SECTION 81: DOMESTIC WATER SUPPLY SYSTEM CONSTRUCTION

81-1 GENERAL

All potable water pipe, fittings, gate valves, fire hydrants, blow-offs and other appurtenances shall be installed in accordance with the requirements of the American Water Works Association (AWWA), 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.

81-2 CONNECTION TO EXISTING FACILITIES

Connection to existing City water facilities may be made upon approval from the Environmental Utilities Department.

A. The Environmental Utilities Department will perform all taps unless specifically authorized in writing for contractor to preform. For services 2" and smaller, the City may allow a hot tap. 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 as determined by the Environmental Utilities Department:

1. Coordinating the work requested with the Water Division and the Development Services Construction Inspector a minimum of 2 business days in advance of any work. This shall include discussions on provisions for materials and equipment required to complete the work.

2. 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. Sheeting, shoring, and bracing as required.

5. 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. Under no circumstances shall anyone other than an Environmental Utilities Water Division representative or Development Services Construction Inspector operate an existing water valve. All water main shutdowns and valve turning operations on existing facilities shall be approved by Environmental Utilities Water Division. All existing water mains returned to service and valve turning operations after tie-ins shall be performed by an Environmental Utilities Water Division representative.

2. With specific approval of the Development Services Construction Inspector.

3. Care shall be taken to provide a clean, sanitary tie-in site.

4. Dewatering of both the new and existing water mains shall take place in a way as to prevent contamination by trench water.

5. All material used in the tie-in shall be clean and swabbed with chlorine to the satisfaction of the Development Services Construction Inspector.

6. All tie-ins shall take place in the presence of the Development Services Construction Inspector.

7. Tie-ins may take place only after the newly constructed water system has successfully passed all required testing procedures as established in these Construction Standards and as determined by the Development Services Construction Inspector.

8. After system tie-in or system pressure loss to less than 5 psi, additional bacteriological samples shall be collected that represent the water quality in the affected portions of the system.

9. If tie-in requires the interruption of water service to residences and/or businesses, the Contractor will be responsible for the notification to the residences and/or businesses of the interruption. A minimum of two (2) business days prior to the start of the tie-in will be required. Notification plan must be approved by Environmental Utilities Water Division and Development Services Construction Inspector.

81-3 CONSTRUCTION STAKING

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

81-4 EARTHWORK

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

A. Excavations: Prior to any excavations, a valid Underground Service Alert (USA) Ticket is required. 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" during construction.

B. Trench Width: The trench bottom width to 6 inches above top of 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. Compaction test results shall be supplied to Environmental Utilities Department upon request. Jetting of trenches is not allowed.

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 and backfilled as approved by the Development Services Construction Inspector and the Public Works 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.

81-5 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.

81-6 PIPE BEDDING

Pipe bedding shall conform to Detail W-1 and the following:

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 replace 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.

D. Where the trench bottom is soft, yielding or unstable, the trench bottom shall be over-excavated. ¾" 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 to ensure that the bell hole is no larger than necessary to accomplish proper joint assembly.

81-7 CONCRETE CRADLES, ARCHES ENCASEMENTS AND TRENCH DAMS

Concrete cradles, arches and encasements shall conform to Construction Standard Details W-23, W-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.

81-8 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 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.

81-9 PIPE INSTALLATION:

Water pipe shall be installed in accordance with 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 the noon-hour as well as overnight.

1. Trenches shall be in a reasonably dry condition when pipe is laid.

2. 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.

3. Pipe sections shall be closely jointed to form a smooth flowline. Care shall be taken in placing the pipe and making field joints.

4. 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.

5. 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.

6. Pipes shall be mechanically restrained to the length specified in the approved plans, using materials specified herein.

7. Thrust blocks shall only be used where specifically shown on the plan /profile sheets and/or standard detail sheets. All fittings and appurtenances shall maintain a minimum of 18 feet of restrained pipe into the fitting from all directions. Plans should reflect the restraint lengths required for each segment and transition.

8. 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 the following:

i. Tracing wire shall be continuous between mainline valve boxes and fire hydrants. It shall be attached to the top of the pipe with 10-mil vinyl tape every 5 feet.

ii. Tracing wires through valve boxes shall be placed outside of riser, but inside the box.

iii. Tracing wire in manholes and vaults shall be attached inside the facility within 1 foot of the rim.

iv. Wire splices shall be located above ground and inside of valve boxes, per 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.

9. A 12 inch wide, blue plastic non-detectable water pipe marking tape, marked "Buried Water Main Below," shall be placed in all main line trenches, 12 to 24 inches from the surface. Where a water main and recycled water main intersect, the plastic marking tape shall also 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. The warning tape shall extend to the nearest valves located on each side of said intersection.

10. Mains in unpaved areas shall be marked every 150 lineal feet with a blue composite utility marker having a decal stating: "Caution Water Pipeline." Appurtenances (valves, ARV's, 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 concrete cylinder 4 inches above finished grade. The brass marker shall state "City of Roseville Water Main."

11. All underground metal (ductile iron, valves, fittings, copper, brass, etc.) shall be wrapped in 8 mil minimum thickness polyethylene encasement (81-16,G.26) with ends taped off with vinyl pipe wrap tape (81-16,G.25).

B. 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 shall be immediately removed from the job site.

4. The pipe shall be installed with the manufacturing label showing on the 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 into a mechanical joint.

7. Minimum length of pipe for installation shall be 5 feet.

C. Ductile Iron Pipe (DIP): DIP shall be installed in accordance with the standards for "Installation of Ductile Iron Water Mains and Their Appurtenances" (ANSI/AWWA C-600) and the manufacturer's recommendations, and as provided herein:

1. DIP shall be polyethylene-encased (81-16,G.26) in accordance with these Construction Standards and the standard for "Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids" (ANSI/AWWA C-105/A21.5).

Polyethylene-encased pipe shall be bedded and backfilled with 3/8" pea gravel to 4 inches above the crown of pipe.

2. At the direction of the Environmental Utilities Department Inspector, the Contractor shall repair damages to the polyethylene encasement as described within ANSI/AWWA C-105/A21.5 or shall replace all damaged polyethylene film sections.

3. Metallic lines shall be exothermically welded and electrically continuous on DIP runs exceeding 100 feet or as approved by the Environmental Utilities Department Director. Each joint shall have 2 individually welded wires. Exothermic welds shall be installed per Detail W-20 and as follows:

a. Weld only against bare metal adjacent to both bell and spigot ends of pipe.

b. Care must be taken not to remove excess metal when removing the pipe coating.

c. Correct horizontal molds must be used for pipe diameters from 4 to 24 inches in diameter. Pipes 30 inches and larger may use flat mold.

d. After a solid weld is made, coat the bare metal with an acceptable bituminous coating material and cover with a exothermic weld cap (81-16,G.8.d).

e. DO NOT weld onto valves.

