CITY OF LATHROP

Department of Public Works

Design & Construction Standards

2022

TABLE OF CONTENTS

SECTION 7
RECYCLED WATER SYSTEM STANDARDS

7-1 INTRODUCTION

The City's recycled water system consists of the land application sites, ponds, pump stations, and distribution system which provides disinfected tertiary treated recycled water for use on agricultural fields, in percolation basins, and on non-residential irrigation sites.

7-2 PURPOSE

The purpose of these recycled water system standards is to establish procedures, specifications, and limitations for the safe and orderly development and operation of recycled water facilities and systems in the City serviced area.

7-3 DEFINITIONS

See Section 1-2 DEFINITIONS:

7-4 CITY SUPPLIED RECYCLED WATER INFORMATION

Recycled water is supplied by the City for use in approved agricultural and landscaping irrigation sites and on approved percolation basins in the City of Lathrop.

7-4.1 Water Quality

The City's recycled water produced from the Consolidated Treatment Facility is disinfected tertiary recycled water as defined by Section 60301, Title 22, California Code of Regulations. It conforms to the Water Recycling Criteria contained in Title 22, California Code of Regulations and is safe for use to irrigate designated agricultural fields and landscape areas and parks that may be open to public access.

7-4.2 The City recycled water distribution system pressure is designed to operate at a lower pressure than the City's potable water system. Designers should contact the City's Public Works Department for obtaining the pressure range anticipated at their specific point of connection.

7-5 REQUIREMENTS FOR DETERMINING ADEQUATE STORAGE CAPACITY AND LAND APPLICATION AREAS FOR RECYCLED WATER SYSTEMS

For those projects for which a new recycled water system or a connection to an existing recycled water system is required, the following shall serve as the basis to determine the necessary storage volume and application area for land disposal of

effluent. If requested, a spreadsheet can be provided to assist in the required calculations.

A. An annual water balance analysis shall be used to estimate minimum total storage volume and minimum total application area for land disposal of effluent.

B. The annual water balance shall be broken down on a month-by-month basis.

C. Monthly rainfall, reference evapotranspiration, and storage basin evaporation amounts used in the water balance shall be as shown in Table 7-1, corresponding to a year with 100-year return frequency annual precipitation. Storage basin evaporation shall be the reference evapotranspiration multiplied by an evaporation discount actor of 90%.

TABLE 7-1

CLIMATOLOGICAL DATA ADJUSTED FOR 100-YEAR PRECIPITATION

MONTH	RAINFALL (in)	REFERENCE EVAPO-TRANSPIRATION [(a)] (in)
October	1.17	3.33
November	2.14	1.60
December	2.61	0.86
January	5.13	0.9
February	4.37	1.73
March	2.85	3.38
April	1.63	5.04
May	1.38	6.45
June	0.24	7.54
July	0.05	8.02
August	0.08	7.11
September	0.28	5.19
Total	**21.8**	**51.15**

[(a)] Evapotranspiration of clipped grass.

D. The reference evapotranspiration (ETo) values presented in Table 7-1 have been adjusted based on historical data corresponding to 100-year annual precipitation. They are lower than average values to reflect the increased number of overcast days in a year with 100-year annual precipitation. These adjusted ETo data shall be used to estimate the monthly evapotranspiration rates of landscaping and crops that will be used in the application areas. The

evapotranspiration for a given crop (ETc) shall be estimated using a crop coefficient (Kc) times the reference evaporation (ETo). Kc values for some common crops are included in Table 7-2. Kc values for crops not included in Table 7-2 shall be subject to approval by the City of Lathrop.

E. In addition to the design average dry weather flow (ADWF), additional flows due to infiltration and inflow (I&I) into the wastewater collection system shall be included in the water balance calculations. The additional I&I flows are assumed to be 8% of the ADWF and are applied year-round.

F. The evaporation losses from the effluent storage basins shall be estimated using the storage basin evaporation values indicated in Table 7-1, applied to the bottom surface area of the basins (area inside toe of sloping sides). As an alternative to using the bottom area, the basin water surface area can be used if it is calculated based on the actual configuration of the basin(s) and the storage volumes, calculated on a month by month basis.

G. Precipitation falling on each storage basin and within its runoff catchment area shall be assumed to be accumulated in the basin. The runoff coefficient (fraction of rainfall collected in the basin) for the inside slopes of the basin and for levee roads and any other areas draining into the basin shall be 1.0.

TABLE 7-2

CROP COEFFIENTS (Kc) FOR SOME COMMON CROPS

	RYE GRASS	TURF	TREES AND SHRUBS
October	1.00	0.75	0.59
November	1.00	0.69	0.58
December	1.00	0.60	0.51
January	1.00	0.61	0.51
February	1.00	0.64	0.56
March	1.00	0.75	0.57
April	1.00	1.04	0.61
May	1.00	0.95	0.58
June	1.00	0.88	0.60
July	1.00	0.94	0.60
August	1.00	0.86	0.60
September	1.00	0.74	0.60

H. For the purpose of the water balance calculations, it shall be assumed that no irrigation shall take place between December and February each year. The purpose of this is to allow for soil drying before the first irrigation (ETc supplied from soil moisture due to preceding rainfall).

I. A leaching requirement of 10% shall be assumed.

J. For each month, the irrigation demand in inches of applied water for each crop shall be calculated as:

(ETc – Precipitation) / ([Irrigation Efficiency/100] x (1 – Leaching Requirements)

In months for which the precipitation exceeds the ETc, the irrigation demand shall be zero. Irrigation efficiencies shall be based on the types of irrigation systems and shall not be less than the values given in Table 7-4. If the irrigation efficiency for a given technique is not included in Table 7-4, the minimum irrigation efficiency and leaching requirement to be used shall be subject to approval by the City of Lathrop.

