

**SECTION 8
WATER SUPPLY SYSTEMS**

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SECTION 8 WATER SUPPLY SYSTEMS

8-1 INTRODUCTION: These Improvement Standards govern the design of all water systems intended for operation and maintenance by the County of Sacramento and the Sacramento County Water Agency. The County of Sacramento provides wholesale and retail water service to certain areas through the Sacramento County Water Agency.

8-2 INTENT OF WATER SYSTEM IMPROVEMENT STANDARDS: The intent of these water system Improvement Standards is to provide a water system that reliably and safely conveys water at a reasonable capital cost and to provide water systems that minimize operation and maintenance costs.

8-3 DEFINITIONS: When the following terms or titles are used in these water system Improvement Standards or in any document or instrument where these Standards govern, the intent and meaning shall be as herein defined:

- AWWA: American Water Works Association.
- SIPS: Site Improvement and Permits Section of the County Engineering Division of the Office of Development and Code Services.
- Non-potable Water: water that does not meet the standards for drinking water but does not originate from sewage. For County purposes considered as a type of recycled water.
- Potable Water: drinkable water.
- Raw Water: ground water or surface water, prior to treatment.
- Reclaimed Water: tertiary treated water that meets the requirements of Title 22, Chapter 3 Regulations of the California Administrative Code.
- Recycled Water: non-potable or reclaimed water.
- SCWA: Sacramento County Water Agency.
- Water Agency: Sacramento County Water Agency.
- Water Supply: Planning, Development, Design, and Water Operation and Maintenance sections of the Department of Water Resources of the County of Sacramento.
- Water System: potable water, raw water, and recycled water systems.

8-4 APPLICABLE STANDARDS: Items not addressed in these Improvement Standards shall be designed in accordance with accepted engineering practices and in accordance with the latest editions of the following:

- Standard Construction Specifications of the County of Sacramento.

- Title 4 and Title 5 of the Sacramento County Water Agency Code where applicable within zones of the Water Agency.
- Laws, codes, and standards of the State of California relating to domestic water supply.
- Rules and Regulations for Recycled Water Use and Distribution, County of Sacramento.
- Laws, codes, and regulations of the State of California relating to water use, conservation, and water efficient landscapes.
- Title 22, Chapter 3 of the Regulations of the California Administrative Code.
- American Water Works Association Standards and Manuals of Water Supply Practice.
- California Uniform Fire Code.

8-5 IMPROVEMENT AND LANDSCAPE PLAN SUBMITTAL: Improvement plans for developments that will be served retail or wholesale water by the Water Agency shall be reviewed by Water Supply. Improvement plans shall meet the requirements of Section 2 – General Requirements, of these Improvement Standards. The initial submittal of improvement plans shall be made to SIPS in accordance with the table below. SIPS will route plans to Water Supply. Subsequent resubmittals of improvement plans for projects in the unincorporated County area shall be delivered to SIPS. Subsequent resubmittals of improvement plans for projects in a City shall be delivered directly to Water Supply. PDF's may be submitted in lieu of hard copies for the plan-checking phase.

Landscape plans for developments that will be served retail or wholesale water by the Water Agency, either potable or recycled, shall be reviewed by Water Supply and by the County or City department having jurisdiction. The following types of landscape projects shall be submitted for review and approval: parks, landscape corridors, residential street frontage, commercial, industrial, apartment, school, and street improvement projects. Irrigation systems required by Water Supply to use recycled water shall comply with all requirements of the latest edition of "Rules and Regulations for Recycled Water Use and Distribution, County of Sacramento". Landscape plans shall be formatted for 22-inch by 34-inch or 24-inch by 36-inch paper sizes. Two complete sets of the initial submittal of landscape plans associated with an improvement plan, for which there is an existing charge account established at SIPS for the improvement plan, shall be submitted directly to Water Supply as well as subsequent resubmittals, and the charges for plan checking and inspection will be charged to the improvement plan account. The initial submittal of all other landscape plans shall be made to SIPS. After establishment of a charge account for plan checking and applicable construction inspection, SIPS will route the plans to Water Supply. PDF's may be submitted in lieu of hard copies for the plan-checking phase.

