

SECTION 141: RECYCLED WATER SYSTEM CONSTRUCTION

141-1 GENERAL

On-site and public recycled water pipe, fittings, gate valves, fire hydrants, blow-offs and other appurtenances shall concur with the current Environmental Utilities Department list of approved materials, provided herein, and shall be installed in accordance with the requirements of the American Water Works Association (AWWA) Standards, these Construction Standards, and as recommended by the manufacturer. These Construction Standards and manufacturer's guidelines shall be present at the construction site at all times.

141-2 CONNECTION TO EXISTING FACILITIES

Connection to existing recycled water facilities may be made upon approval of the Environmental Utilities Department.

A. The Environmental Utilities Department has the option of making a system tap as required on the approved plans. Should the Environmental Utilities Department elect to perform the tap, the Contractor shall pay for such work on a time and materials reimbursement basis. The Contractor shall be responsible for the following tasks associated with the tap, or as determined by the Environmental Utilities Department:

- 1.** Coordinating the work requested with the Environmental Utilities Department and the Development Services Construction Inspector. This shall include discussions on provisions for materials and equipment required to complete the work.
- 2.** Providing traffic control per the City's Public Works Department requirements.
- 3.** Excavating the work area, as agreed upon by the Development Services Construction Inspector.
- 4.** Providing sheeting, shoring, and bracing as required.
- 5.** Providing lighting as required if the tap is to be performed at night.
- 6.** Backfilling, compacting, and pavement restoration of the excavation(s) upon tap completion.

B. The Contractor shall tie-in the new system to an existing stub under the following conditions:

- 1.** With specific approval of the Development Services Construction Inspector.
- 2.** Care shall be taken to provide a clean, sanitary tie-in site.
- 3.** Dewatering of both the new and existing recycled water mains shall take place in a way as to prevent contamination by trench water.

4. All material used in the tie-in shall be clean and swabbed with chlorine.
5. All tie-ins shall take place in the presence of the Development Services Construction Inspector.
6. Tie-ins may take place after the newly constructed recycled water system has successfully passed all required testing procedures as established in Section 141-13 of these Construction Standards and as determined by the Development Services Construction Inspector.
7. Under no circumstances shall anyone other than a representative of the Environmental Utilities Department open or close valves in a City-operated system.

141-3 CONSTRUCTION STAKING

The recycled water shall be staked prior to excavation. Staking shall provide the station and offset to the recycled water main, as well as a cut to the nearest 0.1 foot. Stakes shall be provided at a minimum of every 50 feet in tangent sections and every 25 feet in curved sections and every 10 feet in approved vertical curve sections.

141-4 EARTHWORK

Earthwork required to construct recycled water facilities and appurtenances shall be performed to the lines and grades shown on the approved project plans and as specified below:

- A. Excavations:** Pipeline excavations shall be open-cut trenches, unless otherwise specified on the approved improvement plans, with vertical sides to the pipe crown as specified on Construction Standard Detail W-1. Excavations shall conform to all applicable Federal and State safety requirements. The contractor shall appoint a designated “competent person” who will be present during construction.
- B. Trench Width:** The trench bottom width to 6 inches above top of the pipe shall comply with Construction Standard Detail W-1 or as approved by the Environmental Utilities Department.
- C. Compaction:** Compaction of the trench shall conform to Construction Standard Detail W-1 and Section 31. Compaction test results shall be supplied to the Environmental Utilities Department upon request.
- D. Weather:** During inclement weather, trenches shall be excavated only as far as pipe can be laid and backfilled during the course of the day.
- E. Existing Roadways:** Trenching in existing roadways shall be limited to the length of pipe that can be laid that day. No open trenches shall be left overnight. Exposed trenches shall be plated or backfilled as required by the Development Services Construction Inspector and/or the Development Services Department.

F. Excess Material: Excess material and materials determined unsuitable for backfill by the Development Services Construction Inspector shall be removed from the project site.

141-5 DEWATERING

Dewatering for the installation of structures and pipelines shall commence when groundwater is first encountered and shall be continuous until the excavation is backfilled. Best Management Practices including, but not limited to, scouring and erosion measures shall be used to eliminate sediment-laden discharges in accordance with the approved SWPPP.

141-6 PIPE BEDDING

The gradation of allowable backfill material is as shown on the Construction Standard Detail W-1 and Section 31. Pipe bedding shall be installed as follows:

- A.** Bedding shall provide uniform and continuous support along the barrel of the pipe. The minimum depth of bedding material shall be provided under the bell. Blocking of the pipe is not permitted.
- B.** Loose material shall be removed from the trench bottom and replaced with imported material.
- C.** Where rocky unyielding, or unsuitable foundation material is encountered, the subgrade shall be excavated a minimum of 12 inches below the pipe and the trench width shall be increased a minimum of 12 inches. The over-excavation shall be replaced with imported material. DIP may be used as an alternative to the over-excavation requirements.
- D.** Where the trench bottom is soft, yielding or unstable, the trench bottom shall be over-excavated. 3/4 inch crushed rock shall be placed in the trench to provide a stable foundation. The rock is in addition to the required pipe bedding used in the pipe zone.
- E.** Bell holes shall be excavated per manufacturer's recommendations. The minimum depth of bedding material shall be provided under the bell. Care shall be taken that the bell hole is no larger than necessary to accomplish proper joint assembly.