TABLE 7-4

Minimum Irrigation Efficiencies for Different Irrigation Systems

TYPE OF IRRIGATION SYSTEM	MINIMUM EFFICIENCY
Surface Irrigation	
Basin	80%
Border	65%
Furrow	60%
Sprinkler Irrigation	
Hand Move or Portable	65%
Traveling Gun	60%
Center Pivot & Linear Move	75%
Solid Set or Permanent	70%
Drip/Micro Irrigation	
With Point Source Emitters	75%
With Line Source Products	70%

K. The water balance shall be reviewed and approved by a professional civil engineer licensed by the State of California.

L. The water balance shall be reviewed and approved by the Department of Public Works of the City of Lathrop.

7-6 USES OF RECYCLED WATER

A. Recycled water shall only be used for purposes approved by the RWQCB and as described in the WDRs.

B. All potential uses of recycled water shall be reviewed by the City Engineer. If recycled water use is allowed or required, the facilities shall be constructed in accordance with the procedures and requirements set forth in these Standards. All potential uses other than those stated in this section shall be considered by the City Engineer on a case-by-case basis. Uses shall be in accordance with Section 60304, Title 22, California Code of Regulations.

C. There shall be no direct cross-connection between the domestic potable water system and the recycled water system.

7-7 RECYCLED WATER SYSTEM EXPANSION AND REPAIRS

Expansions or repairs of an existing system shall meet the standards provided herein without reducing the supply, flow, or storage presently available to the existing system, unless the City approves such reduction. Expansions and repairs of an existing system shall also be in accordance with all Regional Water Quality Control Board Waste Discharge Requirements, California State Water Resources Control Board, Division of Drinking Water (SWRCB-DDW) and all applicable state and federal agency requirements.

7-8 RECYCLED WATER SYSTEM INFORMATION AND REQUIREMENTS

Recycled water distribution systems shall include piping throughout the development to provide irrigation of greenbelts, parks, and schools.

To maintain the recycled water distribution system within design operating pressures, a network of pump stations and storage ponds are utilized. When the pressure in the distribution system falls below the low level set point, the pumps at the pump stations are activated, sending water from the storage ponds into the distribution system and to the irrigation sites. When the pressure rises above the high level set point, the pressure relief valves at the storage ponds open, allowing the recycled water from the distribution system into the storage ponds. Pumps will be deactivated when no longer required to sustain system pressure or convey water to or from storage.

7-9 CITY ACCEPTANCE

Upon completion of the final inspection by the City, submission of record drawings, signing of a recycled water agreement, designation and training of a Site-Supervisor, and payment of any outstanding monies, the irrigation system will be

accepted by the City. At that time, service connection to the recycled water line may be made.

7-10 SUBMITTAL REQUIREMENTS

Refer to Sections 1 and 2 of the City's Design and Construction Standards for general submittal requirements. Below are submittal requirements specific to construction of recycled water facilities and distribution systems.

7-10.1 Submittals for Recycled Water Storage Pond Design

If required by the City, the following shall be prepared and submitted to the City with recycled water storage pond designs:

A. A topographical map of the site depicting surrounding water courses, dwelling units, buildings, roads, earthquake fault lines, springs, wells and areas with restricted public access. Contour intervals shall be one foot.

B. A geotechnical report prepared by a licensed Geotechnical Engineer. The report shall include the design high groundwater that will be used a basis of design. The groundwater gradient and direction, design high groundwater elevation, seasonal depth to groundwater, and groundwater quality shall be provided.

C. A watershed map that depicts the hydraulic grade line (HGL) for the 100-year design storm and run-off channels.

7-10.2 Groundwater Information

If required by the City, a report shall be submitted to the City providing information on the area to be irrigated. Information shall include but not be limited to the groundwater elevation and the composition of the existing groundwater including but not limited to the amount of Total Dissolved Solids (TDS).

7-10.3 Drawings

Detailed plans for the recycled water facilities and irrigation systems where recycled water is proposed for use shall be reviewed and approved by the City and inspected during construction to assure compliance with these standards.

A. Prepare and submit a scaled drawing that shows:

1. Specific areas of use;

2. Areas of public access;

3. Surrounding land uses;

4. Wells – color code monitoring, drinking, and agriculture well sites within 1,000 feet of use area;

5. Surface waters; and

6. Color-coded sites with limited public access.

B. Drawings of recycled water facilities, distribution lines, and irrigation systems shall include the following information:

1. Detailed plans showing all piping networks including recycled water, sanitary sewer, auxiliary non-potable water, and potable water lines, and storm drains (with catchments), wherever recycled water lines coexist with any of the other above mentioned lines;

2. Type and location of the outlets and plumbing fixtures that will be accessible to the public;

3. Point(s) of connection;

4. The meter location, size (in inches), address, and civil station number;

5. Location, size, and type of backflow prevention devices;

6. Location and size of all irrigation lines;

7. Location of isolation and line valves;

8. Location of irrigation control valves;

9. Location of quick couplers;

10. Location of control wires;

11. Direction of drainage;

12. Setbacks;

13. Related equipment as specified by the City Engineer; and

14. Reference to standard details.

15. Site Boundaries

16. Site Address

C. Include in the drawings a table stating the following:

1. Total available area;
2. Net available area (with setbacks);
3. Means of application;
4. Types of plants, crops, etc.;
5. Agronomic nutrient application rates;
6. Agronomic water application rates;
7. Monthly projection of agronomic application rates based on both plant water and nutrient needs; and
8. Demand (in acre-feet).

D. The developer shall provide an irrigation plan showing irrigation zones and anticipated flow per zone to determine maximum peak demand in gallons per minute, which will specify sizing of the main extension system.

E. Exterior drinking fountains and other public facilities shall be shown and called out on drawings. If no exterior drinking fountains, picnic tables, food establishments, or other public facilities are present in the design area, then specifically state on the plans that none are to exist.