4. Corrosion test stations shall be installed on metallic lines at intervals not to exceed 1,000 lineal feet or as specified on the approved plans.

5. Minimum length of pipe for installation shall be 2 feet.

D. Ductile Iron Pipe Fittings: In addition to requirements set by these standards, fittings shall be constructed per the following requirements. Flanged and mechanical joint fitting bolt threads and nuts shall be coated with an approved bituminous material (81-16,G.24).

1. Transitions between DIP and PVC shall be made as follows:

a. A PVC pipe spigot may be inserted into a DIP bell by cutting off the PVC bevel on the spigot, and leaving no more than a 1/2-inch taper. A Development Services Construction Inspector shall be present to witness this process.

b. Transitions may be made by the use of DIP repair sleeve.

E. Boring: Borings for installation of water lines shall be made per Detail W-22 and as follows:

1. The equipment, method and sequence of operation and casing pipe grades shall be approved by the Environmental Utilities Department. A minimum of 2 business days shall be given prior to the start of work. Excavation for the boring operation shall be the minimum necessary to satisfactorily complete the work. Bracing, sheeting and shoring shall be adequate to protect workers and any adjacent structure or roadbed.

2. **Casing**: Welded steel casing pipe shall have a minimum wall thickness of a ¼ inch for pipe 24 inches in diameter and smaller, and 5/16 inch for pipe 27 inches through 36 inches in diameter. Casing material larger than 36 inches shall be engineered on a case by case basis. The inside diameter of the casing shall be a minimum of 10 inches larger than the outside diameter of the pipe bell or joint, as approved by the Environmental Utilities Department. A minimum of 4 inches clearance shall be required between the conducted pipe and the casing taking the skids into consideration.

3. **Installation of Casing**: The casing shall closely follow the boring operation. The bored hole shall not be more than 0.10 foot larger in diameter than the outside diameter of the casing. Guide rails shall be accurately set to line and grade to insure installation of the casing within allowable limits.

4. **Placing Pipe in Casing**: Pipe shall be fully restrained ductile iron pipe and shall be supported by a minimum of 2 sets of synthetic skids per stick of pipe, or as required by the Environmental Utilities Department. Skids shall be tightly banded to pipe with steel straps. Pipe sections shall be joined outside of the conductor. The skids and casing entrance shall be lubricated prior to sliding the conducted pipe into place. The height of the skids may be adjusted to meet specified grades.

   The space between the conducted pipe and casing shall be completely filled with clean, dry silica sand, blown into place. First, both ends of the casing shall be plugged with non-shrink grout a minimum of 12 inches into the casing. Both ends shall have a pipe of sufficient diameter placed through the mortar plug and parallel with the conducted pipe. One pipe shall be used for blowing the sand into the annular space. The other pipe shall remain open for venting. Prior to starting, the method of placing sand in the void shall be approved by the Environmental Utilities Department.

5. **Backfill of Voids**: When in the opinion of the Developer's design engineer or geotechnical engineer, the nature of the soil indicates the likelihood of ground loss which would result in a greater space between the outer surface of the casing than allowed, the Contractor shall take immediate steps to prevent such occurrences by installing a jacking head extending at least 18 inches from the leading edge of the casing.

   The jacking head shall cover the upper 2/3 of the casing and project not more than ½ inch beyond the casing outer surface. Excavation shall not be made in advance of the jacking head. Voids greater than allowable shall be filled with sand, soil, cement, grout, or as approved by the Environmental Utilities Department. Where voids are suspected, the design or geotechnical engineer may direct the Contractor to drill the casing, to pressure inject grout to refusal and repair the drilled hole. Grouting pressure shall not exceed 50 pounds per square inch at the nozzle.

6. 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 discharged 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 provided it does not impact sensitive areas such as wetlands, creeks, or other natural water conveyances.

All street borings 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.

F. Vertical Elevation Change: Mains designed with a vertical elevation change using angle fittings shall use ductile iron pipe with an approved restraint system between the 2 angle fittings.

1. The Contractor shall follow the City of Roseville design standards and the California Code of Regulations (CCR) Title 22 Section 64572 Water Main Separation Requirements. Refer to the City's Design Standards Section 8-13.C and Standard Detail W-39.

G. Bridges and Casings: Pipe within bridges and casings shall be fully restrained and fully extended prior to closure.

81-10 SERVICE INSTALLATION

Water services shall be installed in accordance with manufacturer's recommendations, the Construction Standard Details and with the following provisions. Refer to the Table 1 or "Meter Application Table" for meter lay lengths.

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 wrap tape to secure and seal the polyethylene wrap.

D. Service lines shall be encased in 8-mil minimum thickness poly tubing and backfilled with clean washed well graded sand (100% passing #4 sieve and less than 10% passing #100 sieve). Use pipe wrap tape to secure and seal the polyethylene wrap.

E. Service manifolds shall be constructed per the following criteria:

1. Where a main line is extended a distance greater than 20 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 these Construction Standards. Chlorine disinfection shall comply with the American Water Works Association Standard for Disinfection of Water Mains (C651-14) and as specified in Section 81-13C of these standards.

Where a service line is extended, 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 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. Service lines and manifolds 3 inches and larger shall be ductile iron.

3. No water shall be drawn through a service prior to installation of the water meter and certification of the backflow prevention assembly.

F. A backflow assembly shall be required for construction and sales trailers having a landscape irrigation system or a septic holding tank.

G. Backflow assemblies shall be covered with a freeze protection insulated bag (81-16,G.10) per these Construction Standards.

H. The curb in front of residential water services shall be stamped with a "W."

I. Service saddles shall be installed with zinc caps (81-16,G.43) on all bolts, per these Construction Standards.

81-11 ABANDONMENT OF SERVICES AND MAINS

All water services up to and including 2", on water mains that are to remain active, annotate to remove the corporation stop and saddle and install a full circle stainless steel clamp on the main under City inspection.. Mainline stubs shall have the valve removed and replaced with a blind flange or as approved by the Environmental Utilities Department. The abandoned piping shall be removed or left in place as approved by Environmental Utilities Director.

81-12 APPURTENANCES INSTALLATION

All appurtenances, including fire protection, blow-offs, sample stations, air release valves and fire hydrants shall be installed in accordance with manufacturer's recommendations, these Construction Standards and the following provisions:

A. All valves, fittings, DIP, copper and underground brass shall be wrapped and sealed in an 8-mil minimum thickness clear polyethylene encasement (81-16,G.26). Use 10 mil pipe wrap tape (81-16,G.25) to secure and seal to the polyethylene encasement. 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 8" riser stock (81-16,G.31). Riser stock shall be PVC C-900. An operator nut extension shall be installed on valves where the operation nut

exceeds 40 inches in depth from final grade. Valve extensions shall be continuous and within 24 inches of finished grade.