141-7 CONCRETE CRADLES, ARCHES & ENCASEMENTS AND TRENCH DAMS

Concrete cradles, arches and encasements shall conform to Construction Standard Details W-23 and 24 and the following:

- A.** The pipe shall be placed in proper position on temporary cradles or arches consisting of concrete block or bricks. When necessary, the pipe shall be rigidly anchored or weighted to prevent flotation when the concrete is placed.
- B.** Cradles and arches shall be constructed with an ability to adjust the pipe to proper grade in order to avoid vertical joint pull. Cradles and arches shall be placed at 1/3 and 1/2 way points along each pipe segment where specified. Concrete placed beneath the pipe shall be sufficiently workable to fill the voids without excessive vibration. The concrete shall be allowed

to cure and remain undisturbed for a minimum of 24 hours prior to backfill and compaction of the trench.

- C. Restrained pipe within casings, bridges, shall be fully extended or “stretched out” to remove the slack between the joints the entire length of the structure.
- D. Water shall not be permitted to enter, seep or run onto the concrete while curing.
- E. Trench dams shall be constructed of controlled density fill or clay as shown on the drawings or as directed by the Development Services Construction inspector. Trench dam excavations shall be made into native earthen materials to the dimensions shown on the drawings or as directed by the Development Services Construction inspector. Clay materials shall be moisture conditioned to near-optimum moisture content prior to placement in the excavation and compacted to the required relative compaction.

141-8 PIPE ZONE BACKFILL

Pipe zone backfill shall conform to Construction Standard Detail W-1 and the following:

- A. Extreme care shall be taken when consolidating the backfill around the pipe zone. For pipe 12 inches in diameter and smaller, no more than 1/2 of the pipe shall be covered prior to shovel slicing the haunches of the pipe. For pipe greater than 12 inches in diameter, no more than the lesser of 6 inches or 1/3 of the pipe diameter shall be covered prior to shovel slicing. Sufficient care shall be taken to prevent movement of the pipe and damage to the polyethylene encasement during shovel slicing. Shovel slicing shall be witnessed by the Development Services Construction Inspector prior to shading the pipe.
- B. Compaction equipment shall not make direct contact with the pipe.
- C. Where the pipe is to be installed below historic groundwater levels or where the trench is subject to inundation, crushed rock material shall be placed to the crown of the pipe.

141-9 PIPE INSTALLATION

Recycled water pipe shall be installed in accordance with Section 81-9 of these Construction Standards and the following provisions:

- A. The Contractor shall keep the pipe interior free from foreign materials and in a clean and sanitary condition until acceptance by the City. At times when pipe-laying is not in progress, the open pipe end shall be sealed with a tight cap or plug to prevent foreign matter from entering the pipe. Provisions shall apply to break time as well as overnight.
- B. Trenches shall be in a reasonably dry condition when pipe is laid.
- C. Care shall be taken when lowering pipe into the trench to protect the pipe from damage. Chains are not permitted. The pipe shall be laid carefully to the lines and grades shown

without grade breaks, unless designed with such, or to minimum depths shown on the approved plans. If field conditions exist such that the pipe may not be laid to the specified grade, the approved plans will require revisions prior to proceeding with construction.

- D.** Pipe sections shall be closely jointed to form a smooth flow line. Care shall be taken in placing the pipe and making field joints.
- E.** No facility is to be backfilled without inspection by the Development Services Construction Inspector. Improvements installed without proper inspection shall be exposed and inspected as required by the Development Services Construction Inspector.
- F.** All installations shall follow manufacturer's recommendations unless otherwise noted on the approved plans. The manufacturer's installation guide shall be on the job site at all times.
- G.** Pipes shall be mechanically restrained to the length specified in the approved plans, using materials specified herein. Thrust blocks shall only be used where specifically shown on the plan/profile sheets and/or the standard detail sheets. All fittings and appurtenances shall maintain a minimum of 18 feet of restrained pipe into the fitting from all directions.
- H.** A continuous number 12 blue insulated tracing wire (81-16,G.36) shall be attached to mains, service lines and appurtenances per the Construction Standard Details and as follows:
 - 1.** Tracing wire shall also be continuous between main line valve boxes and fire hydrants. It shall be attached to the top of the pipe with 10-mil vinyl tape every 5 feet.
 - 2.** Tracing wires through valve boxes shall be placed outside of riser, but inside the box.
 - 3.** Tracing wire in manholes and vaults shall be attached inside the facility within 1 foot of the rim.
 - 4.** Wire splices shall be located above ground and inside of valve boxes and conform to Details W-16, W-17, and as follows:
 - a.** Install a copper split bolt connector on the splice
 - b.** Twist the wire together with a minimum of 5 twists.
 - c.** Solder all Connections with electrical solder.
 - d.** Cover the splice with mastic tape and wrap with vinyl tape.
- I.** A 12 inch wide plastic backfill tape with black printing on a purple field having the words "RECYCLED WATER PIPELINE BELOW" shall be installed above all mains. Tape is to be buried 12 to 24 inches below finished grade.