F. 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 couplers, and the following information for each type of irrigation emitter:

1. Manufacturer and model number,
2. Flow rate (gpm),
3. Operating pressure (psi),
4. Irrigation emitter pattern, and
5. Sprinkler spray radius (feet), if applicable.

7-10.4 Record Drawings

Record drawings of recycled water facilities and irrigation systems shall conform to and be submitted to the City in accordance with Section 1 of the City's Standards.

7-11 RECYCLED WATER DISTRIBUTION SYSTEM DESIGN REQUIREMENTS

The design criteria herein are provided as a service to the applicant and its engineer and are intended to conform to DDW requirements, Title 17 and 22 of the California Code of Regulations, the City's Waste Discharge Permit, and AWWA Guidelines. However, the ultimate responsibility lies with the designers or developers for conformance with all regulatory requirements.

7-11.1 General Design Requirements

A. All recycled water facilities and services shall conform to the requirements of the Public Works Department, and all applicable state and federal agencies and be designed using accepted design procedures and formulas. The most restrictive and stringent regulation shall prevail when there is discrepancy.

B. All recycled water facilities and irrigation systems using recycled water shall comply with the following:

1. California Department of Public Health: "Title 17" – Division 4 of the California Code of Regulations.

2. California Department of Public Health: "Title 22" – Division 4 of the California Code of Regulations.

3. California Regional Water Quality Control Board Waste Discharge Requirements.

C. All recycled water facilities shall be installed to restrict public access so that the general public cannot draw recycled water from the system.

D. Recycled water lines shall not enter any dwellings.

7-11.2 Pressure

City recycled water system facilities shall be designed to have a minimum static pressure of 45 psi at peak hour flow.

7-11.3 Piping

Design of recycled water pipelines shall conform to Section 4 of the City's Standards, unless otherwise described differently below:

A. Depth and Minimum Cover: The top of recycled water mains shall be a minimum of four (4) feet below the finished street grade or two (2) feet below subgrade, whichever is greater unless otherwise approved by the City Engineer.

B. Location of Recycled Water Mains:

1. Recycled water mains in new and existing streets shall be located 2' west or north of street centerline as shown on the Standard Details for Roads. However, traffic conditions, existing utilities, and other physical features shall be considered. Any deviations require prior approval from the City Engineer.

2. All pipelines designed for the transmission or distribution of recycled water shall be located within the right-of-way dedicated for public streets or roads unless the use of an easement is specifically approved by the City Engineer. Easement requirements are specified in Section 4-5.2 of the City's Standards.

3. Common trench construction of recycled water mains with sanitary sewer or potable water lines are prohibited.

C. Horizontal and Vertical Separation: Recycled water mains shall be installed to maintain a 10 feet minimum horizontal separation from all potable water. Any deviations from these separation requirements require prior approval from the City Engineer and SWRCB-DDW. Recycled water mains shall be installed a minimum of 1 foot below all potable water lines. Recycled water main separations from potable water mains are shown in Standard Detail RW1. Reference Title 22, Division 4, Chapter 16, Article 4, Section 64572. Contact the City Engineer for onsite separation requirements for private systems.

D. Transverse Crossings: Where recycled and potable water pressure main line piping cross, the recycled water piping shall be installed below the potable water piping in a purple-colored PVC sleeve which extends a minimum of 5 feet on either side of the potable water piping. Conventional (white) PVC pipe may be used for sleeving material if it is taped with 3-inch-wide purple warning tape that reads "CAUTION: RECYCLED WATER – DO NOT DRINK" in English and Spanish.

E. All pipes that carry recycled water shall be purple or wrapped in purple polyethylene vinyl sleeve conforming to AWWA C105 specifications and

Health and Safety Code 116815. Recycled water pipes shall be colored and marked in accordance with Section 7-16.

F. All recycled water piping shall be installed in accordance with the Uniform Plumbing Code and all other local governing codes, rules, and regulations.

G. Distribution requirements for recycled water main are specified in Section 4-5.3. Requirements for backflow and backflow prevention devices are specified in Section 4-5.4.

H. The minimum size of recycled water mains shall be four (4) inches in diameter. Smaller mains shall be used only when individually approved by the City Engineer.

I. PVC constant pressure main line piping shall be rubber-ring joint, PVC AWWA C900-16 (or latest edition).

J. Irrigation mainline pipe shall be Schedule 40 PVC solvent weld purple pipe with bell ends.

K. Irrigation lateral lines shall be Class 200 PVC solvent weld purple pipe with bell ends.

L. Irrigation sleeving shall be Schedule 40 PVC purple pipe.

M. All riser pipes for valves or blow-offs on recycled water lines shall be purple piping.

7-11.4 **Appurtenances**

A. Recycled Water Blow-offs

Recycled water blow-offs shall be piped directly to a sanitary sewer manhole and installed in accordance with the Standard Details for Recycled Water.

B. Recycled Water Meters

A recycled water meter shall be installed on each recycled water service lateral see, Standard Details for Water.

1. The size and actual placement location of each meter shall be reviewed and approved by the City.

2. The entire meter assembly, including valves and pipes, shall be purple in color.

C. Pressure Sustaining/Pressure Relief Valves

For pond fill lines and agricultural field irrigation systems, pressure sustaining/pressure relief valves shall be installed downstream of the recycled water meter and as shown on the Standard Details for Irrigation. Pressure sustaining/pressure relief valves shall be capable of controlling downstream pressure to an adjustable set point.

D. Strainers and Filters

Strainers or filters shall be installed in order to protect meters, valves, or irrigation equipment such as sprinklers. Strainers shall be placed upstream of meters and pumps and downstream of the seasonal storage ponds.

1. Strainers that have automatic backwash features will not normally be allowed unless it can be demonstrated to the City that the backwash water will not cause runoff and is disposed of in a manner approved by the City.