C. Buried nuts and bolts shall be coated with a bituminous material (81-16,G.24). This includes exposed bolts found on a manufactured appurtenance (i.e., valve bonnets, etc.) "T" bolt heads do not require coating.

D. Fire hydrants shall be marked with a blue reflector placed 1 foot off of street centerline on the fire hydrant side of the street. Fire hydrants located at intersections shall be marked on both streets.

E. Fire hydrants shall be painted with 1 coat primer and 2 coats safety yellow gloss enamel paint (81-16,G.12). When used as blow-offs, the top 2 inches shall be painted white and marked with an "X" with black gloss enamel paint. Private hydrants shall be painted gloss white.

F. Dead-end lines, permanent and temporary, shall have a Hydrant Assembly constructed per Construction Standard Detail W-4. Temporary Hydrant Assemblies upon inspection and approval of a Development Services Construction Inspector may be re-used in permanent or temporary applications.

G. Insulating kits (81-16,G.11.d) shall be installed at transitions between dissimilar metal pipes per the Construction Details (W-21) and as required by the Environmental Utilities Department.

81-13 TESTING PROCEDURES

Testing of the water system may proceed only after joint utility crossings are completed, the sewer mains and services have passed pressure test and TV inspections, the recycled water system has passed testing and subgrade elevations have been met. Road bases to be lime-treated shall be pressure tested before and after the lime treatment process. Testing prior to subgrade placement may be subject to additional pressure tests at the discretion of the Development Services Construction Inspector. The new system shall be filled with potable water through an approved backflow device.

A. Hydrostatic Test

1. Contractor shall verify with the Development Services Construction Inspector that all system valves are open prior to testing.

2. The Development Services Construction Inspector will be present during the duration of the test.

3. Hydrostatic Test shall be conducted for 2 hours at a minimum of 150 pounds per square inch or at 1 1/2 times the operating pressure, whichever is higher, as measured from the system high point. The test gauge shall be liquid-filled and capable of testing up to 300 psi. Service lines 2" and smaller after the backflow should hold a running pressure test for minimum one (1) hour, and be flushed per the Development Services inspector's discretion.

4. If at any time during the test the pressure drops to 5 psi below the test pressure, repressurize the pipe by pumping in potable water in sufficient quantity to bring the pressure back to the original test pressure.

5. Accurately measure the amount of water required to repressurize the system to the test pressure, compare to the Maximum Allowable Leakage Rates in the table below and, if the average measured leakage per hour exceed the allowable rate, repair and retest the water main.

Table 81-13: Maximum Allowable Leakage Rate at 150 psi

Pipe Diameter (inches)	Allowable Leakage Rate (gallons/hour/1,000 feet of pipe)
4	0.33
6	0.50
8	0.66
10	0.83
12	0.99
14	1.16
16	1.32
18	1.49
20	1.66
24	1.99
30	2.48
36	2.98

Source: AWWA C600 Installation of Ductile Iron Mains and Their Appurtenances

B. Topside Improvements: When all water, recycled water and sewer infrastructures have passed air, vacuum, pressure, continuity and CCTV inspection the Development Services Inspector shall notify Water Asset Gathering indicating that the project is ready for road bases and top side improvements. This does not constitute approval for use of the infrastructure.

C. Chlorine Disinfection: Chlorine disinfection shall comply with the American Water Works Association Standard for Disinfection of Water Mains (C651-14) and as specified below:

1. Disinfection inspections shall begin only after passing the pressure test.

2. Prior to chlorination, pre-flush water mains and services. Pre-flushing is not permitted if using the Tablet Method for chlorination.

3. Chlorine shall be drawn through all mains, hydrant runs and services. The Development Services Construction Inspector shall verify that a minimum chlorine residual of 50 parts per million (ppm) has been achieved.

4. After a 24-hour holding period, the Development Services Construction Inspector will verify that a minimum chlorine content of 25 ppm remains in the system.

5. Upon approval by the Development Services Construction Inspector, the water system shall be flushed to remove concentrated chlorine. Flushing shall be continued until the remaining water has a chlorine residual below 1 ppm and a turbidity equal to or less than 1 NTU. Chlorinated water shall be neutralized to 1 ppm chlorine residual or less prior to discharge. Discharge location and neutralization methods shall be documented in the SWPPP and coordination with and approved by the Development Services Construction Inspector.

6. Chlorinated water resulting from flushing newly installed water lines may only be discharged into the City's sewer system with the specific permission of the Environmental Utilities Department.

   Prior to discharging into the sewer system, the Contractor shall sign a form authorizing the Environmental Utilities Department to bill for the amount of water discharged into the system. At the end of each flushing exercise, and prior to tying into the City water system, the Development Services Construction Inspector shall prepare a bill for water usage based on the meter reading. This bill must be paid before the project is signed off by EUD.

   The discharged chlorinated water shall be classified as "low-strength metered commercial users" under Title 14.16.220 of the City of Roseville Municipal Code. The sewer unit for low-strength metered commercial users shall be one sewer unit per 1,000 cubic feet. The Environmental Utilities Department shall determine the volume of discharge. Chlorinated water shall not be disposed of into environmentally-sensitive areas (i.e., under oak trees, vernal pools, man-made or natural streams, drainage systems, etc.) during any time of the year.

   All discharges into the sewer system shall be governed by the following conditions:

   a. Water used for the purpose of flushing shall be metered.

   b. Discharge into the sewer system shall be done in such a manner as to avoid surcharging the sewer system.

   c. No discharge into the sewer system shall be permitted on rainy days.

d. No discharge shall be permitted upstream of a small lift station.

e. An approved air gap shall be maintained at all times. Air gap distances shall be calculated as 2.5 times the pipe diameter. In no case shall the air gap be less than 12 inches.

D. Water Quality Testing: Water quality samples shall be taken per the following procedure:

1. Once flushing has lowered the chlorine residual below 1 ppm and the turbidity is equal to or less than 1 NTU, the initial set of samples shall be collected by the Development Services Construction Inspector and taken to the City's laboratory. Then the water system shall observe a minimum 24 hour detention time. Water may not be drawn during this time period.

2. After the 24 hour holding period has elapsed, water quality samples shall be collected by the Development Services Construction Inspector for testing by the City's laboratory.

3. The laboratory will require a minimum of 48 hours to complete total coliform and total plate count tests. Actions allowed based on test results are as follows:

Pass Coliform Test		
(Coliform not present?)	**Plate Count Results**	**Action**
Yes	0-1,000	Connect to City
Yes	1,000-1,250	Flush water system and re-test
Yes	1,250+	Flush and re-chlorinate water system and retest
No		Flush and re-chlorinate water System and retest

4. For new mains, sets of samples shall be collected every 1,200 feet (370 meters) of the new water main, plus one set from the end of the line and at least one from each branch greater than one pipe length.