J. Pipe Identification: All buried recycled water piping shall be purple-colored (Pantone 522) PVC with stenciling identifying it as recycled water in accordance with the AWWA manual, Guidelines for the Distribution of Non-Potable Water. The pipe shall be installed with the manufacturing label on top. Markings shall be as specified in Section 141-16 of these Construction Standards, and as modified herein:

1. Alternate pipe with warning tape, as specified below, will be accepted as an alternative to stenciled purple-colored PVC pipe only on a project-by-project basis, with prior written approval from the Environmental Utilities Department.
2. The plastic warning tape shall be prepared with black printing on a purple field, having the words “CAUTION: RECYCLED WATER PIPELINE.” The overall width of the tape shall be 3 inches.

The warning tape shall be installed directly on top to the pipe, longitudinally and centered. The warning tape shall be installed continuous for the entire length of the pipe and shall be fastened to each pipe length by plastic tape banded around the pipe with fasteners no more than 5 feet apart. Taping attached to the section of the pipe before laying in the trench shall have flaps sufficient for continuous coverage. All risers between the main line and control valves shall be installed with warning tape.

K. Mains in unpaved areas shall be marked every 150 lineal feet with a purple composite utility marker, 5 feet 6 inches tall, having a decal stating: “CAUTION: RECYCLED WATER PIPELINE.” Appurtenances (valves, ARVs, test stations, etc.) and angle points shall also be marked. Mains in landscaped areas shall be delineated with a brass marker set in an 8 inch diameter concrete cylinder 4 inches above finish grade. The brass marker shall state “City of Roseville Recycled Water Main.”

L. All underground metal (ductile iron, valves, fittings, copper, brass, etc.) shall be wrapped in 8 mil minimum thickness polyethylene encasement.

M. Polyvinyl Chloride (PVC) Pressure Pipe Installation: PVC shall be installed in accordance with the AWWA Manual M23 and the manufacturer’s recommendations, except as otherwise provided herein:

1. PVC Pipe shall have been manufactured within the 18 month period prior to installation.
2. Pipe and gaskets shall be kept clean and protected against sunlight and heat damage.
3. Pipe showing signs of physical damage or excessive ultraviolet exposure will be rejected, and immediately removed from the job site.
4. The pipe shall be installed with the manufacturing label on top.

5. The reference mark or stab line on the spigot end must be flush with the bell end and visible for inspection.
6. The beveled end of the pipe shall be cut off before placement in a mechanical joint.
7. Minimum length of pipe for installation shall be 5 feet.

N. Concrete Cylinder Pipe: Concrete cylinder pipe shall be installed in accordance with the manufacturer's recommendations, and in accordance with the following provisions:

1. A 3 inch wide plastic warning tape with black printing on a purple field with the words: "CAUTION: RECYCLED WATER PIPELINE" shall be installed longitudinally, and centered directly on top of the pipe. The warning tape shall be installed continuous for the entire length of the pipe and shall be fastened to each pipe length by plastic tape banded around the pipe with fasteners no more than 5 feet apart. Taping attached to the sections of pipe before laying in the trench shall have flaps sufficient for continuous coverage.

O. Ductile Iron Pipe (DIP): DIP shall be installed in accordance with Section 81-9.M of these Construction Standards. Warning tape shall be applied as specified in Section 141-9.N.1 above.

P. Borings: Borings for installation of recycled water lines shall be in accordance with Section 81-9.P of these Construction Standards. Utilizing the City's drainage system for residual discharge from boring operations without the required measures is prohibited. This discharge is a violation of the City's Stormwater Ordinance and the Clean Water Act. Discharge fluid shall be recovered, contained and discarded at an appropriate location, or if the situation allows, fluid may be discharged into an open area with the pre-written approval of the property owner and approval from the Regional Water Quality Control Board (RWQCB) provided it meets RWQCB requirements and does not impact sensitive areas such as wetlands, creeks or other natural water conveyances.

All street boring shall include adequate measures to mitigate sediment-laden water discharge. An acceptable measure is pumping the discharge fluid into a tanker and hauling it away. Other measures suggested by the Contractor will be considered by the City. The City stormwater or Development Services Construction Inspector shall inspect and monitor the discharge recovery, containment, and restoration process.

141-10 SERVICE INSTALLATION

Recycled water services shall be installed in accordance with manufacturer's recommendations, per Section 81-10 of these Construction Standards, per the Construction Standard Details and with the following provisions:

- A. Services shall be continuous from the main line to the service box. Bends in copper tubing shall be made in a manner that does not crimp or flatten the tubing.

- B.** Taps, service saddles and fittings attached to mains shall be separated from each other by a minimum of 24 inches.
- C.** Service saddles shall be wrapped and sealed in 8 mil minimum thickness polyethylene and backfilled with sand. Use pipe tape to secure and seal the polyethylene wrap.
- D.** Service lines shall be encased in 8 mil minimum thickness poly tubing and backfilled with sand. Use pipe tape to secure and seal the polyethylene wrap.
- E.** Recycled water identification shall be installed on service lines as provided for in these Construction Standards.
- F.** Service manifolds shall be constructed per the following criteria:
 - 1.** Where a service line is extended a distance greater than 40 feet, a construction jumper shall be installed per Construction Standard Detail W-14. The new service line and manifold shall be tested in accordance with Section 81-13 of these Construction Standards.

