affixed to the valve designed to withstand exposure to weather, sunlight, and immersion.
- C. The District may allow meters to be located on private street frontages and/or within public utility easements if the District's evaluation concludes that it is reasonable under the circumstances. However, meters must be readily accessible.
- D. Design meter boxes out of traveled ways and a minimum of ten (10) feet from street trees whenever possible. Meter boxes shall be purple and have a warning label permanently molded into or affixed onto the cover with rivets, bolts, etc. Warning labels shall be constructed of a weatherproof material with the warning permanently stamped or molded into the label and having the words, "RECYCLED WATER - DO NOT DRINK- NO TOMAR AGUA".
- E. Meters for the recycled water system shall be installed and paid for by the User. Meters shall be Badger Recordall meter for 1-1/2" to 6" diameter for flows ranging from 1.25 gpm to 2,500 gpm. In certain cases, remote telemetry equipment may be required by the District for recycled water metering and monitoring.
- F. Should a larger meter be required, the metering station shall be as approved by the District.
- G. Recycled water meters shall be painted purple.
- H. Base any required hydraulic calculations for the water meter and service lateral sizes on criteria from AWWA Manual M22 and submit to the District for approval. Service laterals shall be 3/4-inch diameter, minimum.
- I. The maximum velocity in recycled water service laterals from the main to the meter is 15 feet per second.
- J. Meter manifolds shall be detailed on the plans and approved by the District.
- K. Multi-Family Residential (3 Or More Units)
 - 1. See Section 6.01.N for irrigation meter requirements for any landscaped or common areas.

2. All meters must be within public right-of-way or easements and multiple meters will be clustered where possible.
- L. Mobile Home Parks: See Section 6.01.N for common area irrigation meter requirements.
- M. Mixed residential and commercial uses shall have separate meters.
- N. Irrigation
1. Provide separate irrigation meters for landscaped areas of all commercial uses.
 2. Provide separate irrigation meters for common areas of all condominium, town homes, planned unit development (PUD), apartment complexes, and mobile home parks.
 3. Provide backflow devices for all irrigation services as shown in the table in Section 7.01 - A. Backflow devices must be specified on the irrigation plan and must conform to District Standard and current USC Approved List of Devices.
 4. Sizing of irrigation meters will be determined by the District after reviewing calculations provided by the design engineer. Irrigation meter size will be determined by the maximum flow required at the meter and will be based on AWWA criteria for meter sizing. Water demand purchased will be based on the estimated gallons required to maintain the planned landscape in a healthy condition for our climate. Below are tables showing flows for the Badger Recordall Reclaimed Disc, Badger Turbo Series Meters and the Badger Recordall E-Series Ultrasonic Meters.

Badger Recordall Disc Meters Size and Flow Table

Size	Model #	Operating Range	Extended Low-Flow Rate	Maximum Continuous Operation
5/8"x3/4"	M25	1/2-25 GPM	1/4 GPM	15 GPM
3/4"	M35	3/4-35 GPM	3/8 GPM	25 GPM
1"	M55	1-55 GPM	1/2 GPM	40 GPM
1"	M70	1-1/4-70 GPM	3/4 GPM	50 GPM
1-1/2"	M120	2-1/2-120 GPM	1-1/4 GPM	80 GPM
2"	M170	2-1/2-170 GPM	1-1/2 GPM	100 GPM

Badger Recordall Turbo Series Meters Size and Flow Table

Size	Model #	Operating Range	Extended Low-Flow Rate	Maximum Continuous Operation
1-1/2"	T160	4-200 GPM	2-1/2 GPM	200 GPM
2"	T200	4-310 GPM	2-1/2 GPM	310 GPM
3"	T450	5-550 GPM	4 GPM	550 GPM
4"	T1000	10-1,250 GPM	8 GPM	1,250 GPM
6"	T2000	20-2,500 GPM	15 GPM	2,500 GPM