If trench water has entered the new main during construction or if, in the option of the City, excessive quantities of dirt or debris have entered the new main, bacteriological samples shall be taken at intervals of approximately 200 feet (61 meters), and the sampling location shall be identified (see Sec. 5.1.3 for sampling location details). Samples shall be taken of water that has stood in the new main for at least 16 hours after final flushing has been completed.

E. Tying onto the City System: A tie-in procedure shall be submitted and approved by the Environmental Utilities Department prior to the proposed work. The Contractor shall allow for up to 7 days review of the procedures by the Environmental Utilities Department. The water system shall be tied into the City system within 10 working days upon completing and passing all the testing procedures. Tie-ins shall be conducted a specified in Section 81-2 of these Construction Standards. After the tie-in has been made, the Contractor shall flush the segment tied-in to the approval of the Development Services Construction Inspector.

1. If the new water system cannot be tied into the City system within 10 working days, the new system shall maintain a chlorine residual of 0.5 to 1.0 ppm or be subject to water quality testing and re-chlorination. This shall be discussed with the Development Services Construction Inspector.

2. On-site private systems may connect onto the City System upon passing all testing procedures, backflow tests, and meters have been paid for and installed. A tie-in procedure shall be required per this section.

3. New water mains that are equal to or less than one pipe length (20'), the new pipe, fittings, and valves required for the connection may be spray disinfected or swabbed with a minimum of 1 percent solution of chlorine just before being installed. For new or replacement water mains that are greater than 1 pipe length (20'), the pipe must be set up for disinfection and bacteriological samples taken.

F. Continuity Testing: The Environmental Utilities Department will test continuity of the tracing wire with City standard locating equipment. Discontinuity in the tracing wire shall be repaired. Continuity shall be tested after subgrade is made, but before the pavement is placed. Final continuity testing will take place after the pavement is placed and all valve boxes are raised. Costs for said inspection and any repairs shall be borne by the Contractor. Contractor shall notify the Development Services Construction Inspector when ready for continuity testing. Preliminary inspections may be performed by outside Contractors, but shall not be accepted by the Environmental Utilities Department as an official record.

G. Corrosion Protection System Testing: At the completion of the pipe installation and prior to curb and gutter, the corrosion engineer shall conduct a test of the corrosion monitoring system in the presence of the Development Services Construction Inspector. A report showing the test results shall be submitted to the Environmental Utilities Department for review and approval. The report shall include test station locations as called out on the approved plans, appurtenance tested, test result and recommendations for future monitoring and maintenance.

81-14 REPAIRING INSTALLED IMPROVEMENTS

All PVC and DIP water mains shall be repaired per the following procedures:

A. 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 will be required.

B. After the repair has been completed, the excavation shall be backfilled and compacted to grade as specified. The repairs shall then be retested per these Construction Standards.

C. 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.

81-15 PUNCHLIST PROCESS

When the Contractor is satisfied that 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 and Water Distribution Division. The cost of generating the punchlist shall be borne by the Contractor/Developer.

A. Pre-final Requirements
In order for Environmental Utilities Department to install meters to any new residential buildings (model or production homes), the following requirements must be met:

1. To prevent future damage of meter boxes, prior to pre-final inspection (both commercial and residential), a landscaped area with a 10' minimum radius must first be installed. Prior to residential pre-final inspection, all roofing work must be complete.

2. The meter box must be set to finished grade. The contractor shall make sure that debris is not entering the meter box.

a. If the meter box area is to be concreted, concrete work must be complete prior to meter installation.

3. The meter box must be squared to adjacent sidewalk or property line. See Standard Detail W-5, W-6, W-7, and W-29 for more detailed requirements.

4. The meter box must be in a structurally sound condition (no cracks or visible damage).

5. The box shall be cleaned and free of debris.

6. Commercial Meters: No water shall be drawn through the backflow device until it has been tested by the Environmental Utilities Department.

81-16 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 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 at 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 days prior to contract award. All submittals shall include documentation verifying 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, the evaluation period may be extended, or the product may be denied approval as determined by the Environmental Utilities Director. A list of conditionally approved products may be obtained from the Environmental Utilities Department.

C. Material Defects and Failures: Defective material and failures shall be reported immediately. The date of sale, manufacturing dates, lot numbers, and all other identifications shall be provided to the Environmental Utilities Department.

D. Unapproved Materials: Materials not approved for use on the project shall be removed from the site within 24 hours as requested by the Development Services Construction Inspector.

E. Water Main: Unless noted on the approved plans, all water mains shall be either Polyvinyl Chloride Pressure Pipe (PVC) or Ductile Iron Pipe (DIP).

1. PVC Pressure Pipe: PVC Pressure Pipe shall be manufactured to a minimum Class 150 rating and shall conform to the "Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 6 inches through 12 inches, for Water" (AWWA C-900), and shall also include the following:

   a. PVC Pressure Pipe shall be blue or white in color and shall have been manufactured within 18 months of installation. The pipe shall be manufacturer date coded and the City provided the manufacturer's coding for translation. Sun damaged pipe may be rejected at the Development Services Construction Inspector's discretion.

   b. Rubber rings shall conform to the "Standard Specifications for Elastomeric Seals (Gaskets) for Joining Plastic Pipe" (ASTM F-477).

   c. Approved PVC Pressure Pipe manufacturers include: Westlake-Aquaspring C900 Certa-Lok, Diamond Plastics Corporation, J-M Manufacturing, Pacific Western Pipe, Vinyl Tech-White Knight, Pressure-Flex Pipe, PW-Eagle, North American Pipe Corporation, or approved equal.

2. Ductile Iron Pipe: DIP shall be manufactured to conform to the standards ANSI/AWWA C-150/21.50 thickness design of ductile iron pipe and to "Ductile Iron Pipe Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water and Other Liquids" (ANSI/AWWA C-151/A21.51) and shall also include the following:

a. DIP shall be cement-mortar lined in accordance with the standard for "Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water" (ANSI/AWWA C-104/A21.4).

b. Approved DIP manufacturers include: McWane, Tyler, US Pipes, Griffin, American, Electrosteel USA, or approved equal.

3. Concrete Cylinder Pipe- CCP shall be manufactured to conform to the standards AWWA C-303:

a. Approved CCP manufacturers include: Ameron or approved equal.