Where a service line is extended a distance less than 40 feet, the extension shall be cleaned, swabbed with chlorine and flushed in the presence of the Development Services Construction Inspector. The new service line and manifold shall be pressure tested in accordance with Section 81-13.A of these Construction Standards.

In both cases, the installation shall be fully restrained by an approved restraint system, starting at the main and as required by the approved Improvement plans.

- 2.** No water shall be drawn through a service prior to installation of the water meter and testing of the backflow assembly.

Meter Installation and Address: When location of meter is absolutely certain, developer/contractor shall verify address with Development Services Inspector. This shall be prior to payment of recycled water meter by developer/contractor.

- G.** Concrete mow strip shall be used to separate potable and non-potable landscaping unless otherwise approved by the Environmental Utilities Department.

141-11 APPURTENANCES INSTALLATION

Appurtenances, including blow-offs, sample stations, air release valves, booster pump stations and meters shall be installed in accordance with manufacturer's recommendations, Construction Standard Details and with the following provisions:

- A.** All valves, fittings, DIP, copper and underground brass shall be wrapped and sealed in 8 mil minimum thickness polyethylene encasement. Use vinyl pipe wrap tape to secure and seal the polyethylene. Damaged or scratched surfaces on epoxy-coated valves and appurtenances may

be repaired with an epoxy kit per manufacturer's recommendations and to the satisfaction of the Development Services Construction Inspector prior to wrapping. Otherwise, the damaged valve shall be replaced with a new valve.

- B.** Gate valves shall be centered in a one piece riser stock. Operator nuts deeper than 40 inches from finished grade shall require a continuous valve nut extension to within 24 inches of finished grade. Extension shall conform to section 81-16.G.41.
- C.** Buried nuts and bolts shall be coated with a bituminous coating. This includes exposed bolts found on a manufactured appurtenance (i.e., valve bonnets, etc.). "T" bolt heads do not require coating.
- D.** Dead end lines, permanent and temporary, shall have a blow-off constructed per these Construction Standards.
- E.** All appurtenances shall be marked with warning tags, signs and/or purple paint as indicated on the approved plans.
- F.** Insulating kits shall be installed at any transition between dissimilar metal pipes per the Construction Details and as required by the Environmental Utilities Department.

141-12 ON-SITE RECYCLED WATER FACILITIES

Private, on-site recycled water systems shall conform to additional specifications as described herein:

- A. Inspections:** If the on-site system is installed prior to plan approval and/or inspection, any and all portions of the systems shall be exposed, inspected and corrected as directed by the Development Services Construction Inspector. Failure to comply will result in termination of service. Plan changes or field modifications shall be reviewed and approved by the Environmental Utilities Department prior to installation.
- B. Coverage Test for On-site Irrigation Systems:** The Owner/Developer shall be responsible for controlling overspray and run-off on new systems or systems requesting conversion. To ensure that overspray or run-off is in accordance with the Department of Health Services regulations, inspection by the Environmental Utilities Department is required. The Environmental Utilities Department is to be contacted at (916) 774-5750 for a coverage inspection test upon completion of the landscaping improvements involving use of recycled water.

The Owner/Developer or representative shall attend the coverage test and shall have someone attend capable of making minor adjustments to the sprinkling system. All modifications and costs are the responsibility of the Owner/Developer.

The Owner/Developer will be notified in writing of modifications to the system which could not be made during the coverage test. Such modifications shall be made in a timely manner. Failure to make timely modifications will result in termination of service.

C. Controller Charts: Controller charts shall be prepared by the Owner/Developer, approved by the Environmental Utilities Department, and then placed in the controllers prior to start of service. Failure to provide controller charts, or removal of charts from the controller will result in termination of service. Controller charts shall be prepared as set forth herein:

1. Provide 1 controller chart for each automatic controller, showing the area covered by the controller. The chart shall be the maximum size the controller door will physically allow.
2. The chart shall be a reduced size drawing of the actual as-built system. The line weights and lettering on the original controller chart drawing shall be drawn so that the reduced chart is clearly legible.
3. The chart shall be a black line print, with a different color used to show the area of coverage provided by the controller.
4. When completed and approved, the charts shall be hermetically sealed between 2 pieces of plastic, each plastic piece being a minimum of 10 mils thick.

D. Conversion From a Potable System to Recycled Water Supply: The facilities to be converted shall be investigated in detail, including review of any record drawings, preparation of required reports, findings and determinations by the Environmental Utilities Department of measures necessary to bring the system into full compliance with these Construction Standards. The Owner/Developer shall pay all costs associated with converting the system.

E. Conversion From a Recycled Water System to Potable Water Supply: If it becomes necessary to convert from a recycled water system to a potable water system, it shall be the responsibility of the Owner/Developer to pay all costs associated with the conversion, including, but not limited to, the following items:

1. **Isolation of the Recycled Water Supply:** Service shall be removed and plugged at the main, or abandoned in a manner approved by the Environmental Utilities Department.
2. Installation of approved backflow devices on all meter connections.
3. Removal of recycled water quick couplers and replacement with approved potable water quick couplers.
4. Notification to all personnel involved.
5. Removal of all above ground warning labels.

