DIVISION 7: RECLAIMED WATER

7.1 DESIGN CRITERIA

A. APPLICABILITY

1. These Design Standards shall govern construction and upgrade of all public reclaimed water distribution facilities (purple pipe) in the City of Dundee and applicable work within the reclaimed water service area.
2. Permanent reclaimed water distribution facilities shall be provided to all properties designated within the zone established by the Water Master Plan or the City of Dundee City Council in accordance with these Design Standards. This shall generally be interpreted to mean that permanent reclaimed water distribution facilities shall be provided for existing legal lots of record at the time development occurs, and for new legal lots of record created by a major or minor partitioning or subdivision of land at the time of partitioning or subdivision.
3. SPECIAL ITEMS
   a. The design of the following are considered special items and are not covered in detail in these Design Standards:
      i. Water Distribution Pump Stations
      ii. Reservoirs
      iii. Pressure Regulating Devices
      iv. Flow Measurement Devices
      v. Bridge Crossings
      vi. Creek Or Stream Crossings
   b. Review and approval of the above special items by the City Engineer shall be required. When requested by the City, full design calculations shall be submitted for review prior to approval. Special items may also require review and approval by the Oregon Department of Environmental Quality.

B. GENERAL REQUIREMENTS

1. Reclaimed water distribution systems will be designed to the following general requirements:
   a. Meet all expected irrigation demands within the established zone for the specified design life;
   b. Have sufficient structural strength to withstand all external loads which may be imposed;
   c. Be of materials resistant to both corrosion and erosion with a minimum design life of 75 years;
   d. Meet all design requirements of the Oregon Department of Environmental Quality (DEQ). Alternate materials and methods will be considered for approval on the basis of these objectives.

C. RECLAIMED WATER SYSTEM CAPACITY

1. CALCULATION REQUIREMENTS
   a. Design capacities shall be determined by consideration of the following factors and assumptions:
      i. Area to be serviced, both immediate, adjacent and buildout.
      ii. Current and projected land use within the areas to be served.
      iii. Commercial, industrial, institutional and governmental users to be served.
      iv. Changes in any of the above factors which are likely to occur within a foreseeable time period.
2. DEMAND ASSUMPTIONS
   a. In the absence of consumption data or other reliable information, the following factors may be assumed:
      i. Peak hour demands as follows:
         1) 10gpm per single family residential
         2) 6gpm per dwelling unit for multiple family residential
         3) 14gpm per acre for commercial/industrial development
         4) 144gpm per acre for parks
      ii. Demand for unique installations such as parks shall be calculated on an individual basis.

D. HEAD LOSS CALCULATION REQUIREMENTS

1. Head loss shall be determined by the hazen-williams equation based on the following coefficients:

Table 2.2 – Hazen Williams Coefficients

Pipe Diameter	C Value
All pipe sizes	120

E. VELOCITY AND PRESSURE REQUIREMENTS

1. Velocities in reclaimed waterlines shall normally range from three (3) to six (6) feet per second for average demand to a maximum velocity of ten (10) feet per second for maximum day demand plus fire flow.
2. Private systems shall limit velocities as required by the Oregon State Plumbing Specialty Code, Installation Standards.
3. Normal working pressure in the distribution system should be approximately 70 psi with a range of 40 psi to 100 psi.
4. The minimum working pressure for all mechanical joint fittings of a diameter ranging from 4 to 24 inches shall be 350 psi.

5. The reclaimed water system shall have sufficient capacity to maintain 40 psi at the property line, and to provide sufficient volumes of water at adequate pressures to satisfy the maximum expected daily consumption.

F. LOOPING

1. The distribution system shall be looped at all possible locations.
1. All reclaimed water lines shall be looped and valved such that the removal of any single line segment from service will not result in capacity losses below those specified.
2. Permanent dead-ends shall have a permanent thrust restraint system.

G. MINIMUM DEPTH

1. The standard minimum cover over buried reclaimed waterlines within the street right-of-way or easements shall be 36 inches from the finished grade, except that a minimum of 40 inches cover shall be required for reclaimed water lines in fill slopes.
2. Finish grade shall normally be determined as follows:

Table 2.4 – Finish Grade

Mainline Location	Finish Grade
Under Sidewalk In Right Of Way	Top Of Curb
In Front Of Curb	Gutter
In Cut Slope Behind Sidewalk	Top Of Curb
Fill Slopes	Perpendicular From Pipe To Surface
Easements	Finish Grade At Pipe Centerline

3. Where the reclaimed waterline is located in the cut side slope, in an undeveloped right-of-way, or along a roadway developed at less than ultimate width (including sidewalks), reclaimed waterlines shall be placed at a depth sufficient to ensure that 36-inches of cover is maintained at the time of final construction of the roadway.