F. Services

1. **Brass Material**: In compliance with California State Assembly Bill 1953 and any amendments thereto, all brass components and pipe in contact with potable water intended to convey or dispense water for human consumption through drinking or cooking shall contain a maximum of 0.25% lead by weight. Compliant brass product shall be marked indicating the product is manufactured from a low-lead alloy. Non-compliant product shall be immediately removed from the construction site.

a. Brass pipe: Brass pipe shall conform to ASTM B-43 standards. A listing of approved pipe include: Hallstead ¾" through 2" Red Brass, Cambridge-Lee, Federal WW—351, Wolverine, or approved equal.

b. Brass fittings: Brass fittings shall conform to ANSI Standard B16.15, B16.24, B2.1, T-94-1 and be a minimum of Class 125. A listing of approved manufacturers include: Lee Brass, Merritt Brass, New England Union Co. or approved equal.

c. Brass fittings for Copper Tubing: An approved listing for brass fittings for copper tube includes: Jones, Mueller, Ford or approved equal. Parts reference numbers are shown below:

1. Jones (¾ through 2):
- Jones Super Grip CTS x CTS E-2609SG
- Jones Super Grip CTS x MIP E-2605SG
- Jones Super Grip CTS x GIP E-2607SG
- (2 Compression x Compression)

2. Mueller (¾ through 2):
- Mueller-110-CTS H-15403N
- Mueller-110-CTS H-15428N
- Mueller-110-CTS H-15451N

3. Ford (¾ inch through 2 inch):
- ¾ inch"- - Ford Quick Joint CTS x CTS C44-33-Q-NL
- 1– Ford Quick Joint CTS x MIP C84-44-Q-NL
- 2– Ford Quick Joint CTS x FIP C14-77-Q-NL
- (2 Compression x Compression)

2. Copper Tubing: Copper tubing shall be seamless, annealed copper tube and shall conform to ASTM B88 "Standard Specification for Seamless Copper Water Tube" and shall be Type K. Copper shall be grade UNS-C12200. For diameters ranging from ¾ to 1" inch, use Type K Roll Soft Copper. For diameters ranging from 1 ¼ to 2" inch, use Type K Soft 20Sticks. Approved tubing includes: Cambridge Lee, Mueller Streamline, Aqua Shield or approved equal.

3. Corporation Stops: Corporation Stops shall be male, iron pipe thread by compression and full throat ball valve design. A corporation stop shall be installed at the water main for all service laterals 2 inches and smaller. Approved manufacturers of corporation stops include: Jones, Mueller, Ford, or approved equal. Part reference numbers are as shown below:

- Jones:
  - Part #E-1935SG (¾ inch to 2 inch)
- Mueller:
  - Part #B-25028-MIPTXCTS-110N (Compression ¾ inch to 2 inch)
  - Part #N-35028-MIPTXCTS-110N (Compression ¾ inch to 1 inch)
- Ford:
  - Part # FB1100-x-Q-NL (¾ inch to 2 inch)
- AY MacDonalds Mfg. Co. Brass 74704BQ 1 inch corp stop

4. Curb Stops: Approved curb stop manufacturers include: Jones Mueller, Ford, or approved equal. Part reference numbers are shown below:

- Jones: Part #E1921WSG (¾ inch to 2 inches)
- Mueller: Part #B-25172-FIPTXCTS-110N (Compression ¾ inch to 2 inches)
- Ford: Part # B41-xxx-Q-NL (¾ inch to 2 inches)
- AY MacDonalds Mfg. Co. Brass 76102Q 1 inch curb stop

5. Dielectric Tape: Approved manufacturers for dielectric tape include Polyken #932 Hi-Tack joint wrap tape or approved equivalent flexible dielectric tape.

6. Service Saddles

a. PVC Pressure Pipe Service Saddles manufacturers include Jones, Mueller, Ford, or approved equal. Part reference numbers are as indicated below:

- Jones: 4 inch through 12 inch saddles with ¾ inch through 2 inch tap, Part #J-996

- Mueller:

Saddle Size	Part#
4 inch	H-13490
6 inch	H-13491
8 inch	H-13492
10 inch	H-13493
12 inch	H-13494

- Ford:

Saddle Size	Part#
1 inch	S912

b. DIP Service Saddles manufacturers include: Jones, Mueller, or approved equal. Part reference numbers are as indicated below:

- Jones: 4 inch through 12 inch saddles with ¾ inch through 2 inch taps: Part # J-979

- Mueller: ¾ inch through 2 inch taps:

Saddle Size	Part#
4 inch	BR2B0474Ip*
6 inch	BR2B0684IP*
8 inch	BR2B0899Ip*
10 inch	BR2B1104IP*
12 inch	BR2B1314IP*
16 inch	BR2B1732IP*

*the last three numbers denote tap sizes (0.75”=075, 1”=100, 1.50”=150, 2”=200)

G. Appurtenances: In compliance with California State Assembly Bill 1953 and any amendments thereto, all brass components and pipe in contact with potable water intended to convey or dispense water for human consumption through drinking or cooking shall contain a maximum of 0.25% lead by weight. Compliant brass product shall be marked indicating the product is manufactured from a low-lead alloy. Non-compliant product shall be immediately removed from the construction site.

1. **Air Release Valves**: Air release valves shall be vacuum break type with stainless steel body, trim, float and bolts. A listing of approved manufacturers includes: Crispin, Val-Matic, A.R.I. or approved equal. Part reference numbers are as shown below:

Crispin	Part #	Valvematic	Part#	A.R.I.	Part #
1 inch	UL10	1 inch	201C	½ inch	D-040
2 inch	UL20	2 inch	202C	1 inch	D-040
3 inch	UL31	3 inch	203C	2 inch	D-040 or D-46
4 inch	UL41	4 inch	204C	3 inch	D-46

6 inch	UL61	6 inch	206C	4 inch	D-46
8 inch	UL81	8 inch	208C	6 inch	D-46

2. **Backflow Assembly** – A listing of approved manufacturers and products include:

   For domestic and Irrigation services ¾"-2" "Lead Free" Reduced Pressure Principle BPA:
   - Watts LF009 and LF909 series
   - Wilkins ~~975 Series~~ 975XL2

   For domestic and Irrigation services 3"-10" Reduced Pressure Principle BPA:
   - Wilkins 375AST and 375 ASTR

   For Commercial Fire Service Connections
   - Ames 3000SS DCDA Stainless Steel Series (OS&Y)
   - Wilkins 350 ASTDAR (OS&Y)
   - Wilkins 350 ASTDA(vertical and horizontal installation)(OS&Y)

3. **Backflow Assembly Support Stands**: Placer Waterworks series PW/PS or approved equal.

4. **Backflow Assembly Support Stand Saddles**: Placer Waterworks series PW/SDL or approved equal.

5. **Backflow Assembly Color**: All brass/copper Backflow Preventer Assemblies, including the bypass meter and backflow on a commercial fire backflow, shall be painted a "Forest Green" color to provide a deterrent to theft with the proper outreach to recyclers. The paint color code shall be RAL6004 blue green.