Badger Recordall E-Series Ultrasonic Meters Size and Flow Table

Size	Model #	Operating Range	Extended Low-Flow Rate	Maximum Continuous Operation
5/8"x3/4"	E-25	0.1-25 GPM	0.05 GPM	25 GPM
3/4"	E-35	0.1-32 GPM	0.05 GPM	32 GPM
1"	E-55	0.4-55 GPM	0.25GPM	55 GPM

5. Meter Type Selection – anticipated flow rates and water conditions.
 - a. Recordall Disc Meters – Nutating Disc:
 - i. Broad flow range and good low flow registration
 - ii. Not desirable for water with particulates or sand
 - b. Recordall Turbo Meters – Turbine (propeller style) element:
 - i. Designed for higher, constant flow rates (not low flows)
 - ii. Good at passing particulates and sand
 - c. Recordall Ultrasonic Meter:
 - i. Excellent for extended low flow registration
 - ii. No moving parts – good at passing particulates and sand
6. Radio Communication – recycled water meters shall be equipped with an appropriate encoder receiver transmitter (ERT) and ancillary equipment per

NapaSan requirements. Metadata identifying the equipment for reading shall be provided to NapaSan.

SECTION 7 - BACKFLOW DEVICES

7.01 BACKFLOW DEVICES

- A. Backflow Prevention shall be in accordance with AWWA M14 and shall be required for the following applications:

Application	Type of Device
Buildings with Recycled Water for approved Dual Plumb uses	Reduced Pressure
Irrigation System w/Chemical Feed	Reduced Pressure
Irrigation System w/Fertilizer Feed	Double Check
Irrigation System w/water impoundments on-site	Double Check
Irrigation System w/quick coupling devices	Double Check
Irrigation System w/Supplemental Water from the Potable Water System	Air Gap

- B. All backflow devices must be tagged with a recycled water identification tag with the words "RECYCLED WATER – DO NOT DRINK" on one side and "NO TOMAR AGUA" on the other. Identification tags shall be permanent plastic tags affixed to the valve designed to withstand exposure to weather, sunlight, and immersion.

SECTION 8 - SPECIAL CONDITIONS FOR DELINEATED FAULT ZONES

8.01 SPECIAL CONDITIONS

- A. Fault zones must be identified on improvement plans.
- B. Ductile iron pipe must be indicated on the improvement plans in delineated fault zones and extend to 100 feet outside each side of the delineated fault boundaries.

SECTION 9 - ABANDONMENT OF RECYCLED WATER MAINS AND SERVICES

9.01 ABANDONMENT OF RECYCLED WATER MAINS AND SERVICES

- A. Any existing recycled water mains and service laterals that will not be used must be abandoned and must be shown on the Improvement Plans with appropriate notation.
- B. For all abandoned recycled water services up to and including two (2) inches, annotate to remove the valve and saddle and install a full circle clamp on main under the presence of District Inspector.
- C. For flanged or mechanical joint tees, annotate the Improvement Plans to remove the valve and install a blind flange or mechanical joint plug under the presence of District Inspector.
- D. For push-on tees, the tee, valve and concrete thrust block must be removed and the main repaired with approved pipe and suitable couplings, and so noted on the Improvement Plans.
- E. Valve boxes for abandoned valves must be removed and so noted on the Improvement Plans.
- F. Abandoned mains, valves, and risers located within any street structural section or within any new trench must be shown on the Improvement Plans to be removed.
- G. Show all 12-inch diameter and larger recycled water mains to be abandoned within the public right-of-way as removed or broken every 100 feet and filled with sand slurry.

SECTION 10 - ON-SITE DESIGN STANDARDS

10.01 ON-SITE DESIGN STANDARDS

Trench backfill material is considered to be all material placed in the trench between the pipe embedment and the road bed or ground surface.

A. INTRODUCTION

1. General

Consideration should be given to the type of landscaping and selection of plant materials to accommodate good irrigation practices in the recycled water use area. Irrigation design must address specific recycled water management criteria including prevention of overspray onto adjacent sites, runoff and ponding.