DELIVERY OF PLANS (Delivery Location / Number of Sets Required By Water Supply)					
	INITIAL PLAN SUBMITTAL	PLAN RE- SUBMITTAL	APPROVED PLAN	APPROVED PLAN REVISION	RECORD PLAN
	Deliver To: (Quantity)	Deliver To: (Quantity)	Deliver To: (Quantity)	Deliver To: (Quantity)	Deliver To: (Quantity)
IMPROVEMENT PLANS					
PROJECTS IN THE UNINCORPORATED COUNTY AREA	SIPS (2 sets or PDF's*)	SIPS (2 sets or PDF's *)	SIPS (2 sets*)	SIPS (2 sets*)	Supervising County Inspector (2 sets*)
PROJECTS IN A CITY	SIPS** (2 sets or PDF's *)	Water Supply (2 sets or PDF's)	SIPS** (2 sets*)	SIPS** (2 sets*)	Supervising County Inspector (2 sets*)
LANDSCAPE PLANS***					
ASSOCIATED WITH AN IMPROVEMENT PLAN THAT HAS AN ACTIVE SIPS CHARGE ACCOUNT	Water Supply (2 sets or PDF's)	Water Supply (2 sets or PDF's)	Water Supply (4 sets)	Water Supply (4 sets)	Supervising County Inspector (2 sets*)
OTHER LANDSCAPE PLANS	SIPS** (2 sets or PDF's)				
* The total number of sets required for submission will be greater due to the sets required by other County departments having jurisdiction. Contact the receiving office to determine the total number of required sets for submission.					
** SIPS services are limited to (1) establishment of the charge account for plan checking and construction inspection, and (2) distribution of the delivered plans to the applicable County departments.					
*** Delivery location and number of sets for landscape plans that contain sewer service or major drainage, or that are subject to County Drainage fees or review by other County departments, shall be in accordance with "Improvement Plans" above.					

A completed SCWA Water Service Request and Cross Connection Control Questionnaire shall be submitted to Water Supply for all projects except single-family residential projects. A separate questionnaire shall be submitted for each building. Facility design information shall be provided as required on the form, including design flows for consumptive use and fire sprinklers. The questionnaire shall be stamped by a licensed engineer or a licensed architect. Completed questionnaires shall be included with the first or second plan submittal, and shall

be approved prior to approval of a plan. Water Supply will provide the questionnaire upon request.

8-6 APPROVAL OF IMPROVEMENT AND LANDSCAPE PLANS: All improvement and landscape plans to be served by the Water Agency shall be approved and signed by an authorized representative of the Water Agency.

A. Improvement Plans -- The following shall occur before the improvement plans can be approved:

- All comments made by Water Supply to the improvement plans shall be addressed.
- Two sets of landscape plans shall be submitted to Water Supply. Alternatively, in lieu of submission of landscape plans, a letter and diagram prepared and stamped by a licensed landscape architect shall be submitted with the following information: (1) the water demand and meter sizes, with calculations, (2) a diagram showing the boundaries of the area to be served, street crossing sleeves, and the location of service connections, water meters, and reduced pressure principle backflow devices, (3) a delineation of areas to be served by potable and/or recycled water. It is essential that meters are sized and located properly prior to improvement plan signing to preclude the need to relocate meters in the future. Irrigation services, meters, and backflow devices shall be shown on the improvement plans.
- The Fire Department shall approve and sign the improvement plans.
- The location of all wells in use and all abandoned wells shall be shown on the grading plan. A note shall be placed on the plans indicating that wells shall be properly destroyed in accordance with the requirements of the Sacramento County Environmental Management Department. The note shall also instruct the contractor to call Sacramento County Environmental Management Department at 875-8400 for inspection of the well destruction.
- If the project is within the water supply service area of the Water Agency, the applicable water development fees shall be paid. Development fees for Zone 40 and Zone 50 shall be in accordance with Schedule A of Title 4 of the Sacramento County Water Agency Code and with the development fee programs in effect for sub-areas within Zone 40. Fees shall be paid at SIPS.
- Well and treatment plant sites shall be approved by Water Supply. Purchase agreements for well, treatment plant, and storage sites, where required by the conditions of approval, shall be executed by the property owners and delivered to Water Supply. Well site and

treatment plant site assessment reports shall be submitted to Water Supply.