2. All recycled water that enters the recycled water distribution system from an open reservoir shall be filtered through a filtration process similar in performance to the filters used at the recycled water plant or, as a minimum, screened through a micro strainer with a 200-mesh screen.

3. The maximum strainer size is 100-mesh for placement upstream of pumps (i.e., particles larger than 127 microns are prevented from passing).

4. The maximum strainer size is 30-mesh for placement upstream of sprinkler and drip irrigation systems (i.e., particles larger than 533 microns are prevented from passing).

5. Sprinklers shall be able to pass any particles which will pass through a 30-mesh screen.

6. Sprinkler irrigation systems shall have a “Y” or basket strainer located downstream of the meter.

7. The strainer drain valve shall operate with a recessed key slot.

E. Recycled Water Sample Stations

Recycled water sample stations shall be installed where determined by the City. The sampling station shall consist of a 3/4-inch service connection stubbed out at least twelve (12) inches behind the sidewalk; an in-line

corporation stop with a valve box and cover, and an above-grade lockable sampling station. The above-grade lockable sampling station shall be as shown on Standard Details for Water. The sampling station shall be purple in color and shall be center mounted on a four (4) inch thick concrete slab, two (2) feet square in area.

F. Hose Bibs and Quick Couplers

1. Hose bibs are prohibited on the recycled water system.

2. Quick couplers shall be labeled as CAUTION: RECYCLED WATER – DO NOT DRINK and not be used for connection to the Potable Water System.

G. Recycled Water Monitoring Wells

As required by the City's RWQCB waste discharge permit, a monitoring well installation work plan shall be prepared by a licensed professional engineer or hydrogeologist for City and RWQCB approval prior to the construction, abandonment, or replacement of any monitoring well that is part of the City's monitoring well network.

General monitoring well design shall comply with the City Standard Details. The design is consistent with San Joaquin County Environmental Health Department and State of California Monitoring Well Standards. A description of the monitoring well design includes:

1. The well casing, perforated over the targeted depth interval for monitoring.

2. The annular spacing between the perforated well screen and borehole, filled with a filter pack.

3. A transition seal placed on top of the filter pack.

4. A sanitary seal which extends upwards from the top of the transition seal to the land surface.

7-12 RECYCLED WATER IRRIGATION SYSTEM DESIGN REQUIREMENTS

Recycled water irrigation systems shall conform to the following general design requirements, as well as the specific requirements for design of agricultural and landscaping recycled water irrigation systems.

7-12.1 General Recycled Water Irrigation System Design Requirements

A. Obtain prior approval for all proposed changes and modifications to any facilities. Such changes must be submitted to and approved by the City and designed in accordance with these guidelines and standards.

B. Recycled water shall not be allowed to flow from the designated use areas as surface flow or into the storm drain system or waters of the United States.

C. Land application areas irrigated with recycled water shall be designed with flat surfaces to prevent runoff.

D. Misting and carrying of sprays by wind must be considered when designing the irrigation system. No overspray into public facilities and areas not approved for recycled water use is permitted. Modifications to sprinkler head types and line pressures must be made at the time of system start-up to mitigate the effects of misting and spray drift caused by wind.

7-12.2 **Agricultural Recycled Water Irrigation**

City approved agricultural recycled water irrigation areas shall be flood (also called furrow) type.

A. Agricultural Irrigation System Components

In general, agricultural recycled water irrigation systems shall consist of the connection to the recycled water main, irrigation supply system, and tail water return system.

1. Connection to Recycled Water Main

Each connection to the recycled water main shall consist of an isolation valve, pressure sustaining/pressure relief valve, pressure gauges, and flow meter. No bypass of these components are permitted without the approval from the City Engineer. See Standard Details for Irrigation.

a. Isolation valve shall be solid wedge, resilient seat, gate valve, suitable for distribution system pressures. Provide 125 lb flange, above grade application or restrained joint fittings for buried application.

b. Pressure sustaining/pressure relief valve shall be CLA-VAL or favorably reviewed equivalent and shall be suitable for recycled water designed to maintain a pressure of 35 to 80 psi.

c. A pressure gauge shall be installed on each side of the pressure sustaining/pressure relief valve.

d. The flow meter shall be as favorably reviewed by City Engineer. A flow meter using SCADA and telemetry, or an alternate method approved by the City Engineer, is required to capture daily recycled water flows.

2. Irrigation Supply System

a. Piping: All piping from the irrigation main through the irrigation supply components up to the air gap shall be pressure rated, PVC AWWA C900-16 (or latest edition) for buried service and PVC or DIP or Steel pipe with 125 lb flanges at the valves.

b. Air Gap: The pressure piping shall terminate above ground with an air gap prior to the irrigation piping. See Standard Details.

c. Irrigation Pipe Materials: All piping downstream of the air gap shall be:

i) Centrifugally cast Reinforced Concrete Pipes (RCP) with rubber gaskets or

ii) Polyvinyl Chloride (PVC) shall be glue and socket for pipe diameter less than 8 inches and rubber gaskets for pipe diameter 8 inches through 36 inches. PVC piping shall be solid wall with a minimum working pressure of 80 psi pressure.

3. Irrigation Distribution Systems

The flood irrigation shall consist of lateral pipes distributing water through the fields and controlled by valves. Lateral spacing shall be such that water is applied uniformly. Spacing shall be computed based on soil hydraulic properties, slope, water use rates, and system efficiencies.

Site grading shall provide for water distribution and runoff without ponding of recycled water. The overall site shall drain to a ditch draining to the tail water return pumping station. See Standard Details.

4. Tail Water Return System

The tail water return system shall consist of a sump with a submersible or self-priming centrifugal pump. The design shall consider screening of water flowing into the sump as well as the

pump discharge. A portable trash pump with a sump may also be used to return tail water. Tail water shall be returned to the irrigation pipe for distribution back through the irrigation system. See Standard Details.