In general, the recycled water irrigation system shall be designed to safely and efficiently apply recycled water to the intended use area. General guidelines are:

- a. Minimize overspray and runoff.
- b. Direct irrigation water away from sensitive areas.
- c. Select heads and pressures that minimize atomization or misting.
- d. Maximize physical separation between domestic and recycled piping systems.
- e. Schedule irrigation around sensitive areas at times of least public exposure and maximum dry out period.
- f. Use of low trajectory or non-spray type heads around sensitive areas.
- g. Efficient irrigation design.

In sensitive areas, special consideration should be given to the following:

- a. Use of decorative shielding or screening.
- b. Non-irrigated buffer zones.
- c. Use of plant materials that can be irrigated using drip or some method of non-spray irrigation.

2. Irrigation Times

According to public health standards, irrigation using recycled water should take place at the time of least public exposure and allow maximum dry out time for those areas receiving public contact. To avoid overloading the District's

distribution system, the irrigation demand should be spread evenly over a maximum period as long as it poses no public health threat. The District reserves the right to assign irrigation times if peak irrigation demands result in a significant loss of the District's system pressure.

B. SUBMITTAL AND APPROVAL PROCESS

1. Approvals

Construction Approval, Follow-up and On-site Inspections Prior to Construction will be made by the District Inspector. Two complete sets of plans and specifications shall be submitted to the District for approval. Once approved, District will sign originals. Any field changes shall be brought to the attention of the District for approval. A complete set of "as built" reproducible plans shall be delivered to the District upon completion of the project.

2. Record Drawings

The Contractor must prepare record drawings to show the recycled water irrigation system as constructed. These drawings must include all changes in the work constituting departures from the original contract drawings including those involving both constant-pressure and intermittent-pressure lines and appurtenances. All conceptual or major design changes must be approved by the District before implementing the changes in the construction contract. The recycled water irrigation system record drawings must be submitted to the District within thirty (30) days of the site receiving recycled water.

3. Irrigation Equipment Legend

For irrigation systems, a legend showing the pertinent data for the materials used in the system shall be recorded on the plans. The legend shall include a pipe schedule listing pipe sizes and materials of construction; a listing of valve types including quick coupling valves; manufacturer and model number of automatic controller; and the following information for each type of sprinkler head:

- a. Manufacturer and model number
- b. Sprinkler radius (feet)
- c. Operating pressure (PSI)
- d. Flow (gpm)
- e. Sprinkler pattern
- f. Precipitation rates
- g. Nozzle size and/or pressure compensating device size where appropriate

C. GENERAL CONSIDERATIONS FOR USE

1. District Access

The District shall be entitled to reasonable access for the purpose of monitoring and inspecting the recycled water facilities, operations of said facilities, and the use areas. The District shall have access to the user's premises during the construction periods, as well as whenever the recycled water service is operational. These inspections are necessary as a condition of the Permit to ensure compliance with District and all other applicable standards, and to maintain adequate public safety. The access rights listed in this section shall also apply to the potable water supplier of the site.

2. Public Access

In order to prevent the possibility of unauthorized use, all on-site recycled water facilities shall be restricted from the public so that the general public cannot draw water from the system. Facilities, such as washdown hydrants, blowoff hydrants, blowoffs on strainers and other such facilities shall be restricted from public access. These facilities, both above and below grade, shall be housed in an approved lockable container and posted with a sign.

3. Posting Of Use Areas

All use areas where there is public contact are required to post permanent signs stating the area is irrigated using recycled water. The signs shall measure not less than 8" x 8" with 1" minimum white lettering on a purple background.

Use area signs shall be posted at the direction of the District and in a conspicuous manner to adequately inform the public, especially at access points to the use area. It is the responsibility of the user to initially post and to maintain necessary identification to the satisfaction of the District. Signs are available from the District and paid for by the user.

4. Prevention of Overspray, Runoff and Ponding

In accordance with the prohibition on runoff and for control of the areas to which recycled water is applied, the design of irrigation systems shall conform to the following:

- a. The on-site recycled irrigation system shall be designed to meet the peak moisture demand of all plant materials used within the designated use area.
- b. On-site recycled irrigation systems shall be designed to prevent or minimize discharge onto areas not under control of the user. Part circle sprinklers shall

be used adjacent to roadways and property lines to confine the sprinklers to the designated use area.