- Water easements shall be approved by Water Supply and County Real Estate Division. If documentation is required by Water Supply to substantiate an easement signer's authority to convey easements on behalf of a property owner, the documentation shall be provided and approved.

B. Landscape Plans -- Water Supply will review landscape plans for the following items:

- The proper water delivery pressure shall be stated, starting at the transmission main, in accordance with Section 8-10 of these Standards.
- The location and size of water services, meters, and backflow devices shall match the approved improvement plans.
- An irrigation schedule shall be included in the plans listing the following minimum information: all control valves shown on the plans, the demand at each control valve in gpm, and the run time of each control valve in minutes on the maximum day.
- The controllers shall be set so that flows do not exceed the maximum allowable flow for the meter size stipulated in Section 8-16.D.
- No trees shall be planted within 8 feet of a water main, service, or appurtenance, measured centerline to centerline.
- Landscape plans using recycled water for the water source shall meet all requirements of the latest edition of "Rules and Regulations for Recycled Water Use and Distribution, County of Sacramento".
- A signature block for the Water Agency shall be provided on a landscape plan with the label "Approval for SCWA Water Fees and Meter Size Only", "Sacramento County Water Agency", and a space for the date. If a landscape plan includes recycled water irrigation, the signature block for the Water Agency shall instead be provided with the label "Approval for Fees, Meter Size, and Recycled Water Requirements Only", "Sacramento County Water Agency", and a space for the date.
- The SIPS charge account order number for plan checking and applicable construction inspection shall be listed on the cover sheet.

Landscaping projects subject to these Improvement Standards shall not be constructed prior to plan approval by the Water Agency.

C. Delivery of Approved Improvement and Landscape Plans -- After approvals have been obtained and prior to the start of construction, plan

sets shall be delivered to the location and in the quantity listed in the table above. Of the sets delivered to SIPS, SIPS will route two sets to Water Supply.

8-7 IMPROVEMENT PLAN REVISION: All plan revisions that affect a water system to be maintained and operated by the Water Agency shall be approved and signed by an authorized representative of Water Supply prior to being approved by SIPS or a City and prior to construction of the revision. Revisions shall normally be made using hand markups on the originals. If the nature of a revision is such that hand markups would result in poor legibility, a replacement drawing may be added to the set; in this case, the original approved drawing shall remain in the set with an "X" through it.

After approvals have been obtained and prior to the start of construction, copies shall be delivered to the location and in the quantity listed in the table above. Of the sets delivered to SIPS, SIPS will route two sets to Water Supply.

8-8 CONNECTION PERMITS AND FEES: A water connection permit shall be obtained for each connection to the water system. Contact Water Supply for information concerning Water Agency fees.

8-9 WATER SUPPLY QUALITY: The quality of the potable water supplied by the Water Agency will conform to the Environmental Protection Agency Drinking Water Act, and the State of California Drinking Water Standards.

8-10 WATER SUPPLY PRESSURE: Water supply pressures shall be designed as follows:

- A. Potable Water -- Normal operating pressure in water transmission mains shall be 40 psi minimum to 90 psi maximum. Normal operating pressure in water distribution mains shall be 35 psi minimum to 90 psi maximum. The minimum pressure for domestic services, fire services, and irrigation services shall be 35 psi at the point where the service line connects to a distribution main. During periods of maximum day domestic demand plus fire demand, the pressure shall not be less than 20 psi at the location of the fire flow and no less than 10 psi elsewhere in the distribution system.
- B. Recycled Water -- Recycled water distribution systems shall be designed to maintain a minimum pressure of 40 psi at the service connection.

8-11 WATER DEMAND: For the design of water distribution systems serving single family residential areas, assume the water demand is 1 gallon per minute per

residential connection (maximum day demand) plus fire flow. For the design of water distribution systems serving commercial areas, water demand shall be determined in accordance with industrial standards and in consultation with the Water Agency.