6. Installation of potable water lines, as necessary. Potable water connection fees shall be paid prior to installation.
7. Any previously paid recycled water connection fees will not be credited toward potable water connection fees.
8. Water quality testing as specified in these standards.
9. Any other provisions necessary to meet City Water System Design and Construction Standards, as deemed necessary by the Environmental Utilities Department Director.
10. Preparation of required reports.

F. On-site Pipe Identification: All buried on-site recycled water piping shall be purple-colored (Pantone 522) PVC with stenciling identifying it as recycled water in accordance with the AWWA manual, Guidelines for the Distribution of Non-Potable Water. The pipe shall be installed with the manufacturing label on top. Markings shall be as specified in Section 141-9 of these Construction Standards, and as modified herein:

1. Alternate pipe with warning tape, as specified below, will be accepted as an alternative to stenciled purple-colored PVC pipe only on a project-by-project basis, with prior written approval from the Environmental Utilities Department.
2. The plastic warning tape shall be prepared with black printing on a purple field, having the words “CAUTION: RECYCLED WATER PIPELINE.” The overall width of the tape shall be 3 inches.

The warning tape shall be installed directly on top of the pipe, longitudinally and centered. The warning tape shall be installed continuous for the entire length of the pipe and shall be fastened to each pipe length by plastic tape banded around the pipe with fasteners no more than 5 feet apart. Taping attached to the sections of the pipe before laying in the trench shall have flaps sufficient for continuous coverage. All risers between the main line and control valves shall be installed with warning tape.

G. Quick Coupling Valves: Quick coupling valves shall conform to the following:

1. **Recycled Water:** Quick coupling valves used for recycled water systems shall be constructed of brass with a purple rubber or vinyl cover and shall have a $\frac{3}{4}$ inch or 1 inch inlet.
 - a. The cover shall be of a locking type and shall have a warning label, permanently stamped or molded into the cover, stating:

“RECYCLED WATER”
“DO NOT DRINK” in English and “NO BEBER” in Spanish

2. Potable Water: Quick coupling valves used in potable water systems shall have a cover made of brass, metal or yellow rubber or vinyl. Quick coupling valves intended for recycled water use shall not be used on potable water systems.

H. Sprinklers: All sprinklers used for on-site recycled water systems shall have an exposed surface colored purple. The exposed surface shall be colored purple through the use of dyed plastic. The exposed surface shall also display either a molded or hot stamped warning, stating “DO NOT DRINK” in English and Spanish along with an international warning symbol cautioning against drinking the water emitted through the sprinkler or an identification tag conforming to these Construction Standards.

Sprinkler risers and swing joints shall be identified with purple adhesive 3 inch x 3 inch labels. Each label shall state “Recycled Water – Do Not Drink” in English and “NO BEBER” in Spanish.

I. Warning Labels: Controller panels, wash down or blow-off fire hydrants on water trucks and temporary construction services may require installation of warning labels, as directed by the Environmental Utilities Department Director. The labels shall state “Recycled Water – Do Not Drink” in English and Spanish.

J. Valve Boxes and Tags:

1. Valve Boxes: Valve boxes shall meet the following requirement:

- a.** All gate valves, manual control valves, electrical control valves, and pressures relief valves for on-site recycled water systems shall be installed below grade in a purple valve box with a lid identifying use of recycled water.
- b.** Electrical and manual control valve boxes shall have a warning label permanently molded into or affixed onto the lid with stainless steel rivets or bolts. Warning labels shall be constructed of a purple weatherproof material with the warning permanently stamped or molded into the label. The warning shall contain the following information:

“RECYCLED WATER”
”DO NOT DRINK” in English and “NO BEBER” in Spanish

2. Valve Tags: All recycled water sprinkler control valves shall be tagged with identification tags conforming to the following:

- a.** Tags shall be ~~weatherproof plastic~~ engraved stainless steel, 3 inch x 4 inch, ~~purple background with permanent black lettering~~, stating “RECYCLED WATER – DO NOT

DRINK” imprinted on one side and “AGUA RECICLADA – NO BEBER” on the other side.

b. One tag shall be attached to each valve as follows:

- Attach to valve stem directly or with plastic tie wrap, or;
- Attach to solenoid wire directly or with plastic tie wrap, or;
- Attach to valve cover with existing valve cover bolt.

K. Strainers: Strainers shall be installed as follows:

1. Sprinkler irrigation systems shall have a “Y” or basket strainer located upstream of the meter. The strainer shall have a 30 mesh or finer screen. Strainers that have automatic backwash features will not be normally allowed unless it can be demonstrated to the Environmental Utilities Department that the backwash water will not cause run-off and is disposed of in a manner approved by the Environmental Utilities Department. The strainer drain valve shall operate with a recessed key slot.
2. All strainers shall be installed below grade in a rectangular box of sufficient size to easily allow repair or replacement of the unit(s). Box shall be permanently marked “RECYCLED WATER – DO NOT DRINK/NO BEBER”.

L. On-site Recycled Water Piping: All on-site recycled water piping shall be installed in accordance with the Uniform Plumbing Code and all other local governing codes, rules and regulations. Recycled water piping under paved or concreted areas shall be installed within a marked C900 sleeve as approved by the Environmental Utilities Director. 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.