- c. The design of the on-site recycled irrigation system shall provide for watering during the periods of minimal use of the service area to the extent possible. Consideration shall be given to allow a maximum dry out time before the designated area is used by the public.
- d. Recycled water shall be applied at a rate which does not exceed the infiltration rate of the soil, thereby avoiding potential runoff. Where varying soil types are present, the design of the recycled irrigation system shall be compatible with the lowest infiltration rate present.

5. Sensitive Areas

Because of increased potential public health risks, some areas within or adjacent to recycled water use areas require special considerations during the design of landscape and irrigation facilities. Generally, additional precautions are necessary to minimize public contact in these areas. Examples are: exterior drinking fountains and picnic tables must be shown and called out on the recycled water system plans. Note that any drinking fountains and picnic tables which will be located in or adjacent to a recycled water use area require specific approval by the District.

6. Irrigation From Domestic Water System

Generally, it is preferred that all irrigation takes place from the recycled water system. However, situations may arise where it is desirable or prudent to irrigate using potable water. If this is the case, care must be exercised to protect against inadvertent cross connection with the recycled water system.

Also, recycled water is only to be used for those purposes specifically allowed in the Permit. If water is needed for purposes not covered by the District Permit, then potable water from the domestic water system must be used. Hose bibs and/or quick couplers should be provided on the domestic water system for these purposes.

7. Conversion of Existing Irrigation Systems to Recycled Water

With the exception of pipe identification and pipe separation, facilities where the existing buried piping system is converted from potable to recycled water must meet the same a retrofitted site must meet the identification and separation requirements for new systems. In addition, any existing piping uncovered for any reason during construction must be marked according to pipe identification requirements to the extent feasible.

D. DESIGN REQUIREMENTS

1. General

The design and construction of the on-site recycled water distribution system shall, at a minimum, conform to the standards of the UPC, District's "Recycled Water Users' Guide", and any other federal, state or local regulations or requirements

2. System Pressure

Every service from the recycled water system will be no greater than 150 PSig, depending upon elevation and distance from the point of supply. With adequate on-site piping, this will be excessive pressure for most irrigation heads; therefore, pressure reducing devices may be required on some irrigation systems.

The District reserves the right to modify its operation in order to increase the reliability or efficiency of the recycled water system, which may result in increases or decreases in delivery pressure.

3. Pressure Regulator

Where the recycled water static service pressure exceeds 80 PSI, a pressure-regulating valve shall be installed and maintained in the user's piping between the meter and the first point of water use, and set at not more than 50 PSI when measured at the highest fixture on the property served.

This requirement may be waived if the user presents evidence satisfactory to the District that excessive pressure has been considered in the design of water-using devices and that no water will be wasted as a result of high pressure operation.

4. Backflow Prevention

Backflow prevention is required to ensure that recycled water is not inadvertently introduced into a potable water supply. General information on the requirements for backflow prevention is within these specifications, but potential users should contact the District for specific information concerning their proposed use.

Backflow protection of the potable water supply to any premises also having a recycled water service is required by the "California Code of Regulations, Title 17 – Public Health, Section 7583 –7605".

Specifically, §7604, Type of Protection Required, Table 1 (3) states that premises where recycled water is used and there is no interconnection with the potable

water system require a "Reduced Pressure Principal Backflow Prevention Device (RP)" In some cases, an "Air Gap" Separation may be required.

Generally backflow protection will not be required on the recycled water service unless such service has provisions for chemical injection or other means of potentially contaminating the recycled water system or when such irrigation system does not meet conditions specified within this manual. Backflow protection may be required for reasons other than recycled water. For backflow protection on the recycled water system, see Standard Details.

Backflow preventers shall be tested immediately after they are installed, relocated or repaired and not placed in service unless they are functioning as required.

The installation, testing and maintenance of backflow protection shall be the responsibility of the user, Title 17, Section 7605.