8-12 FIRE FLOWS: Required fire flows shall be determined by the adopted California Uniform Fire Code, the fire protection district having jurisdiction, and the County of Sacramento. Water distribution systems shall be designed to provide max day demand plus the required fire flow to each hydrant while maintaining 20 psi or greater residual pressure at the hydrant. For all projects, a note shall be placed on the water plan stating the design fire flow for the distribution system.

The water distribution system for single family residential water areas is designed for 1,500 gpm. This will meet requirements for homes up to 3,600 square feet of combustible area, including garages and porches. Homes larger than 3,600 square feet of combustible area are a special condition and may require increased fire flows with larger mains. Required fire flows are 1,750 gpm for homes from 3,600 to 4,800 square feet of combustible area and 2,000 gpm for homes from 4,800 to 6,200 square feet or more of combustible area, or as required by the local Fire Department.

The minimum fire flow required by the adopted California Uniform Fire Code for commercial/industrial water systems is 1,500 gpm. For all new commercial/industrial projects the Water Agency shall require a distribution system designed for 3,000 gpm. Larger buildings or projects may require fire flows up to 4,000 gpm and may require water system upgrades or private supplemental water supplies.

8-13 WELLS, TREATMENT PLANT AND STORAGE FACILITY DESIGN: Water Supply will either design or provide design oversight for the construction of wells, treatment plants, booster pumping plants, and storage facilities for Water Agency use.

In general, all developments shall have a minimum of two sources of water. If adequate elevated or ground level storage is provided, a single source of water system may be acceptable upon approval by Water Supply and the local fire district.

Sites for the above water facilities shall be provided when required by the conditions of approval for a project.

Sites for wells shall meet the following criteria:

1. Sites shall meet the requirements of the Environmental Health Division of the County Environmental Management Department, and the Division of Drinking Water of the State Water Resources Control Board.
2. Sites shall conform to the requirements of Standard Drawing 8-19. Special provisions in the form of prohibitions, restrictions, and special construction may be required on adjacent properties and improvements.
3. In general, a minimum horizontal separation of 1000 feet shall be maintained between existing wells of any type and new municipal wells. The Water Agency may require a greater minimum horizontal separation in certain aquifers. If less separation is proposed, a hydrogeologic study shall be provided to evaluate the influence on and by other wells. The study shall be approved by Water Supply.
4. Sites shall be located to minimize the length of raw water mains.
5. Sites shall abut a paved street with a minimum 30 feet frontage.
6. Where possible, well sites shall be bordered by open space, such as parks or school sites. If such open space does not exist, well sites shall be bordered by commercial space.
7. Well sites shall be fenced with 6-foot split face masonry walls, other fencing solutions are subject to the approval of the Director.
8. Sites shall be provided a water service and a storm drain stub sized for the well capacity.

The applicant shall provide Water Supply with information necessary to verify that proposed well sites and treatment plant sites comply with the setbacks recommended by the Environmental Health Division of the County Environmental Management Department, and the Division of Drinking Water of the State Water Resources Control Board. The information shall consist of copies of existing environmental site assessment reports for all properties within 1000 feet of proposed well sites and treatment plant sites. If reports are not available, the applicant shall procure the services of a qualified firm, acceptable to Water Supply, to prepare a site assessment report providing the necessary information.

A preliminary hydro-geologic and sanitary assessment, including exploratory test hole drilling and evaluation, shall be performed for each proposed well site. If the results are not acceptable to Water Supply, alternate well site locations shall be provided and evaluated as above until acceptable results are obtained. When well sites are required by the conditions of approval, improvement plans shall not be approved until acceptable results are obtained and acceptable sites provided for all

well sites. Sufficient time shall be provided for this process to be completed prior to plan approval.

8-14 TRANSMISSION MAIN DESIGN: Technical specifications and details for water transmission mains will be prepared by Water Supply and given to the consultant to be included with the improvement plans.

Transmission mains shall be designed to provide a minimum of 3,000 gpm at distribution main connection points. In order to minimize connections to the transmission main, distribution main connections to the transmission main shall be provided at one-quarter mile intervals beginning one-eighth mile from section corners or arterial intersections as approved by Water Supply. Distribution main connections shall be 12 inches in diameter, with valves, and shall extend to the edge of pavement. A minimum of one valve shall be located on the transmission main at distribution main connection points. Under no circumstances shall fire hydrants or water services be directly connected to a transmission main. If hydrants or services are needed, a distribution main shall be included on the improvement plan.