H. RECLAIMED WATERLINE REQUIREMENTS

1. MINIMUM LINE SIZE

Minimum sizes for reclaimed waterlines shall be as follows:

Table 2.5 – Mainline Size Requirement	
Minimum Diameter	Type of mainline
6-Inch	Minimum size public reclaimed waterline.
8-Inch	Minimum size reclaimed waterline distribution system for the public reclaimed water system. Looping back into the distribution grid shall be at intervals as required by the City, but shall generally not exceed 600 feet.
10-Inch And Larger	As required for transmission mains and distribution mains in commercial and industrial areas to serve the required demand

2. ALIGNMENT AND LOCATION

   a. General Requirements

      i. Reclaimed water lines shall generally be parallel to the right-of-way or easement lines

      ii. Unless otherwise required by the City Engineer, reclaimed water lines shall generally be located on the south and west sides of the right-of-way.

   b. Location with Regard to Other Utilities

      i. Reclaimed waterlines shall be separated from all other utilities by a minimum of 5 feet.

      ii. Reclaimed waterlines shall generally be separated from water mainlines by a minimum of 10 feet. In no case shall the separation be less than 5 feet or as required by OAR Chapter 333, Division 61.

      iii. Water main crossings

         1) Where water mainline crosses below or within 18 inches vertical separation above a reclaimed waterline or lateral, one full length of ductile iron pipe shall be centered at point of crossing.

3. LOCATION IN EASEMENTS

   a. Unless otherwise specified or authorized by the City, minimum easement widths for reclaimed waterlines shall be 15 feet for normal depth lines.

   b. Reclaimed waterlines in easements will be allowed only in cases where it is required in order to loop and avoid a permanent dead end condition if required by a capacity analysis, and only after all reasonable attempts to loop the mainlines in a right-of-way have been exhausted.

   c. When reclaimed waterlines in easements are approved by the City, the easement shall be centered on the line, and the line shall be offset a minimum of 6 feet from any property line.

   d. The conditions of the easement shall be such that the easement shall not be used for any purpose which would interfere with the unrestricted use for the reclaimed waterline purposes. Under no circumstances shall a building or structure, trees, ornamental landscaping or fence be placed over a reclaimed waterline or easement. Prohibited structures shall include footings, decks and overhanging portions of structures located outside the easement.

   e. Easement locations for public reclaimed waterlines serving a PUD, apartment complex or commercial/industrial development shall be in parking lots, private drives or similar open areas which will permit unobstructed vehicle access for maintenance.

   f. Common placement in the easement of water and a reclaimed waterline may be allowed under certain conditions subject to approval by the City Engineer. Easements wider than the minimum will be required.

      i. Common easements will be reviewed on a case-by-case basis. Separation of utilities must meet OHA PHD requirements.

   g. All easements must be furnished to the City for review and approval prior to recording.

I. VALVES

1. SIZES

   a. In general, valves shall be the same size as the mains in which they are installed.
   b. Unless otherwise approved or required by the City Engineer, valves shall conform to the following table.

Table 2.6 - Required Valves By Size And Operating Conditions		
Valve Size	Static Pressure	Valve Style
10- Inch and Smaller	<120 Psi	Gate Valve
12-Inch & Larger	All Pressures	Butterfly Valve

   c. Valve types and materials shall conform to the requirements of these Design Standards and the OSSC Standard Specifications for waterlines.

2. LOCATION

   a. Distribution system valves shall be located at the tee or cross fitting as nearly as possible.
   b. There shall be a sufficient number of valves so located that not more than four (4) and preferable three (3) valves must be operated to effect any one particular shutdown. The spacing of valves shall not exceed 400 feet generally.
   c. A tee-intersection shall be valved on two (2) branches and a cross-intersection shall be valved on three branches.
   d. Hazardous crossings (i.e. creek, railroad, freeway crossings, etc.) shall be valved on each side of the crossing.
   e. Distribution branches on transmission mains shall be spaced not more than 800 feet apart where practical and shall be valved and plugged.
   f. Transmission reclaimed waterlines shall have valves at spacings as required by the City Engineer.