5. Separation Requirements

A certain degree of separation is necessary between the user's recycled water and the domestic water system in case of piping damage, failure, or leakage. If minimum separation is not possible, alternate methods will be used to provide the necessary safeguards.

- a. Basic Separation - Ten feet (10') of undisturbed soil must exist between recycled water and domestic water piping. Recycled water and domestic water piping are not to be installed in a common trench.
- b. Less than Basic Separation will only be allowed if there are no other alternatives available, and require prior approval by the District and the potable water supplier to the site
 - i. Not in common trench - If it is required that recycled water and domestic water piping parallel one another in separate trenches with less than ten feet (10') of undisturbed soil between them, the new line or one of the lines must use Schedule 80 PVC pipe. Dig in (marking tape) protection is also required over at least one of the lines.
 - ii. Common trench - Recycled water and domestic water piping can be installed in a common trench only if there are no other alternatives available. The domestic water line shall be placed on a solid shelf excavated at one side of the common trench. The bottom of the water line shall be 12" above the top of the recycled water line.

The recycled water line shall be minimum Schedule 80 PVC, purple pipe marked "Recycled Water". If purple pipe is not available, then marking tape and dig in protection will be required.

Any new domestic water piping shall be minimum Schedule 80 PVC and shall be identified as domestic water piping.

6. Crossings - Sleeves

If recycled water and domestic water lines cross, it is required that such crossing is made perpendicular to each other.

Sleeves shall be required where it is necessary to protect the integrity of either the recycled water or the domestic water system in order to minimize the potential for contamination of the on-site domestic water system. Sleeve size and material shall be approved by the Engineer.

Example: Where a constant pressure recycled water line crosses a constant pressure potable water line; a sleeve shall be provided on the recycled water line. The sleeve shall extend not less than 5 feet on each side of the potable water line.

7. Pipe and Dig In Protection

All new recycled water piping systems (including laterals) shall be purple in color and marked "Recycled Water". All constant pressure recycled water piping shall also have metallic dig in protection tape installed in the trench, 8" below and essentially parallel to the finished surface. The tape shall be placed in the trench with the printed side up, and the necessary precautions shall be taken to insure the tape is not pulled, distorted or otherwise misplaced in backfilling the trench.

8. Depth of On-Site Recycled Water Piping

For on-site recycled water piping, the minimum depth from finished grade to top of pipe (minimum cover) shall be as follows:

Onsite Recycled Water Pipe Diameter (Inches)	Minimum Cover (Inches)
Less than 3" at constant pressure	18
3" and larger at constant pressure	24
Intermittent pressure lines	12

Where piping is under paved areas, these minimum cover dimensions shall be constructed to the bottom of the subgrade.

9. Flushing

User may desire a method of flushing the recycled water system. Any flushing must be done in such a way that it will not create a hazard or violate the conditions of the Permit. Flushing into the sanitary system is the most acceptable way. If this is not possible, flushing may be done utilizing a tank truck or other approved holding facilities. All holding facilities must be clearly marked. The holding facility shall then be transported and dumped at an approved site in an approved manner.

10. Hose Bibs

Hose bibs are not permitted on any recycled water system for any purpose. Hose bibs located on the domestic water system and in close proximity to the recycled water system shall be clearly marked as "Potable Water".

11. Washdown Hydrants and Other Points of Public Access

All on-site recycled water facilities shall be restricted from public access so that the general public cannot draw water from the system. Facilities, such as washdown hydrants (typically found at tennis courts), blowoff hydrants, blowoffs on strainers, and other such facilities, shall be restricted from public access.

These facilities, both above and below grade, shall be housed in a District approved lockable container with a sign posted as shown in Standard Details. An alternative acceptable means of restricting public access is the use of valves that operate by means of a recessed key slot or by means of pentagonal heads (such as those typically found on fire hydrants). Other means of restricting public access may be approved by the District.