A. Transmission Main Design Plan Requirements:

1. The transmission mains shall be shown in full in plan and profile views, including valves, air relief/vacuum valve assemblies, blow-off assemblies, all other appurtenances, and restrained joint lengths. Normally, restrained joint lengths shall be shown on the profile.
2. A water plan sheet shall be included as part of the improvement plans, showing locations of valves, fire hydrants, existing water lines, air release/vacuum valves, blow off valves, water services, and water quality sampling stations. The water plan shall also indicate driveways, electroliers, and storm drain inlets. The scale of the water plan shall normally be 1 inch = less than or equal to 100 feet and as necessary to fit the water plan onto a single sheet and legibly show the water facilities and call outs. If water facilities scaled at 1 inch = 100 feet cannot fit onto a single sheet, the water plan may be shown on multiple sheets.
3. Details of distribution mains crossing other utilities or unusual alignments shall be provided if deemed necessary by Water Supply.
4. Stationing and elevations for all fittings, hydrants, valves, air release/vacuum valves, end-of-line blow-offs, temporary blow-offs, in-line blow-off valves and locating wire stations shall be

called-out in the profile view of the improvement plan sheets. Stationing for restrained joint lengths shall be called out. Elevations shall be called-out at all changes in pipe elevation. Certain standard drawings require installation of gate valves as part of the construction of a water transmission main appurtenance. Each of those gate valves shall be shown on the plan view with the use of the correct valve symbol.

5. Water construction notes shall be numbered. The number of a note shall not vary within a plan set. The notes applicable to a drawing shall be listed on that drawing. The water plan shall include a complete list of all water construction notes.

B. Transmission Main Location -- All transmission mains shall be installed within public rights-of-way or water easements.

1. The water transmission main shall be located on the north or west side of a street. The water transmission main may be located at a minimum of 4 feet from the lip of gutter. The transmission main and valve actuators shall be located so that the valve boxes will be located in the center of a traffic lane or on traffic lane lines. A deviation from these criteria may be allowed if approved by Water Supply in consultation with other affected utility providers.
2. Water transmission mains shall not be located within landscape corridors or medians, unless approved by Water Supply as a result of irresolvable conflicts with other utilities.
3. Water Transmission Main Separation – Separation shall comply with Section 64572 “Water Main Separation” of the California Code of Regulations. Separation may vary if approved by both the State Water Resources Control Board and by Water Supply.
4. Normal minimum cover under roadways shall be 48 inches and as necessary to provide (a.) a minimum of 8 vertical inches between the top of the main and the bottom of the street subgrade scarification zone, and (b.) sufficient main depth for air release/vacuum valve lines to be installed beneath the street subgrade scarification zone. A minimum cover of 36 inches for C900/C905 PVC pipe, C200 steel pipe, and C303 concrete cylinder pipe, and 30 inches for C151 ductile iron pipe may be allowed in special circumstances if approved by Water Supply. Minimum cover depth shall be measured from gutter flow-line (existing, new, or future) to top of pipe.

5. Minimum cover in open fields shall be 60 inches for C900/C905 PVC pipe and C303 concrete cylinder pipe, and 48 inches for C151 ductile iron pipe.
 6. Transmission mains shall not be located under portland cement concrete pavements unless approved by Water Supply. If it is necessary to locate a transmission main under a decorative AC pavement, valves and fittings shall be located outside of the decorative area and pipe in the decorative area shall be restrained Class 350 ductile iron.
 7. Railroad undercrossings shall normally be in steel casings with cathodic protection on the casing.
- C. Transmission Main Layout and Sizing -- The transmission main system location and size shall conform to the master water supply plans of the Water Agency. The maximum degree of bend for elbow fittings shall be 45 degrees for horizontal bends and 22.5 degrees for vertical bends, unless approved by Water Supply.
- D. Transmission Main Pipe Restraint -- Pipes shall be restrained from movement as a result of thrust on the fittings and valves of the water transmission main system. Thrust restraint shall be provided at all valves, bends, reducers, tees, crosses, and dead ends.