J. SERVICE LINES

1. GENERAL REQUIREMENTS

   a. The use of pumps on a service line to provide adequate pressure to a subdivision lot or property located above the pressure level of the supply main shall be prohibited.
   b. Each legal lot of record shall be connected by a separate reclaimed water service line connected to the public reclaimed waterline. Combined reclaimed water service lines will not be permitted.

2. SIZES

   a. Standard service line sizes are l-inch, 1 1/2-inch and 2-inch. Service lines will be reviewed for effects on the distribution system and shall not be greater in size than the distribution main.

Table 2.7 – Minimum Service Size

Type Of Service	Minimum Service Size
Residential Service	1-Inch
Triple Residential Service (Triplexes Only)	1½-Inch
Commercial Service	1-Inch Minimum
Note: The Next Larger Service Size May Be Required For Lots Large.	

   b. The reclaimed water service line on the private side of the meter may not be larger than one nominal pipe size larger than the service line size.
   c. Commercial services shall not be smaller than 1-inch. For new streets or streets being cut for service installation, far side commercial services shall be installed in a 3-inch minimum size PVC sleeve.
   d. Service piping shall be equal to the meter size.

3. PRESSURE REGULATING VALVES

   a. All new service lines shall be equipped with an approved pressure regulating valve installed on the private side of the meter within an approved underground box.

4. TAPPING REQUIREMENTS

   a. Tapping requirements for reclaimed water service lines shall be with an approved service saddle,

5. LOCATION

   a. The service lines shall normally extend from the main to a point 6 inches behind the back of the right-of-way line. A curb stop and meter box shall be located at the termination of the service line.

   b. In general, individual service connections shall terminate in front of the property to be served.

K. METERS

1. GENERAL REQUIREMENTS

   a. All reclaimed water meters within the service area prescribed by the City of Dundee will be furnished and installed by the City at the request and expense of the customer. The service line, meter box and all piping within the meter box must be installed by the developer.

2. LOCATION

   a. General

      i. Meters shall be located at the termination of the City service line.
      ii. A public utility and access easement shall be provided to and around any meter box intended set on private property. The easement shall be sized to provide a minimum of five (5) foot clear around the meter box or vault on all sides.

   b. 1 inch through 2 inch meters

      i. Meters shall be located on private property adjacent to the public right-of-way to allow reading and maintenance. Meters must be accessible with a crane truck to within 10 feet of the installation with a 10 foot vertical clearance.
      ii. The meter, vault and piping are to be protected from freezing, vandals and vehicles. The area around the vault must be sloped in such a manner to prevent storm water from ponding over or running into the vault.
      iii. A minimum 3 foot clear space must be provided around the vault to provide ample working space for maintenance.

3. METER BOXES

   a. Meter boxes shall be provided by the developer for each reclaimed water service and meter location. Double set meters (2 meters in 1 box) are not allowed.
   b. Meter boxes shall be set level to finish grade. The developer or builder shall be responsible for setting meter boxes and services to finish grade prior to installation of reclaimed water meters by the City.

L. UNDERGROUND WARNING TAPE

1. Detectable or non-detectable acid and alkali-resistant safety warning tape shall be provided along all reclaimed waterlines.
2. Underground warning tape shall be placed a minimum of 12 inches and a maximum of 15 inches below the finish ground surface, and shall be continuous the entire length of the reclaimed waterline as specified.

M. BORED CROSSINGS

1. Bore casing size shall be adequate to permit proper construction of the carrier pipe to the required lines and grades. Carrier pipe used in bore casings shall be as specified herein.
2. All bore crossings shall be provided with casing spacers and end seals. Casing spacer configuration shall conform to the manufacturer's recommendations, but in no case shall less than three (3) spacers per length of pipe be used.
3. In order to prevent over-belling of flexible pipe while installing it through the casing, provide a method for restricting movement between the assembled bell and spigot conforming to the manufacturer's recommendations.

4. The design of the bore crossing shall include the following as a minimum:
    a. Casing and carrier pipe materials and dimensions, including outside bell diameters of the carrier pipe.
    b. Details for any part of the system which must be changed as a result of the boring operation.
    c. Bore and receiving pit backfill material and compaction requirements.