12. Quick-Coupling Valves

Quick coupling valves used in the recycled water system shall conform to the following:

- a. Quick coupling valves shall be 3/4" or 1" normal size with brass construction and a normal working pressure of 150 PSI (Nelson 7642 or 7643 quick coupler with 7640 or 7641 key or approved equal).
- b. Valve and key to be coupled using a threaded connection (Nelson 7642 or 7643 quick coupling valve with 7640 or 7641 key or approved equal).
- c. A cover shall be permanently attached to the quick coupling valve. The top of the cover shall be purple and read "Non-Potable Water" or other wording as approved by the District.

- d. Locking covers may be required.

13. Flow Meter

All recycled water services shall be metered with a District-Approved recycled water meter. The District does not provide/supply recycled water meters. The recycled water meter shall be furnished by the Contractor or User.

Recycled water meters shall be painted purple. Recycled water meter boxes shall be painted purple on all surfaces.

In certain cases, at the District's discretion, remote telemetry equipment may be required for recycled water metering, at which time the requirements shall be provided by the District.

14. Strainers

Sprinkler irrigation systems shall, as necessary, have a "Y" strainer located downstream of the meter. The strainer shall have a 30-mesh or finer screen. Strainers that have automatic backwash features will not normally be allowed unless it can be demonstrated to the District that the backwash water will not cause runoff and is disposed of in a manner approved by the District. Strainer drain valve shall have a recessed key slot.

15. Control and Regulating Valves

All gates valves, manual control valves, electrical control valves, pressure reducing valves, and pressure relief valves for the on-site recycled water system installed below grade shall be in a valve box with purple interior and labeled Recycled Water.

16. Pipe Identification

All new piping, whether for a new or retrofitted system, must be installed according to the approved plans and marked per these requirements to clearly distinguish between recycled water and potable water systems.

a. Identification of Buried Recycled Water Lines

The use of purple colored pipe with continuous wording "RECYCLED WATER – DO NOT DRINK" printed on opposite sides of the pipe is the preferred method for identification of new buried recycled water piping (constant-pressure main lines/intermittent-pressure laterals). Pipe must be laid with wording facing upwards.

b. An acceptable alternative

All new buried recycled water lines (constant-pressure main lines/intermittent-pressure laterals) must be identified by continuous lettering on three inch (3") minimum width, purple marking tape with one inch black or white contrasting lettering bearing the continuous wording "RECYCLED WATER – DO NOT DRINK." This tape must run continuously on top of all piping (main lines and laterals) and must be attached to piping with plastic tape banded around the marking tape and the pipe every five feet on center. Marking tape must extend to all valve boxes and/or vaults and exposed piping.

c. Identification of Existing Buried Recycled Water Lines

Existing buried piping which will be converted to recycled water use need not be marked unless the piping becomes exposed, such as during installation of new pipeline or maintenance of existing pipe. The exposed section must be marked as indicated above for new piping.

d. Identification of Above Grade Recycled Water Lines

All above grade recycled water pipelines, whether new or existing, must be labeled with the words "RECYCLED WATER - DO NOT DRINK" and color coded purple to differentiate recycled water pipelines from potable water pipelines. If purple identification tape is used to label the pipe and/or color code the pipe, the tape must be adhesive, permanent, and resistant to environmental conditions. Purple bands may also be painted around the circumference of the pipe at ten-foot intervals for color-coding. Purple PVC pipe is not an acceptable alternative for color-coding because the purple color will fade when exposed to sunlight.

e. Identification of Recycled Water Lines Inside Structures

Exposed (not buried) constant pressure recycled water irrigation pipelines, such as copper or galvanized pipelines, that might be used in a structure such as a parking garage to route recycled water, must be identified per UPC Appendix J, with the exception that the labeling on the piping must read "CAUTION: RECYCLED WATER – DO NOT DRINK." Intermittent-pressure lines inside a structure must be identified by affixing decals to this piping at ten-foot intervals and wherever the piping changes directions. These decals must be purple in color and must be imprinted in nominal one-inch-high, black, uppercase letters, with the words "RECYCLED WATER – DO NOT DRINK," and must be adhesive, permanent, and resistant to environmental conditions.