1. **Minimum Requirements of Piping and Fittings:** The minimum class or schedule of piping and fittings shall be as follows:
 - a. Cast-iron fittings for A.C. P.: ANSI 21.10 and AWWA C110.
 - b. Galvanized steel: Schedule 40, mild steel screwed pipe.
 - c. Galvanized malleable iron fittings: ANSI B-16.3.1
 - d. Hard drawn copper Type K: ANSI H-26.1 and ASTM B 88.
 - e. Wrought copper or bronze solder fittings: ANSI B.16.22

- f.** All PVC constant pressure pipe shall be as follows:
 - Schedule 40 for lines 2½ inches in diameter and smaller.
 - Class 160 rubber-gasketed pipe for lines 3 inches and larger.
 - C905 Class 165 for 16 inch pipe.
 - DIP or CCP for pipe larger than 16 inches.
 - g.** PVC intermittent pressure lateral line piping: Schedule 40 or Class 200.
 - h.** PVC fittings: PVC Schedule 40 solvent weld and factory manufactured, or Schedule 40 with rubber-ring joint. PVC schedule 80 solvent weld and factory manufactured, or schedule 80 with rubber-ring joint.
 - i.** Tubing for drip irrigation systems: Manufactured from virgin polyethylene conforming to ASTM D 1248, Type II, Class C.
 - j.** Ductile-iron mortar lined fittings: Class 250 AWWA C110.
- 2. PVC Piping:** PVC pipe fittings shall conform to the following:
- a.** PVC plastic pipe and fittings shall be installed below grade.
 - b.** All PVC pipe shall be made from NSF-approved Type I, Grade I compound conforming to ASTM D 1784.
 - c.** All PVC Schedule 40 and Schedule 80 pipe shall be manufactured conforming to ASTM D 1785 and D 2466 and shall meet requirements set forth in Federal Specifications PS-21.
 - d.** All PVC Class 200 solvent weld and Ring-Tite pipe shall be manufactured conforming to ASTM D 2241 and meet requirements set forth in Federal Specification PS-22 with Standard Dimension Ration (S.D.R.) for pressure rated pipe. Pipe shall be extruded from approved Class 12454-PVC with resin specifications conforming to ASTM D 1784 and rubber rings conforming to ASTM D 169.
 - e.** All PVC C900 and C905 shall be manufactured conforming to ASTM D 2241. Pipe shall be extruded from approved Class 12454 PVC with resin specifications conforming to ASTM 1784 and rubber rings manufactured conforming to ASTM F477.
 - f.** All pipe shall be homogeneous throughout, free from visible cracks, holes or foreign materials.
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The pipe shall be free from blisters, dents, wrinkles, ripples, die and heat marks. All piping shall be manufactured per NSF specifications.

- g.** All PVC plastic pipefittings shall be rigid PVC virgin Type I, minimum Schedule 40, with working pressure no lower than that of the pipe. Sockets shall be tapered to conform to the outside diameter of the pipe, as recommended by the pipe manufacturer. All Schedule 40 fittings shall conform to ASTM D 2466. Schedule 80 fittings shall conform to ASTM D 2464 and D 2467.
- h.** All fittings shall be injection-molded of an improved PVC fitting compound featuring high tensile strength, high chemical resistance and high strength. The compound must meet the requirements described in ASTM D 1784 and D 2466, cell classification 13454B. Where threads are required for plastic fittings, they shall also be injection molded. All tees and ells shall be side gated.
- i.** PVC solvent cement shall conform to ASTM D 2564.
- j.** Class 160 pipe and gasket shall conform to ASTM D 1784, D2241, and D1869

M. On-site Potable Water Piping: All potable water piping installed within the same project limits as the on-site recycled water piping shall be installed in accordance with the Uniform Plumbing Code and all other local governing codes, rules and regulations, and shall also conform to the following provisions:

- 1.** The pipe shall be continuously and permanently marked with the manufacturer's name or trademark, nominal size and schedule or class indicating the pressure rating.
- 2.** All potable water piping shall have a blue plastic tape identifying it as a potable water line. Potable water warning tape shall be a minimum of 3 inches wide and shall run continuously for the entire length of each line. The tape shall be attached to the top of the pipe with nylon tie-wrap banded around the warning tape and the pipe every 5 feet on center. Warning tape for the potable water piping shall be blue in color with the words "CAUTION: POTABLE WATER LINE" imprinted in minimum 1 inch high, black letters. Imprinting shall be continuous and permanent.