7.2 MATERIALS

A. GENERAL

1. Unless otherwise approved by the City Engineer, materials used for the construction of public reclaimed waterlines shall conform to the most current version of the Oregon Standard Specifications for Construction, the minimum requirements outlined herein and as shown on the Standard Details. This listing is not intended to be complete nor designed to replace the any of the city required standards.
2. In the case of conflicts between the provisions of these Design Standards and the OSSC, the more stringent as determined by the City Engineer shall apply. Acceptable materials shall be as outlined in these Design Standards.
3. It is not intended that materials listed herein are to be considered acceptable for all applications. The Design Engineer shall determine the materials suitable for the project to the satisfaction of the City Engineer.

B. PIPE

1. Reclaimed water distribution pipe shall be C900 pipe, purple in color.
2. All ductile iron pipe and fittings buried underground shall be coated on the outside with a standard coating of black bituminous paint a minimum of one (1) mil thick unless otherwise specified.

C. FITTINGS

1. MECHANICAL JOINT FITTINGS
    a. All mechanical joint (MJ) tees, crosses, elbows, reducers, adapters, combinations thereof, and other miscellaneous fittings 4-inches through 24-inches in diameter shall be ductile iron compact fittings in conformance with AWWA C153.
    b. The minimum working pressure for all mechanical joint (MJ) fittings 4-inches through 24-inch in diameter shall be 350 psi.
2. FLANGED FITTINGS
    a. All flanged tees, crosses, elbows, reducers, adapters, combinations thereof, and other miscellaneous fittings 4-inches through 48 inches in diameter shall be cast iron or ductile iron fittings in conformance with AWWA c110.
    b. The minimum working pressure for all flanged cast iron or ductile iron fittings shall be 250 psi.

D. COUPLINGS

1. Couplings shall be limited in their application to connection of new pipe work to existing reclaimed waterlines, temporary installations, and where specifically approved by the City Engineer.
2. Couplings shall be mechanical joint solid sleeve or mechanical joint split sleeve type couplings consisting of a ductile iron sleeve, ductile iron follower rings, rubber gaskets, and corrosion-resistant bolts and hex nuts.
3. Mechanical joint couplings shall have minimum pressure ratings that will accommodate maximum pressures which will be experienced during hydrostatic and leakage testing.
4. Solid sleeve couplings shall be Clow F-1208 or approved equivalent. Split sleeve couplings shall be Mueller H-785 or approved equivalent.
5. Dresser-type couplings are not an approved option unless specifically approved by the City Engineer. Applications shall be limited to transitions between pipe types for which mechanical joint couplings are not available.

E. MAIN LINE VALVES

1. GENERAL
   a. All mainline valves and appurtenances shall have the name, monogram, or initials of the manufacturer cast thereon. They shall be built and equipped for the type of operation as specified herein or as shown on the drawings.
   b. Valve Operators
      i. All valve operators shall be totally enclosed traveling nut type manual operators, sealed and lubricated for underground service.
      ii. All buried valves shall be supplied with a 2-inch square operating nut. Nuts shall have a flanged base on which shall be cast an arrow at least 2-inch long with the word "open" cast on the nut to clearly indicate the direction of opening.
      iii. Extension stems shall be provided for buried valves when the operating nut is four (4) feet or more below finished grade. Extension stem shall extend to within 12-inches (maximum) of the finished ground surface and shall be provided with spacers to center the stem in the valve box.
   c. Valve Boxes
      i. All buried valves shall be provided with valve boxes as shown on the Standard Details.
   d. Gate Valves
      i. All gate valves shall be resilient wedge gate valves conforming to the requirements of AWWA C-509, except as herein modified.

ii. Gate valves shall be epoxy coated iron-body, resilient wedge non-rising stem gate valves. The wedge shall be cast iron completely encapsulated in an elastomer covering with polymer guide bearing caps on each side. The valves shall have a full diameter waterway with no grooves or recesses at the valve seat location. Flanges, where required, shall be 125 pound, full faced, drilled per ANSI B16.1.
iii. Valves shall be tested and certified by the manufacturer for shut-off at a working pressure of 200 psi and a minimum test pressure 300 psi.
iv. Gate valves shall be Mueller A-2360, Waterous Series 500 or approved equivalent.