7-12.3 **Landscaping Recycled Water Irrigation**

City approved landscaping recycled water irrigation areas may be sprinkler or drip irrigated, in accordance with the requirements and restrictions described below.

A. Types of Landscaping and Allowable Irrigation Methods

1. Park, school, and streetscape landscape strip irrigation systems may utilize a combination of spray and drip irrigation.

2. Medians irrigated with recycled water within residential areas shall be through drip or bubbler irrigation.

B. Recycled Water Irrigation Area Boundary

The recycled water irrigation area boundaries include the perimeter of the irrigation area, handicap ramps, and the perimeters surrounding sensitive and recreational areas. Sensitive areas include children's play areas and areas with picnic tables, benches, or drinking water fountains. Recreational areas are defined as play areas that do not include equipment for children to play on, such as sand volleyball courts and horseshoe pits.

C. Frontline Sprinklers

The closest sprinklers to an irrigation area boundary, including sensitive and recreational area boundaries, are called frontline sprinklers. Frontline sprinklers shall be a minimum of 5 feet from the recycled water irrigation area boundaries except for sensitive area boundaries, where the distance shall be a minimum of 10 feet. The frontline sprinklers shall be half-circle sprinklers pointed away from the boundaries. The frontline sprinklers shall be low-angle sprinklers with a radius of no greater than 10 feet and should include a pressure-compensating device, in order to create larger droplets.

D. Irrigation in Buffer Areas for Sensitive and Recreational Areas

The region between the frontline sprinkler and irrigation area boundary is called the buffer area. Landscaping within the buffer area between the recycled water irrigation area boundary and the frontline sprinklers is at the discretion of the designer. However, the buffer area shall not have a spray irrigation system (it may have a bubbler or drip irrigation system). If the buffer is landscaped with turf, it shall have a subsurface irrigation system.

E. Landscaping Irrigation System Components

In general, landscaping recycled water irrigation systems shall consist of the connection to the recycled water main, irrigation controllers, irrigation distribution piping, irrigation emitters, and any required tubing associated with the emitters.

1. Connection to Recycled Water Main

   Each connection to the recycled water main shall consist of an isolation valve, backflow prevention device, and flow meter. No bypass of these components are permitted without approval from the City Engineer. See Standard Details for Irrigation.

   a. Isolation valves shall be solid wedge, resilient seat, gate valve, suitable for distribution system pressures. Provide 125 lb flange for above grade applications or restrained joint fittings for buried applications.

   b. The flow meter shall be as favorably reviewed by City Engineer.

   c. All piping from the irrigation main through the irrigation supply components shall be pressure rated, PVC AWWA C900 for buried service and PVC or DIP or Steel pipe with 125 lb flanges at the valves.

2. Irrigation Controllers

   a. Each irrigation distribution system shall consist of an electrically operated control valve with anti-siphon valve.

   b. The controller shall be a Calsense controller compatible with the City's existing irrigation controllers.

   c. Irrigation with recycled water in public use areas shall only be allowed between 10:00 pm and 6:00 am.

   d. The controller shall be linked to the City's irrigation SCADA system and programmed to shut off the irrigation system (or not allow it to come on) during a high wind event.

   e. Irrigate in a manner such that the application rate will not exceed the infiltration rate of the soil. Timers will be adjusted so as to be compatible with the lowest soil infiltration rate present. This procedure may be facilitated by the efficient

scheduling of the automatic control clocks, (i.e., employing the repeat function to break up the total irrigation time into cycles that will promote maximum soil absorption).

f. The irrigation system controller shall be able to be programmed to match the irrigation rate with the evapotranspiration rate for the irrigated plants/turf and should be operator-adjustable. Therefore, there shall be no ponding. Given that irrigation rate will match the use by the plants/turf, the catch basins are only for the conveying of storm water from the recycled water irrigation area. Where varying soil types are present, the design of the peak rate of recycled water application shall be compatible with the lowest infiltration rate present. No recycled water shall be applied to the irrigation area during periods when soils are saturated or during periods of rainfall.

g. Copies of the soils test reports shall be made available to the City upon request.

h. Controllers shall be equipped with removal handles or locking mechanisms to prevent public access or tampering.

3. Irrigation Control Valves

Irrigation control valves shall be housed in purple plastic boxes with purple covers with “Recycled Water” imprinted on the lid, and shall be equipped by removable handles or locking mechanisms to prevent public access or tampering. All valves should also be tagged with purple identification tags reading "RECYCLED WATER - DO NOT DRINK" with the international symbol.

4. Strainers and Filters

Strainers and filters shall be installed in accordance with the Section 7-11.4.

5. Irrigation Distribution Piping

a. All piping from the irrigation main through the irrigation supply components shall be PVC AWWA C900 or Schedule 40 for buried service. Schedule 40 PVC Piping shall have screw fittings or glued pipe with couplings at valves. All above ground PVC pipe shall be painted for protection from sunlight and be in accordance with requirements in Section 7-16.

b. Micro-irrigation laterals shall be of PVC or polyethylene. Laterals shall be buried at a shallow depth and rise to the emitter.

c. Cover Depth

i) Sprinkler Type: Piping shall be buried at a sufficient depth to allow turf aeration.

ii) Drip Type: Piping shall be buried from 1 to 3 feet and painted when exposed.

6. Irrigation Emitters

There are two main types of irrigation emitters: sprinkler (or spray) type and drip type. Sprinklers operate under higher pressure, generally have higher flow rates, and spray recycled water up and over the irrigation area. Drip types operate under lower pressure, generally have lower flow rates, and provide water to the base of plants.

a. Sprinkler Type

i) Sprinkler heads shall be popup type and designed to allow mowing and sports use. Sprinklers shall be designed for even coverage within the irrigated area.

ii) Sprinklers shall be connected to buried PVC distribution piping.

iii) All sprinklers used in recycled water facilities shall have their exposed surface colored purple to associate them with recycled water use. The exposed surface shall be colored purple through the use of dyed plastic or rubber. All spray heads shall have purple caps with the words "RECYCLED WATER - DO NOT DRINK" imprinted.

iv) Adjust sprinkler heads to eliminate overspray onto adjacent hardscapes, patios, decks, pools, fences, etc.

b. Drip Type

i) The drip irrigation system shall consist of connection(s) to the main recycled water distribution system, lateral piping, supply, sub-supply, and emitter piping.

ii) Conventional drip type emitters shall be above ground and may be installed on flexible polyethylene risers.