6. **Blocking for Boxes**: A listing of approved materials includes: Slump Block- 4 inch x 4 inch x 15 ½ inch, or approved equal.

7. **Cadwelds**: A listing of approved materials includes:
   - #4 jumper cable, CP cable, 18 inches long with 1 inch bare end
   - #4 cadweld copper sleeve
   - #4 cadweld shot with thermite mastic weld cap-t-cap
   - Exothermic weld caps:
     - Ci thermOcap with thermOprime adhesive
     - Ci thermOcap PC
     - Royston Handy Cap with Roybond 747 Primer
     - Royston Handy Cap IP

9. Fittings

a. PVC: Unless otherwise specified or shown on the approved plans, all fittings to be used with PVC Pressure Pipe shall conform to the standard for "Ductile Iron Compact Fittings for Water and Other Liquids" (ANSI/AWWA C-153/A21.53 for MJ compact fittings; C110 for flange fittings). Approved fitting manufacturers include Sigma, Star, Tyler, Union and US Pipe.

1. All ductile iron fittings shall be mortar lined in accordance with the standard for "Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water" (ANSI/AWWA C-104/A21.4).

2. All fittings shall be wrapped and sealed in accordance with these Construction Standards.

3. The Contractor may use a ductile iron mechanical joint flange adapter designed for AWWA C-900 pipe with connecting PVC Pressure Pipe to flanged fittings or flanged valves. Pipe ends must be cut smooth and square with no bevel. The joint shall be restrained to the PVC pipe using an approved restraint method.

b. Ductile Iron Pipe: Unless otherwise specified or shown on the approved plans, all fittings to be used with DIP shall employ either mechanical joints or restrained joints conforming to the standard for "Ductile Iron Compact Fittings for Water and Other Liquids" (ANSI/AWWA C-153/A21.53). Approved fitting manufacturers include Sigma, Star, Tyler, Union, and US Pipe.

1. All ductile iron fittings shall be mortar lined in accordance with the standard for "Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water" (ANSI/AWWA C-104/A21.4 – Double thickness mortar).

2. All fittings shall be wrapped and sealed in clear polyethylene encasement in accordance with these Construction Standards (81-16,G.26).

10. Freeze Protection for Backflow Assemblies: The backflow assembly freeze protection materials shall be comprised of the following:

a. Laminated forest green fabric conforming to Herculite #10 by Herculite Products (fabric shall be a minimum of 10.6 oz/sq. yd.), or approved equal.

b. Brass Rolled Rim Grommet and spur washer by Astrup, or approved equal.

c. Polyester thread with a minimum strength of 14.2 pounds, Coats American's Star Ultra product line, or approved equal.

d. Fiberglass insulation R-19 rated, 6 inch minimum thickness.

e. 1-inch minimum width Velcro, or approved equal.

f. Black UV rated nylon zip tie, 0.30" minimum width.

11. Gaskets: Gaskets shall conform to the following specifications:

a. Flange Gaskets: Flange gaskets shall be neoprene rubber, red rubber, US Pipe, Flange Tite, or approved equal.

b. Push On Gaskets: Manufacturers recommendations.

c. MJ Gaskets: Manufacturers recommendation.

d. Insulting Flange Gaskets: Insulating flange gaskets shall be USSO Standard B.16.21 insulation flange kits, Type E Full Face Gasket with 2 sided insulation as manufactured by Calpico, or approved equal as per detail W-21.

12. Hydrants: Hydrants shall be wet barrel type bronze – lead free. Exterior shall be painted with 1 coat primer and 2 coats "safety yellow" gloss oil based enamel paint (e.g. Rust-Oleum HP 7543). Caps shall be cast iron. Approved hydrants (with 6" x 2-1/2" x 2-1/2" x 4-1/2)include: James Jones (Bronze) Part # J3762-Z13, Clow (Bronze) 2060, or approved equal. The Part Number shall contain the letter "NL" to indicate the hydrant is lead free. Example: Part # Jxxx-ZxxNL.

i. All new hydrants to be installed with breakoff check valves. Approved valve: Clow LP619 Hydrant Breakoff Check Valve or equal.

13. Hydrant Bury: Hydrant buries shall be ductile iron mechanical jointed cross flange, cement-mortal lined per AWWA C104. A list of approved hydrant buries include: South Bay Foundry MJ x Size, Clow MJ x Size or approved equal.

14. Hydrant Bury Extensions: Hydrant bury extensions shall be grooved and cement-mortar lined per AWWA C104. A list of approved hydrant bury extensions include: South Bay Foundry, Clow Part # CW-EXT-BO (6 inch x 6 inch through 6 inch x 36 inch), Tyler (6 inch x 6 inch through 6 inch x 32 inch), or approved equal.

15. Location Stakes: A list of approved off-site location stakes include: Carsonite-# CUM375, 4 inch x 5 feet with anchor barb kit, Caution stickers attached-# CW-112 and organization decal # P101, City of Roseville-Call Before Digging-(916) 774-5750, or approved equal.

16. Main Line Valve Lock-Out: A list of approved manufacturers and part reference numbers include: SW Services PC800, DC600, or approved equal.

17. Manholes Cone, and Barrels For listing of approved manufacturers reference City construction standards Section 91-16.E.1

18. Manhole Frame and Cover: A listing of approved manufacturer and part reference number includes: South Bay Foundry (SBF1957-W), GMI Composite Frame and Cover 2600 and 3800 series, or approved equal. Manholes constructed outside of paved area shall use a GMI composite lid and frame.

19. Meters: All meters shall be purchased through the Environmental Utilities Department, Water Division. Call (916) 774-5750 for information.

20. Meter Idlers: A listing of approved meter idler manufacturers include: Ford, Jones, Spears, or approved equal. Part reference numbers are shown below:

Ford	Part #
¾ inch	IDLER #3-NL
1 inch	IDLER #4-NL
¾ inch x 9 inch	884-090-NL
1 ½ inch	IDLER #6-NL

Jones	Part #
5/8 inch x ¾ inch	E-2208
1 inch to 2 inch	E-2208

Spears (no lead/low lead)	Part #
¾ inch x 7 ½ inch	884-075
1 inch x 10 ¾ inch	885-107

20. Meter Setters: Meter setters with dual check valves shall be used unless otherwise approved by the City Water Division. A listing of approved meter setter manufacturers include: AY MacDonald, Ford, Jones, Mueller, or approved equal. Part reference numbers are shown below:

Ford 40 Series	Part #
¾ inch	VBHH43-12WH-NL-FP
1 inch	VBHC44-15W-NL-FP
1 ½ inch	VBB76-18HB-11-66-NL-FP
2 inch	VBB77-18HB-11-77-NL-FP