e. Butterfly Valves

i. All butterfly valves shall conform to AWWA C504, except as herein modified.
ii. Butterfly valves shall be epoxy coated short body type AWWA Type-B valves. Flanges, where required, shall be 125 pound, full-faced, drilled per ANSI B16.1.
iii. Valve operators shall be enclosed traveling nut type manual operators, sealed and lubricated for underground service, and shall be rated for submerged operation up to ten (10) psi (±23 feet).
iv. Valves shall be tested and certified by the manufacturer for shut-off at a working pressure of 150 psi and a minimum test pressure 300 psi.
v. Butterfly valves shall be Pratt Groundhog Series, or approved equivalent.

f. Shop Painting

i. All valves shall be furnished with a fusion-bonded epoxy coating inside and outside conforming to the requirements of AWWA C550.

F. SERVICE PIPE AND FITTINGS

1. All services that are saddle tapped shall use ductile iron service saddles with stainless steel bolts and clamps. All ductile iron service saddles shall be furnished with a fusion bonded epoxy coating conforming to the requirements of AWWA C-550.
2. Unless otherwise shown on the drawings, residential service pipe shall be one (1) inch in diameter.
3. One (1) inch services
    a. Unless otherwise specified herein, reclaimed water service lines shall be seamless Type K copper pipe, conforming to AWWA C500, 160 psi rated.
    b. All corporation stops shall be brass ball valve corporation stops rated to 300 psi with iron pipe thread inlet and compression outlet to adapt copper pipe. Corporation stops shall be Ford FB-1100 or approved equivalent.
    c. Each individual reclaimed water service line shall be equipped with a locking ball valve meter stop assembly at the inlet to the meter. All meter stop assemblies shall be brass with copper pipe connector as appropriate and outlet for meter coupling.
    d. Meter stops for 1-inch meters shall be locking angle ball valves with CTS pack joint inlet. 1-inch meter stops shall be Ford BA43-242W and Ford BA43-444W, respectively, or approved equivalent.
    e. Service line couplings shall be CTS pack joint style couplings. Couplings shall be Ford C44 coupling or approved equivalent.

4. 1½ Inch and Larger Services

   a. 1½ inch and 2 inch reclaimed water service lines shall be seamless type k copper pipe, conforming to AWWA C800, 160 psi rated.
   b. 1½ inch and 2 inch reclaimed water services shall be provided with high bypass copper setters for flanged meters, Ford 70 Series or approved equivalent conforming to Standard Details.

      i. The coppersetter shall be provided with ball valves on the inlet and outlet, with inlet valve provided with a lock wing and the outlet valve provided with a handle.
      ii. The bypass line shall be 1-inch diameter minimum, and shall be provided with a lockwing ball valve.

G. RECLAIMED WATER METER BOXES

1. Unless otherwise approved by the City Engineer, all meter boxes must be as shown below:

Table 2.9 - Reclaimed Water Meter Boxes

Meter Size	Non-Traffic Area	Traffic Area	Inside Dimensions
1 Inch	1armorcast A6001946pcx12	1armorcast A6001946pcx12	13” X 24”
	Lid A6001866r	Lid A6001866	
1 ½ Inch	1armorcast A6001640pcx12	1armorcast A6001946pcx12	17” X 30”
	Lid A6001643r	Lid A6001643	
2 Inch	1armorcast A6001640pcx12	1armorcast A6001946pcx12	17” X 30”
	Lid A6001643r	Lid A6001643	

2. Meter boxes outside of traffic areas shall be polymer concrete boxes with nonskid polymer concrete covers and hinged reading lids.
3. Meter boxes within traffic areas shall be polymer concrete boxes with one piece traffic rated covers.
4. All meter boxes shall be provided with knockouts for touch-read sensors.

H. UNDERGROUND WARNING TAPE

1. Underground warning tape shall be detectable or non-detectable acid and alkali resistant safety warning tape. The tape shall consist of a minimum 4.0 mil (0.004") thick, virgin low density polyethylene plastic film formulated for extended use underground. The tape shall be in accordance with the APWA national color code and shall be permanently imprinted in lead free black pigments suitable for direct burial.
2. The tape shall be purple and shall be provided with the legend "caution buried reclaimed water line below" or approved equivalent printed continuously down the length of the tape.

I. BORE CASINGS AND ACCESSORIES

1. Casing shall be welded smooth steel pipe conforming to the requirements of ASTM A-53 or approved equal, with a minimum yield strength of 35,000 psi