7. Site Grading and Retention Basins

a. Site grading shall provide for water retention at the plants and runoff control through use of swales leading to a retention basin within the irrigated area.

b. Individual emitters shall discharge into a depression or basin at each plant. The entire area shall drain to a containment area where runoff is contained.

F. In accordance with Title 22, California Code of Regulations, all piping and irrigation shall be designed so that spray, mist or runoff shall not enter dwellings, designated outdoor eating areas, or food handling facility and shall not contact any drinking water fountain. See Sections 7-12.4 or setback requirements.

G. Drinking water fountains shall not be located in landscaped areas irrigated by spray-type irrigation devices. Concrete patios, walls, shrubbery irrigated by drip or bubbler systems, or other barriers shall be used to physically separate drinking fountains from areas irrigated by spray-type irrigation devices.

H. All areas irrigated with recycled water shall be provided with appropriate signage.

7-12.4 **Setbacks**

When irrigating with recycled water, comply with the following minimum setback criteria.

Description	Minimum Setback
Recycled water land application area to domestic water supply well	50 feet
Recycled water agricultural land application area to surface water	25 feet
Recycled water land application area to irrigation canal drainage course	50 feet
Recycled water storage pond to domestic water supply well	100 feet
Frontline sprinklers to Sensitive Areas	10 feet
Frontline sprinklers to Recreational Areas	5 feet

7-12.5 **Cross Connection and Backflow Prevention**

A. Cross connections between potable water facilities and recycled water facilities are forbidden.

B. Backflow prevention devices shall be installed as required by the City Engineer on a case-by-case basis if there exists a potential for back-siphonage or backpressure of water into the recycled water distribution system, which could impact the quality of the recycled water. Backflow prevention devices shall be installed in conformance with Section 4-5.4.

C. If a facility has both potable and recycled water service is it considered a "dual-source" site and required to have an AWWA-approved backflow preventer device on the potable water service as close to the meter as possible.

1. Pond recycled water and supplemental potable water inlet: the potable water service connection must have an AWWA-approved air-gap backflow preventer (see Standard Details) for Recycled Water). All backflow prevention must be approved by the City.

2. Recycled water to irrigate and potable water to domestic uses (i.e. park): A reduced pressure principle backflow prevention device is required on the potable water service as close to the meter as possible. All backflow prevention must be approved by the City.

7-13 RECYCLED WATER STORAGE POND DESIGN REQUIREMENTS

The following design requirements apply to the design and construction of seasonal storage ponds.

A. Pond Design Requirements

1. Pond embankments shall be no steeper than 3:1 (horizontal to vertical). Pond embankment for interior of basin may have a slope of 2.5:1 (horizontal to vertical) with supporting recommendations from a geotechnical engineer. The basin bottom shall be gradually sloped for drainage. See Standard Detail RW-5 for Typical Cross Section.

2. The top of the embankment shall be a minimum of fifteen (15) feet wide and should be covered with gravel. The perimeter of the pond shall have a ten (10) foot access road covered with gravel. Gravel shall be ¾" maximum sized aggregate. The gravel layer thickness shall be a minimum of three (3) inches.

3. Each storage pond shall hold no more than 1,500 acre-feet and shall have a berm height from the toe of the outside slope of less than 15 feet.

4. A minimum distance of 1 foot shall be maintained between the design high groundwater level elevation and the basin bottom design. High groundwater level elevation must be determined by a certified hydrogeologist.

5. A freeboard of two (2) feet minimum during 100-year precipitation conditions shall be required for all storage ponds. The storage pond should remain operational after such conditions, with no structural damage.

6. Seepage collars shall be installed to junctions where piping exits and enters the basin dike.

7. The storage ponds shall be fenced (eight (8) feet minimum in height) with a material approved by the Community Development Director and shall include a gate sized for vehicular access. The gate shall

be secured by a lock with keyhole matching City maintenance personnel existing keys.

8. Controls for algae and other floatable solids shall be constructed. Examples of adequate controls include aeration and recirculation.

9. Outlet structures shall be designed for flexibility in operations.

10. Each storage pond shall have an electrically operated control valve reporting to the City's SCADA system.

11. Each storage pond shall be graded and a sump shall be provided such that the pond can be completely drained.

B. Pond Lining

A geomembrane liner is required for all storage ponds. The geomembrane liner shall be 40 mil high density polyethylene (HDPE).

C. Storage Pond Inlet

Extend recycled water main using PVC C900-16 (or latest edition) pipe. Feed the storage pond using an isolation valve (gate), pressure sustaining/pressure relief valve, and back pressure solenoid controls.

Install a magnetic type flow meter that totalizes flow, displays the flow rate, and can digitally transmit the totalized flow and flow rate to the City's SCADA system.

Piping discharge shall be above the basin liner and adequate erosion measures at the discharge point shall be constructed. Examples of adequate erosion control measures include rip-rap beneath the inlet piping, concrete splash pads, or wear sheets for geomembrane liners. All piping penetrations shall be made with a liner boot around the pipe.

D. Supplemental Water

Where supplemental water is provided by potable water, the supplemental water inlet shall have an air gap.

The air gap shall be at least two pipe diameters above the pond edge or 12 inches, whichever is greater. (See Standard Details for Recycled Water).