Jones	Part #
¾ inch to 1 inch	E03-B-(C)-MT X MT-BV-SC-12
1 ½ inch	E02E-FIP-FIP-BV-SC-12AS
2 inch	E02F-FIP-FIP-BV-SC-12AS

AY MacDonald	Part #
1 inch	718 412JM

Mueller	Part #
¾ inch to 1 inch	B-24118-2N
1 inch	390 B-24118-6A
1 ½ inch to 2 inch	B-2423-99000N

21. **Meter Spud Couplers**: A listing of approved meter spud couplers manufacturers include: Ford, Jones, Mueller, or approved equal. Part reference numbers are shown below:

Ford	Part #
¾ inch	C38-33-NL (4" and 8-1/2" Spud)
1 ½ inch	CF31-66-NL
2 inch	CF31-77-NL

Jones	Part #
1 ½ to 2 inch	E-129
¾ inch to 12 inch	E-130 (3/4" or 1" use 4" and 8-1/2" Spud)

AY MacDonalds	Part #
1 inch	718412JC

Mueller	Part #
1 inch	H-10890N
Size 10	H90-99029N (4 inch and 8 ½ inch Spud)

22. **Nuts and Bolts**

    a. **Flange bolts and nuts** shall conform to a minimum ASTM #A307. Bolts less than ¾ inches in diameter shall be a minimum Grade B (heavy hex). Bolts ¾ inches and larger in diameter shall be a minimum Grade A (standard hex).

    b. **Hydrant Bolts**: Hydrant bolts to be hollow breakaway (top) and non-breakaway bolts (bottom), 5/8 inch x 3 inch, conforming to ASTM-A307 Grade A & B Low Carbon Steel. Insulating flange bolts, nuts, and washers shall be stainless steel Grade 316.

    c. **Meter Bolts** are to be stainless steel, Grade 316 with brass nuts.

    d. **Tee Bolt**: Steel bolts are to be ¾ inch high strength, low alloy steel with a heavy nut, conforming to AWWA Standard C-111-90.

23. **Nylon Bushings**: Nylon bushings shall be 76-76R, 2 ½ inch MIPT x 2 inch FIPT.

24. **Patching Material**: A listing of approved manufacturers and part reference numbers for patching of Dip include: Cop-Coat Carboline Company (Bitumastic No. 50, Coal Tar), Coppers Coat 50, or approved equal.

25. **Pipe Wrap Tape**: 10 mil vinyl tape manufactured by Calpico Inc. (Calpico VI-10) or approved equal.

26. **Polyethylene Encasement**: "Clear" non-colored polyethylene film shall be used. The polyethylene film shall have a minimum thickness of 8 mils. The thickness shall not be less than 10 percent of the nominal thickness. The polyethylene shall be in either tubular

or in sheet form. Polyethylene film shall be manufactured from a Type 1, Class A raw polyethylene material conforming to "Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids" (ANSI/AWWA C-105/A21.5). Approved manufacturers include: Fee Spec's-LP378D Northtown, Fulton Enterprise Inc., Global Polymer Tech, Unisource, or approved equal.

27. Pressure Regulators: A listing of approved all brass pressure regulator systems include: Watts (¾ inch through 2 inch, UB5-series), Wilkens (¾ inch through 2 inch 600 series, 2 ½ inch through 3 inch 500YSBR), or approved equal.

28. Reinforcement Bar: Rebar shall be grade 60 steel, deformed type. Smooth bar shall not be allowed. All rebar shall be number four (4) unless otherwise specified on the plans.

29. Restraints

a. PVC: Approved restraint systems for PVC Pressure Pipe include: Westlake-Aquaspring C900 Certa Lock (for straight runs only), ROMAC Alpha Restrained Joint, ROMAC Grip Rings, EBAA Iron Series 2000 PV, Sigma One Lok Series "SLC", DR18 JM Eagle Loc, eagle lock, PVC Star Grip 4000 series, (See section 81-16,H for additional conditionally approved options) or approved equal.

b. DIP: Approved restraint systems for DIP include: Field Lock Gaskets (3 inch through 12 inch diameter only), Mega Lug 1100 Series, ~~TR Flex~~, sigma One Lok Series "SLD", Star Grip 3000 series, American Fastite Joint Assembly or approved equal.

30. Riser Aligners: A listing of approved products include: Davis & Associated Riser Aligners 8 inch, or approved equal.

31. Riser Stock For Curb Stops: Riser stock schedule 40 PVC. The riser shall be 4 inch diameter inside meter boxes, and 6 inch diameter for curb stop type valves in valve boxes.

32. Riser Stock for Main Line Valves: Riser stock shall be 8 inch diameter PVC C-900 for all main line valves.

Riser insert/main line valve lock out shall be used where the valve is located in the gutter pan. See section 81-16.G.16

33. Sampling Stations: MX Fusion or approved equal. Model MX3000-H FBE (Wht)

34. Service Boxes and Lids: All box lids are to be permanently marked with the appropriate label (i.e., Water, ARV, Blow-Off, CPT, etc.). Lids shall have a 1 7/8 inch hole offset at upper 1/3 portion of lid measured along the long axis. In commercial project, meter lids shall be stenciled with the number address it serves. The numbers shall be painted using white enamel paint and 2 inch stenciling. A list of approved box manufacturers include: Christy, BES, Armorcast, CDR, Placer Water Works, or approved equal. Part reference numbers are shown below:

Christy	Part #

¾ inch and 1 inch services	N-16 Box (10k load) N-30 box (10k load) B-16-61DP Cover (10k load) B-16CP Cover (10k load) FL16P001 (10k load) FL 30 cover (10k load) Placer Water Works PWW-F16 (20k load) (w/ 1 7/8 inch hole, off-set at upper 1/3 portion of lid, measured along the long axis) B-16-12 Box Extension
1 ½ inch to 2 inch services	B-40 Box B-40-61D CoverB-40-61D Cover (w/1 7/8 inch hole, off-set at upper 1/3 portion of lid, measured along the long axis) B-40-10Box Extension
3 inch meter box	B-40 Box
4 inch meter box	B-48 Box B-48-62DP P48-10 Extension
6 inch to 10 inch meter boxes	B-48 Box P48-10 Extension R-17P24 PIT R-17-52DP Lid R-17-24 Extension
6 inch to 8 inch compound meter Box and Extension	R37-54H Lid

Armorcast	Part #
¾ inch to 1 inch	A6000492 Box (20k load) P000492 Box (20k load) A6000489-T-H5 (20k load) A6000489-H5 (10k load) A-6000 489-TI Non Traffic Lid with 2 inch probe hole and metal detection device. Label “RSVL WATER
1 ½ inch to 2 inch services	A-6001 643-TI Non Traffic Lid with 2” probe hole and metal detection device. Label “RSVL WATER”

CDR	Part #
¾ inch to 1 inch services	WB03-1121-12 Box WC00-1121-02RR Lid (10k load)
1 inch services	(For Tiers 15 & 22)*
Quazite Lid	(For Tiers 15 & 22)*

*Tiers 15 & 22: Driveways, parking lot, and off-roadway applications subject to occasional non-deliberate heavy vehicular traffic.