141-13 TESTING PROCEDURES

Recycled water facilities testing shall be performed once joint utility crossings, sewer pressure test and TV inspection and subgrade is made and in accordance with Section 81-13 of these Construction Standards, and as provided herein:

A. Public System (Offsite): Tests and procedures for recycled water systems to be accepted and maintained by the City shall consist of the following:

1. **Pressure Test:** Shall conform to Section 81-13.A of these Construction Standards.
 2. **Topside Improvements:** Shall conform to Section 81-13B of these Construction Standards.
 3. **Chlorine Disinfection:** Shall conform to Section 81-13.C of these Construction Standards.
 4. **Water Quality Testing:** Shall conform to Section 81-13.D of these Construction Standards.
 5. **Cross-Connection Control Survey (Hazard Assessment):** Testing for cross-connection shall be in accordance with the California Plumbing Code, Chapter 16 part II, and the following requirements prior to acceptance and use.
 - a. A Cross Connection Control Survey (CCCS) shall be performed on the system by City forces including a certified cross connection control specialist with the assistance of the Contractor. Depending on the complexity of the site, a preliminary field meeting may also be required. The Contractor shall coordinate the test through the Environmental Utilities and/or Parks Department inspector. A minimum of two (2) business days of advance notice is required for the survey.
 - b. At the time of the CCCS, construction on both the recycle water system and/or the potable water system being tested must be complete and both systems fully operational and functioning as designed.
 - c. **During the Cross Connection Control Survey, only potable water through a permitted city hydrant meter/backflow assembly may be used to pressurize the recycled water system.**
 - d. No connection shall be made to the City's existing recycled water system until the new facilities have been successfully pressure tested and a CCCS has been performed by the City. Taps to the existing recycled system will be made by City forces only.
 - e. Once the CCCS passes, the recycle water meter can be installed.
 6. **Continuity:** Shall be in conformance with Section 81-13.F of these Construction Standards.
 7. **Corrosion Protection System Testing:** Shall conform to Section 81-13G of these Construction Standards.
- B. Private System (On-site):** Tests and procedures for recycled water systems for private use and maintenance shall conform to the following:

1. **Pressure Test:** The constant pressure recycled water system including appurtenances shall be tested at 125 PSI for 1 hour with non-detectable leakage.
2. **Cross-Connection Testing:** Testing for cross-connections shall be in accordance with the California Plumbing Code, Chapter 16 part II prior to use.

141-14 REPAIRING INSTALLED IMPROVEMENTS

All PVC and concrete cylinder pipe recycled water mains shall be repaired by the following procedure:

A. PVC: PVC repairs shall consist of the following:

1. Damaged or failed pipe sections shall be removed and replaced with new pipe in the presence of the Development Services Construction Inspector. Replacement can be accomplished by the use of City-approved ductile iron mechanical joint repair sleeves. Pipe restraints may be required, depending on repair locations.
2. After the repair has been completed, the excavation shall be backfilled and compacted to grade as specified. The repairs shall then be re-tested per these Construction Standards.
3. At the direction of the City, the Contractor shall repair damage to the polyethylene encasement as described within ANSI/AWWA C-105/A21.5 or shall replace all damaged polyethylene film sections.

B. Concrete Cylinder Pipe Repairs: Concrete cylinder pipe repairs shall be coordinated with the Environmental Utilities Department on a case-by-case basis.

141-15 PUNCHLIST PROCESS

When the Contractor feels all improvements are substantially complete, a punchlist of final outstanding items may be requested. With the assistance and presence of the contractor, the punchlist shall be generated by the Development Services Construction Inspector. The cost in generating the punchlist shall be borne by the Contractor/Developer.

141-16 MATERIALS

A. Approved Equal: The words “approved equal” shall mean any material deemed by the Environmental Utilities Department to be acceptable for use within the City’s recycled water system as compared to products of specified manufacturers. Contractors proposing to use materials which are not specifically named shall submit all necessary documentation to allow review of said material for use as an approved equal.

The submittal shall include a letter with:

1. **Product:** A description of the product and the appropriate materials specification section number. A sample of the product may be required for review and testing.
 2. **Contact:** The name and telephone number of the contact person for the proposed product.
 3. **Reference:** A list of a minimum of 3 agencies that are using the proposed product (include names and telephone numbers).
 4. **Performance:** Information and reference for 3 locations with a performance record of 3 years in operation of the installation.
 5. Address the letter to the Environmental Utilities Department Engineering Division, 2005 Hilltop Circle, Roseville CA 95747, ATTN: EUD, Chairman of METAC. City staff may request a sample of the product for review.
 6. The contractor shall submit all material for review 35 day prior to contract award. All submittals shall include documentation verifying the contract award date. Contractors shall allow 2 to 4 weeks review time by the Environmental Utilities Department.
- B. Conditionally Approved Material:** Materials or products that have met the reference and performance requirements shall be conditionally approved for a minimum trial period of 2 years. Upon completion of the 2 year period. The product may be approved or the evaluation period may be extended as required by the Environmental Utilities Director. A list of conditionally approved products may be obtained from the Environmental Utilities Department.
- C. Unapproved Materials:** Materials not approved for use on the project shall be removed from the site within 24 hours if requested by the Development Services Construction Inspector.
- D. Recycled Water Main:** Unless noted on the approved plans, all recycled water mains shall be either Polyvinyl Chloride Pressure Pipe (PVC), Concrete Cylinder Pipe, or DIP.
1. **PVC Pressure Pipe:** PVC Pressure Pipe shall be manufactured in accordance with Section 81-16 of these Construction Standards, except as modified herein:
 - a. All PVC transmission mains up to 12 inches in diameter shall be purple colored (Pantone 522) PVC. Mains 12 inches in diameter and smaller shall be AWWA C-900 class 150. pipe manufacturers include: Westlake-Aquaspring C900 Certa-Lok, Diamond Plastics Corporation, J-M Manufacturing, Pacific Western Pipe, Vinyl Tech-White Knight, PW-Eagle, North American Pipe Corporation or approved equal.