E. Pond Level Monitoring

1. Pond level shall be monitored and transmitted to the City's SCADA

system.

2. SCADA control shall be used to stop pumps at low water level and close inlet valve at high water level.

3. A high water alarm shall be transmitted to the City's SCADA system.

4. An aluminum staff gauge must be present at each pond. Length intervals shall be marked in units of tenths of a foot, and be easily readable.

F. Setbacks

No impoundment of disinfected tertiary recycled water shall occur within 100 feet of any domestic water supply well.

7-14 RECYCLED WATER PERCOLATION BASIN DESIGN REQUIREMENT

Percolation basins may be used for groundwater recharge within the City of Lathrop. Contact the City Engineer for feasibility. All ground water recharge projects must comply with California Code of Regulations, Title 22.

7-15 RECYCLED WATER PUMPING STATION DESIGN REQUIREMENTS

The following design requirements apply to the design and construction of recycled water pumping stations.

A. The designer shall locate pump station structures at least one (1) foot above HGL for 100-year design storm.

B. The pumping station shall consist of multiple pumps designed to cover the range of irrigation demands and one standby pump with equal capacity to the largest duty pump.

C. Pumps, valves, flow meter, and strainer and electrical equipment shall be installed above grade in a weatherproof enclosure. Pumps shall be controlled both from City's SCADA system and from a local control panel. Pump status (on/off/standby), flow (flow and total flow), and pressure shall be transmitted to the City's SCADA system.

D. Pumps shall be vertical centrifugal pumps. Flow and number of pumps to match range of flow demand. All pumps shall be designed with VFD to match motor horsepower (480v). Overall system shall be designed for 45 psi minimum pressure at peak hour flow. Maximum allowable pressure within the system shall be 55 psi.

E. Motor control center shall be Square D, Eaton or approved equal with Square D Altivar 61 VFDs or approved equal, Modicon PLC and Ubiquiti Rocket M Radio or approved equal. Designer shall verify compatibility with City SCADA and control system.

F. The flow meter shall be a magnetic flow and have a combination sensor and transmitter with relay for directional indication. The flow rate shall be transmitted to the City's SCADA system. The flow meter shall be sized for maximum accuracy over the full range of anticipated flows.

G. Air and vacuum relief valve shall be installed with bronze corporation stop or ball valve (min 150 psi rating).

H. All piping shall be sized for velocities less than 10 ft/s, including future design considerations.

I. Pressure transducers shall be in-line, two wire (0-200 psi).

J. Pressure reducing and check valves shall be per ANSI 125, 1.0 psi max drop at rated gpm, epoxy coated.

K. Pressure sustaining/reducing/backpressure valve shall be "Y" pattern, ANSI 125, max 1.0 psi max drop at rated gpm, epoxy coated.

L. Transducer for level measurement shall be 1-10 psi.

M. Gate valve shall be commercial/industrial iron gate valve, solid wedge, resilient seat, ANSI 125.

N. Butterfly valve shall be per AWWA C504, Class 125, bonded seat in-body, manual, cylinder, and motor actuator.

O. All outside exposed surfaces of all structures shall have Tex-Cote Graffiti-Guard®, 21st Century Coatings Anti-Graffiti, or approved equal applied to full height of structure.

7-16 TESTING AND INSPECTION

Refer and conform to Section 1 of the City's Standards for Inspection Requirements, in addition to the requirements below for recycled water systems.

7-16.1 General Requirements

A. Notify the City at least two (2) working days in advance of installation of

irrigation facilities so that the City can inspect the construction.

B. In no case shall irrigation lines be backfilled before inspection by the City.

C. If the irrigation system is installed prior to plan approval and/or inspection, all or any portion of the system shall be exposed and corrected as directed by the City. Failure to comply will result in termination of service.

D. Provide access and cooperate with the City representative, so that the City representative may perform system inspections required by the City. Correct, at no expense to the City, any work that violates the City standards.

7-16.2 **Cross Connection Testing and Inspection**

A. Initially, before activation of recycled water service a thorough cross-connection shutdown test and inspection of both the potable and recycled water irrigation systems on the site shall be conducted under the supervision of an AWWA Certified Cross-Connection Program Specialist employed by the City. Additional cross-connection tests may also be performed whenever determined necessary by the City.

B. Cross connection inspections shall include a visual check of the entire system to verify that no cross-connections have been made.

C. Any cross-connection or a backflow incident involving the potable drinking water system shall be reported to the City immediately and the recycled water system shut off at the meter. The potable water system should remain on and pressurized. “Not for Drinking” signs must be posted at all potable water fixtures and outlets and may only be removed upon City approval.

D. The applicant, owner, or customer shall be responsible for correcting any work which violates the City regulations at their sole expense including any costs associated with repairing and re-testing the backflow device should the backflow device fail to pass the City’s test.

7-16.3 **Hydrostatic and Leakage Tests**

Hydrostatic and leakage tests shall occur, as a whole or in sections, on the reclaimed water mains between valves.

A. The total length of pipe for any single test shall not exceed 5,000 feet.

B. The mains shall be tested in accordance with AWWA Standard Specification C600-87, under an average hydrostatic pressure of not less than 150 psi, using a 300 psi gauge, for a minimum of two (2) hours.

C. All valves shall be tested for secure closure.

7-16.4 **Coverage Test**

A. Control overspray and runoff of systems. To ensure the limitation of overspray and runoff is acceptable, an inspection of the completed irrigation system by the City is required.

B. When the sprinkler system is completed and the planting installed, contact the City and arrange for a coverage test walk through.

C. The Contractor must be present and have persons capable of making system adjustments during the coverage test.

D. If modifications to the system are required, other than minor adjustments, the City will provide notification in writing of the changes required. To avoid termination of service, the modifications must be made in a timely manner.

E. All modifications to the system are the responsibility of the applicant and said applicant shall pay all costs associated with such modifications.