Placer Waterworks	Part #
All sizes	All standard lids listed above (10k and 20k load)

Hubble Meter Box	Part #
1 inch meter	CDR 15 inch X 27 inch straight wall style (stackable assembly) CDR 17 inch X 30 inch straight wall style (stackable assembly)

35. Traffic Boxes: A list of approved traffic box manufacturers include: BES, Christy, or approved equal. Parts reference numbers are shown below:

a. BES
- C-17 inch x 30 inch Box-Full Traffic Concrete
- G-5 Box

b. Christy
- V-64 Box
- V-64 Box x 12 inch Extension
- V-64 Cover Traffic Load
- G-5 Box with D & L Lid # K6004
- G-5C Lid

c. Placer Water Works
- PW/G5 Lid

37. Tracing Wire: Tracing wire shall be light blue in color and minimum 12 gauge solid copper with UF rated plastic insulation.

38. Tracing Wire Connectors: Tracing wire connectors shall be copper split-bolt type connectors. A listing of approved products include: Perminate Seal-Wire Connectors-Part #97811, Christy's (S-X), or approved equal.

39. Tracing Wire Mastic Tape Seal: Tracing wire mastic tape shall be 3M Mastic Tape #2229 or approved equal.

40. Valves

a. Butterfly Valves: Butterfly valves to be used on pipe diameters ranging from 16 inch to 72 inch. A list of approved valves include: Standard Pratt Ground Hog, with MDT Traveling Nut Actuator, Mueller Lineseal III, Dezurik butterfly valve with square nut actuator (LA series only) , or approved equal. NOTE: All valves shall be Holiday free epoxy, interior lining and standard black asphalt varnish exterior. Certification shall be provided by the valve manufacturer stating the epoxy lining is holiday free. The epoxy coating shall be spark tested and approved for installation by the Environmental Utilities Department inspector.

b. Gate Valves: Gate valves used on diameters ranging from 3 inch to 12 inch shall be grey cast iron or approved equal. A list of approved valves includes: M & H 4067 RW Gate Valve, Mueller-A-2361 RS Gate Valve, Clow, AFC or approved equal.

c. 2-part epoxy repair kit shall be provided by valve manufacturer.

41. Valve Boxes: All valve boxes in street and other traffic areas shall be designed to H-20 loading conditions. A list of approved manufacturers and part reference numbers include: Christy (Type G5, Type B 17 by 30 H-20), BES, D&L (#K-6004), or approved equal.

42. Valve Extensions: Placer Waterworks extensions model PW/VE or approved equal.

43. Water Pipe Marking Tape-Approved manufacturers and materials include: Cal Pico Inc. (Tracer Tape-non-Detectable 12 inch width), Reef Industries Inc., Terra Tape Extra Stretch 450 Material, or approved equal.

44. Zinc Caps: A listing of approved manufacturers include: Mars, or approved equal. Part reference numbers are shown below:

Mars:

- 7/16 inch to ½ inch— 2.5 ounce weight
- 5/8 inch to 1 inch— 6.0 ounce weight

H. CONDITIONALLY APPROVED

The following products are conditionally approved in the City for a period of 2 years conditional acceptance period, the product may be granted approved equal status and be added to the list of approved products in the City of Roseville Standards.

2. HydrantGuard Breakoff Check Valves

3. SIP Industries DIP
    a. C153 Compact MJ Ductile Iron Fittings
    b. C110 Full Body Flanged Joint Ductile Iron Fittings
    c. Ductile Iron MJ Restraints for Ductile Iron and PVC Pipes

4. Diamond Plastics Lok 21 Restraint Gasket

5. American Flow Control – Series 2500 Gate Valve (Sizes 2" – 12") with a single stainless steel fastener

6. ARV - A.R.I, models D-40 and D-46

7. US pipe restraint – HDSS

8. AY MacDonald - All service brass (brass fittings for copper tubing)

METER APPLICATION TABLE 1

METER APPLICATION TABLE 1

Size	Class	Meter Type	Meter Length	Meter Box [2]	Top of pipe finish grade	Residential Dom	Commercial Dom	Commercial Irrig	Meter Lid [1]
3/4"	PD	SRII TRC	7 1/2"	NA	Fire bypass				Fire backflow bypass
3/4"	PD	SRII or iPerl	9"	N-16	9"	x	x	x	CI incert/Fibrelyte
1"	PD	SRII or iPerl	11"	N-30	9"	x	x	x	CI incert/Fibrelyte
1 1/2"	C [2]	Sensus omni-Compound	13"	B-40 w/ext	8" - 12"		x		Checker plate
1 1/2"	T [2]	Sensus omni-Turbo	13"	B-40 w/ext	8" - 12"			x	Checker plate
2"	C [2]	Sensus omni-Compound	17"	B-40 w/ext	8" - 12"		x		Checker plate
2"	T [2]	Sensus omni-Turbo	17"	B-40 w/ext	8" - 12"			x	Checker plate
3"	C [2]	Sensus omni-Compound	19"	B-40 w/ext [3]	8" - 12"		x		Checker plate
3"	T [2]	Sensus omni-Turbo	19"	B-40 w/ext [3]	8" - 12"			x	Checker plate
4"	C [2]	Sensus omni-Compound	23"	B-40 w/ext [3]	8" - 12"		x		Checker plate
4"	T [2]	Sensus omni-Turbo	23"	B-40 w/ext [3]	8" - 12"			x	Checker plate
6"	C [2]	Sensus omni-Compound	27 1/8"	B-48 w/ext	8" - 12"		x		Checker plate/Split-lid
6"	T [2]	Sensus omni-Turbo	27 1/8"	B-48 w/ext	8" - 12"			x	Checker plate/Split-lid
8"	C [2]	Sensus omni-Compound	30 1/8"	B-48 w/ext	8" - 12"		x		Checker plate/Split-lid
8"	T [2]	Sensus omni-Turbo	30 1/8"	B-48 w/ext	8" - 12"			x	Checker plate/Split-lid
10"	C [2]	Sensus omni-Compound	41 1/8"	B-48 w/ext	8" - 12"		x		Checker plate/Split-lid
10"	T [2]	Sensus omni-Turbo	41 1/8"	B-48 w/ext	8" - 12"			x	Checker plate/Split-lid

Notes:
[1] Lid shall have probe hole for Ert
[2] Standard meter box for City of Roseville
[3] Recycled meters 3" and larger use B-48

* All meters are ordered in turbo length