17. Valve Boxes

All remote control valves, isolation valves, pressure reducing valves, and strainers for on-site recycled water systems must be installed below grade in a valve box. Green, black, or purple valve boxes and lids are acceptable.

Valve boxes must have an advisory label or "nameplate" permanently molded into or affixed onto the lid with rivets, bolts, etc. Labels must be constructed of a purple weatherproof material with the wording "RECYCLED WATER - DO NOT DRINK - NO TOMAR AQUA" permanently stamped or molded into the label.

18. Irrigation Controllers

New recycled water system controllers must be automatic with multiple start/stop times for any 24 hour period and installed according to the approved plans and local codes. All recycled water system controllers must be identified by affixing a sticker or "nameplate" to the outside of the controller cabinet, the inside of the controller cabinet, or the outside or inside of the controller cabinet enclosure. Stickers or nameplates must be weatherproof, and must contain wording in English and Spanish indicating that the controller is for a recycled water system.

19. Irrigation and Water Feature Advisory Signs

All use areas where there is public contact shall post permanent signs stating the area is irrigated using recycled water. The signs shall measure not less than 8" x 8" with 1" minimum white lettering on a purple background.

Use area signs shall be posted at the direction of the District and in a conspicuous manner to adequately inform the public, especially at access points to the use area. It is the responsibility of the user to initially post and to maintain necessary identification to the satisfaction of the District. Signs may be provided by the District and paid for by the user.

20. Miscellaneous Hardware and Appurtenances

All other facilities in the recycled water system not specifically mentioned above shall be suitably labeled to the effect that it is part of the recycled water system. The District will advise and assist in this type of identification.

E. INSPECTION

1. Construction Inspection

The District's Engineering Office shall be called for inspection two working days prior to the start of work at (707) 258-6000. The potable water supplier to the site shall also be notified two working days prior to the commencement of work.

2. Cross-Connection Test

The user shall be responsible for a procedure to determine if a cross-connection exists between the potable water and the recycled water system. The procedure shall be acceptable to the District and the potable water supplier and the user shall execute the procedure to the satisfaction of and in the presence of representatives from the District and the potable water supplier.

3. Final Inspection and Approval to Receive Recycled Water

Before the recycled water irrigation system is connected to recycled water, the District will perform a final inspection to ensure all requirements have been met. This inspection may be coordinated with the cross-connection test. The District Inspector will check to see that the proper equipment was used and that all required tags, labels, and signs are in place.

The District must grant final approval before recycled water can be supplied to the site. Final approval will be granted when construction has been completed in accordance with approved plans and specifications, all cross-connection tests have been performed, a final on-site inspection has been conducted, and all requirements have been met satisfactorily.

The State DHS will be forwarded a copy of all test and inspection reports as well as notification that recycled water service has started. During the lifetime of the recycled water system, the District will periodically inspect the recycled water system to ensure compliance with all applicable rules and regulations.

RECYCLED WATER DETAILS

- RW-1 – Concrete Anchor Blocks for Vertical Bends
- RW-2 – Concrete Thrust Blocks for Horizontal Bends
- RW-3 – Not Used
- RW-4 – Recycled Water Main Trench Section
- RW-5 – Not Used
- RW-6 – 2" Blow-Off Assembly
- RW-7 – 3/4" & 1" Water Service Lateral for 3/4" & 1" Meters
- RW-8 – 2" Water Service Lateral for 2" or 1-1/2" Meter
- RW-9 – 4" Water Service Lateral for 3" Meter
- RW-10 – 4" Water Service Lateral for 4" Meter
- RW-11 – 6" Water Service Lateral for 6" Meter
- RW-12 – Reduced-Pressure Backflow Device
- RW-13 – Gate Valve
- RW-14 – Not Used
- RW-15 – 1" Air Release and Vacuum Valve Assembly
- RW-16 – 2" Air Release and Vacuum Valve Assembly
- RW-17 – Recycled Water Line Notes
- RW-18 – Recycled Water Sign