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b. PVC pipe shall be manufactured within the 18 month period prior to installation. All PVC pipe shall be purple in color with stenciling identifying it as recycled water, in accordance with the AWWA manual “Guidelines for the Distribution of Non-Potable Water”. Markings on the PVC pipe shall be placed continuous on two sides of the pipe and shall include:

- “RECYCLED WATER – DO NOT DRINK”
- The pressure rating of the pipe, in pounds per square inch (PSI).
- The ASTM designation.

2. Concrete Cylinder Pipe (CCP) – The use of CCP is one option for recycled water transmission mains larger than 16 inches in diameter, CCP shall be in accordance with AWWA designations.

Approved concrete cylinder pipe manufacturers include: Ameron, Pacific-States, or approved equal.

3. Ductile Iron Pipe (DIP) – Mains 16” in diameter or larger shall be DIP. DIP shall conform to Section 81-16 of these Construction Standards.

E. Services

- 1. Brass Material:** Shall conform to Section 81-16.F of these Construction Standards.
- 2. Copper Tubing:** Shall conform to Section 81-16.F,c.2 of these Construction Standards.
- 3. Corporation Stops:** Shall conform to Section 81-16.F,3 of these Construction Standards.
- 4. Curb Stops:** Shall conform to Section 81-16.F,4 of these Construction Standards.
- 5. Service Saddles:** PVC Pressure Pipe Saddles shall conform to Section 81-16.F,6 of these Construction Standards.

F. Appurtenances

- 1. Air Release Valves:** Shall conform to Section 91-16.F,1 of these Construction Standards.
- 2. Blocking for Boxes:** Shall conform to Section 81-16.G,6 of these Construction Standards.

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- 3. Boxes:** All box lids are to permanently be marked with the appropriate label (i.e., Recycled Water, ARV, Blow-Off, CPT, etc.). Boxes and manufacturers shall conform to Section 81-16.G,33 of these Construction Standards.
- 4. Cadwelds:** Shall conform to Section 81-16.G,8 of these Construction Standards.
- 5. Fittings:** PVC fittings shall conform to Section 81-16.G,9 of these Construction Standards.
- 6. Gaskets:** Shall conform to Section 81-16.G,11 of these Construction Standards.
- 7. Location Stakes:** Shall conform to Section 81-16.G,15 of these Construction Standards.
- 8. Mainline Valve Lockout:** Shall conform to Section 81-16.G,16 of these Construction Standards.
- 9. Manhole Frame and Cover:** Shall conform to Section 81-16.G,17 of these Construction Standards.
- 10. Meters:** All meters are to be purchased through the Environmental Utilities Department Water Division at (916) 774-5750.
- 11. Meter Idlers:** Shall conform to Section 81-16.G,19 of these Construction Standards.
- 12. Meter Setters:** Shall conform to Section 81-16.G,20 of these Construction Standards.
- 13. Meter Spud Couplers:** Shall conform to Section 81-16.G,21 of these Construction Standards.
- 14. Nuts and Bolts:** Shall conform to Section 81-16.G,22 of these Construction Standards.
- 15. Nylon Bushing:** Shall conform to Section 81-16.G,23 of these Construction Standards.
- 16. Patching Material:** Shall conform to Section 81-16.G,24 of these Construction Standards.
- 17. Polyethylene Encasement:** Shall conform to Section 81-16.G,26 of these Construction Standards.
- 18. Pressure Regulators:** Shall conform to Section 81-16.G,27 of these Construction Standards.
- 19. Restraints**

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- a. 12 Inches and Smaller Diameter c-900 PVC – Approved restraint systems for PVC Pressure Pipe include: Aquaspring C900 Certa-Lok (for straight runs only), Romac Grip Rings, Romac Model 611 Bell restraint, or approved equal.
 - b. Roman 470 or approved equal for mechanical joint restraint or bell and spigot restraint.
 - c. Restraint systems for pipe diameters 24 inches and larger shall conform to Section 81-16.G,28 of these Construction Standards.
- 20. Riser Aligners:** Shall conform to Section 81-16.G,29 of these Construction Standards.
- 21. Riser Stock:** Shall conform to Section 81-16.G,30 of these Construction Standards. Purple pipe shall be used.
- 22. Sampling Station:** Sampling stations shall be purchased from the Environmental Utilities Department Water Division at (916) 774-5750.
- 23. Tracing Wire:** Shall conform to Section 81-16.G,36 of these Construction Standards.
- 24. Tracing Wire Connectors:** Shall conform to Section 81-16.G,37 of these Construction Standards.
- 25. Traffic Boxes:** Shall conform to Section 81-16.G,35 of these Construction Standards.
- 26. Valves:** Shall conform to Section 81-16.G,39 of these Construction Standards.
- 27. Valve Boxes:** Shall conform to Section 81-16.G,40 of these Construction Standards.
- 28. Valve Nut Extensions:** Shall conform to Section 81-16.G,41 of these Construction Standards.
- 29. Zinc Caps:** Shall conform to Section 81-16.G,43 of these Construction Standards.