7-16.5 **Medians and Parkways**

Testing and inspection of median and parkway water systems receiving recycled water will be in accordance with the City's design, review and inspection procedures.

7-16.6 **Ponds**

Notify the City at least two (2) working days in advance of installation or construction so that the City can inspect the proper installation or construction of the following:

A. Liner;

B. Berm; and

C. Recycled water and any supplemental water inlets.

7-16.7 **Pump Stations**

Each pump shall be operated at shutoff and near the specified primary selection point to demonstrate proper operation, adequate head and capacity, and proper performance as designed. Pump stations shall work effectively and respond to various controls and alarms. The SCADA system shall be tested for full

functionality. The flow rate shall be measured using a temporarily installed ultrasonic flow meter or by another method approved by the City.

7-17 SIGNAGE AND IDENTIFICATION PAINTING AND MARKING

Areas irrigated with recycled water and recycled water facilities and systems shall have signage or identification painting or marking as required below, or as determined by the City Engineer.

Any time caution wording in English or Spanish is stated, the following wording shall be used with the international symbol:

- Caution wording in English: RECYCLED WATER – DO NOT DRINK
- Caution wording in Spanish: AGUA PROCESADA – NO BEBER

A. Recycled Water Piping

1. All piping or piping wrap shall be permanently labeled with caution wording in English and Spanish.

2. The lettering shall be at minimum 1-inch high in black or white color. The lettering shall be repeated continuously on opposite sides (2 sides at minimum) of the pipe or encasement for the full length of the pipe or encasement. Identification tapes and markings shall be placed longitudinally and centered. Tapes shall be at least 3 inches in width and attached to sections of pipe before they are placed in the trench shall have flaps sufficient for continuous coverage. Pipes shall be installed in the trench such that the lettering is facing on the top of the pipe.

3. All buried piping shall be purple Pantone 522; exposed piping, tape and polyethylene vinyl wrap purple shall be purple Pantone 512.

4. All marking and coloring shall be durable enough to be easily recognizable and legible for the design life of the piping.

5. For above ground pipe, the tape shall be applied to the pipe with an adhesive.

6. In addition, all piping shall be continuously and permanently marked with the manufacturer's name or trademark, nominal size, and schedule or class indicating the pressure rating.

B. Potable Water Piping

Potable water piping shall have warning tape at parks where both recycled water for irrigation and potable water for drinking fountains, bathrooms, etc. are used.

1. Warning tape for the potable water piping shall be blue in color with the words "CAUTION: BURIED POTABLE WATER LINE BELOW" imprinted with lettering at minimum 1-inch high and black in color. Imprinting shall be continuous and permanent.

2. Warning tape shall be a minimum of 3 inches wide and shall run continuously for the entire length of all constant pressure main line piping. The tape shall be attached to the top of the pipe with plastic tape banded around the warning tape and the pipe every 5 feet on center.

C. Valve Boxes

1. Valve boxes covers shall be heavy-duty, triangular in shape, and colored purple (Pantone 512).

2. All valve box covers shall in accordance with Standard Detail for Water have the words "RECYCLED WATER" imprinted on them.

D. Equipment

1. Buried fittings, valves, and appurtenances shall be colored purple, Pantone 522. Exposed fittings, valves, pumps, and appurtenances shall be colored purple, Pantone 512.

2. Both aboveground and below grade equipment, such as blow-offs, valves, pumps, and recycled water meters, shall be labeled with recycled water identification tags with caution wording in English and in Spanish.

3. Recycled water identification tags shall be weatherproof plastic, 3" x 4", purple (Pantone 512) in color with caution wording in English and Spanish imprinted on both sides. Imprinting shall be permanent and black in color.

4. All recycled water sprinkler control valves shall be tagged with recycled water identification tags that say " RECYCLED WATER - DO NOT DRINK" and contains the international symbol cautioning against drinking the water.

    i) One tag shall be attached to each valve using one of the following methods:

ii) Attached to the valve stem directly or with plastic tie-wrap,

iii) Attached to the solenoid wire directly or with plastic tie-wrap, or

iv) Attached to the valve cover with valve cover bolt.

5. The interior of all gate post risers shall be painted purple, to indicate a recycled water valve in case the lid is lost.

E. Storage Ponds and Pumping Facilities

1. Permanent signs shall be provided along the fence of storage ponds to designate the nature of the facility and advise against trespassing. Signs shall have caution words in English and Spanish and be posted on each side of the fenced facility. Posting shall be every 300 feet or less.

2. The lettering on the signs shall be at minimum ½-inch in black on purple colored background (Pantone 512). The size of the sign shall be no less than 8½ inches wide by 11 inches high.

F. Irrigated Areas

1. All irrigated areas where recycled water is used shall be posted with signs that are visible to the public.

2. Signs shall have caution words in English and Spanish and include the international warning symbol cautioning against drinking the water as shown in Standard Details for Recycled Water.

3. The lettering on the signs shall be at minimum ½-inch high in black or white on purple colored background (Pantone 512). The size of the sign shall be no less than 8½ inches wide by 11 inches high.

4. For park areas, signs shall be placed where they can be easily seen at all entrances to the park, adjacent to all sensitive areas and recreational areas, or as otherwise determined by the City.

5. For streetscapes (e.g., parkways, medians), place signs at street corners as appropriate to notify passersby. Streetscape signs shall be placed no further than 1,000 feet apart. For medians, signs shall be placed at the beginning and end of each median, and another approximately equidistant from the ends of the median for medians longer than 1,000 feet.

G. Irrigation Emitters and Supply Lines

All emitters and supply lines shall have their exposed surface colored purple to associate them with recycled water use.

H. Curbs

The location of recycled water service lines shall be permanently indicated by embedding the letter "RW" in the curb, directly above the line and shall be in conformance with Section 4-5.3 E 5a & b and Standard Details for Roads.

END OF SECTION