Restrained Joints -- Restrained joints shall be used to resist thrust at fittings and valves 14 inches in diameter and larger, at valves 12 inches in diameter and less, and at fittings 12 inches in diameter and less in thrust configurations not covered in Standard Drawing 8-3A.

If the type of pipe within a restrained joint length is restricted to ductile iron or to another specific pipe type, it shall be called out.

The Standard Drawings for lateral water appurtenances include the necessary requirements for joint restraint and pipe type for the construction of the appurtenance.

Water distribution main stub-outs for future extension that are installed with water transmission mains shall be restrained over the full length of the stub.

- E. Transmission Main Pipe Type and Pipe Deflection -- Pipes 18 inches and less in diameter may be AWWA C151 ductile iron or AWWA C900/C905 polyvinyl chloride. Pipes 20 through 30 inches in diameter shall be AWWA C151 ductile iron. Pipes 36 through 60 inches in diameter shall be AWWA C151 ductile iron unless approved by the Water Agency.

Pipes 36 through 60 inches in diameter may be AWWA C200 steel pipe or AWWA C303 concrete cylinder pipe if the use of the transmission main is such that it will not be subject to future tapping or cut-in's as determined by the Water Agency. Pipes 64 inches and more in diameter shall be AWWA C200 steel pipe or AWWA C303 concrete cylinder pipe.

For ductile iron pipe without restrained joints, deflection at joints shall not exceed 2.5 degrees for 36-inch and smaller pipe and 2.0 degrees for 42-inch and larger pipe. A fitting shall be used if joint deflections exceed these limits.

For ductile iron pipe with restrained joints, deflection at joints shall not exceed: 2.5 degrees for 12-inch and smaller pipe, 2.0 degrees for 16-inch and 18-inch pipe, 1.25 degrees for 20-inch and 24-inch pipe, 1.0 degrees for 30-inch pipe, 0.75 degrees for 36-inch pipe, and 0.25 degrees for 42-inch and larger pipe. A fitting shall be used if joint deflections exceed these limits.

Joint deflection of polyvinyl chloride pipe is not allowed. Bending of polyvinyl chloride pipe shall not exceed the limits described in Standard Drawing 8-9B.

- F. C200 Steel and C303 Concrete Cylinder Transmission Mains -- Improvement plans and specifications shall require the contractor to hire an independent testing firm (subject to approval by the Water Agency) to provide certified welding inspections, confined space inspections, and the specialty inspections listed below for the project. The scope of inspection shall be (a) delivery acceptance inspection of all pipe and fittings, (b) inspection of all field welds with the use of magnaflux or penetrating dye method, and (c) inspection and testing of all exterior coatings and patching prior to backfilling and inspection and testing of all interior linings, patching, and pipe cleaning after completion of backfilling.

- G. Transmission Main Cathodic Protection Systems -- Cathodic protection systems shall not be provided unless required by Water Supply.

Cathodic protection systems shall be designed with a 50-year life. Buried lateral cable runs shall be in concrete-encased conduit with a minimum of 48 inches of cover. Test stations shall be located in non-traffic areas and shall be extra heavy duty, vandal resistant, and tamper resistant.

The location of all anode beds, lateral cable runs, and test stations shall be shown to scale on the civil plan and profile sheets and shall be called out by station and offset from road centerline on either the plan view or profile.

H. Transmission Main Water System Appurtenances -- Transmission main appurtenance requirements on the improvement plans shall be as follows:

1. Valves shall be spaced no greater than 1300 feet apart and shall be located so that any section of main can be shut down without going to more than three locations to close valves. Normally, three valves shall be placed where mains cross and two valves where mains tee. Each section of pipeline between crosses or tees shall have a minimum of one valve. Valves at intersections shall be located within the curb returns and set as close to minimum pipe depth as possible. Valves shall be placed on the end of temporary transmission main dead ends that are longer than 330 feet. On temporary dead ends shorter than 330 feet, valves shall be placed at the tee or cross. Valves 8 inches in diameter and smaller shall be gate valves. Ten-inch valves may be gate or butterfly valves. Valves larger than 10 inches in diameter shall be butterfly valves. Butterfly valve symbols shall indicate on which side of the pipe to install the offset right-angle gear drive valve operator. Operators shall be located as near as possible to center of lanes or lane lines. No more than one butterfly valve operator shall be located in a single quadrant of a tee or cross.
2. Air release/vacuum valve assemblies shall be required at high points on the transmission main as determined by Water Supply. Transmission mains shall require a 2-inch air release vacuum valve. See Standard Drawing 8-14B for specifications and typical installation details.

In streets with roadside ditches, provide profile views of ARV lines and boxes. ARV boxes shall be located beyond the ditch. ARV lines shall not daylight in the ditch crossing.
3. Temporary blow-offs shall be provided on stub-outs. Temporary blow-offs may be 2 inches in diameter for mains up to 24 inches in diameter and 3 inches in diameter for mains larger than 24 inches in diameter, subject to approval by Water Supply.
4. Permanent blow-offs shall be provided at dead ends. Permanent blow-offs shall be 4 inches in diameter for lines up to 24 inches in diameter and 6 inches in diameter for lines larger than 24 inches in diameter.
5. In-line blow-off valves shall be required at low points on the water transmission main as determined by Water Supply. In-line blow-off valves shall be 4 inches in diameter for water lines up to 24

inches in diameter and 6 inches in diameter for water lines larger than 24 inches in diameter.

In streets with roadside ditches, provide profile views of blow-off lines and boxes. When possible, blow-off valves and boxes shall be located beyond the ditch.

6. Locating wire stations shall be placed on transmission mains when the distance between valves and/or permanent and in-line blow-offs exceeds 600 feet. See Standard Drawing 8-4B for specifications and typical installation details.

8-15 DISTRIBUTION MAIN DESIGN: In general, water distribution systems shall be looped, with two points of connection to water sources, separated by a minimum of one valve and an adequate separation distance approved by Water Supply. Sizing of distribution mains shall be such that the normal pressures stated in Section 8-10 and the minimum requirements stated below for distribution main spacing and sizing are attained.

The Hazen-Williams formula shall be used in the hydraulic study of the system, using a "C" value of 125 for cement-lined pipe, polyvinyl chloride pipe, and ductile iron pipe. Velocity in distribution mains shall not exceed 7 feet per second at peak hour or 10 feet per second conveying fire flow. Unit head loss shall not exceed 5 feet per 1,000 feet. The unit head loss does not apply to fire flow.

A Hardy-Cross hydraulic analysis of any proposed distribution system shall be supplied to Water Supply. The analysis shall comply with the requirements of Sections 8-10, 8-11, and 8-12.

A. Distribution Main Design Plan Requirements:

1. All public distribution mains, including those on commercial and apartment projects, shall be shown in plan and profile. Profile sheets shall include the portion of the plan area being profiled, placed above the profile and vertically aligned with the profile. Restrained joint lengths shall be shown. Normally, restrained joint lengths shall be shown on the profile. Stub-outs for future extension shall be shown in plan and profile. The profile for stub-outs may be omitted if (a) the design profile is straight, (b) finish grades over stub length are provided, and (c) there are no crossings, ditches, or embankments.
2. A water plan sheet shall be included as part of the improvement plans, showing locations of valves, fire hydrants, existing water

lines, air release/vacuum valves, blow off valves, water services, and water quality sampling stations. The water plan shall also indicate driveways, electroliers, and storm drain inlets. The scale of the water plan shall normally be 1 inch = less than or equal to 100 feet and as necessary to fit the water plan onto a single sheet and legibly show the water facilities and call outs. If water facilities scaled at 1 inch = 100 feet cannot fit onto a single sheet, the water plan may be shown on multiple sheets.

3. Details of distribution mains crossing other utilities or unusual alignments shall be provided if deemed necessary by Water Supply.
 4. Stationing for all fittings, shut off valves, hydrants, air release/vacuum valves, in line blow-off valves, and end-of-main blow-off valves shall be called-out in the profile view of the improvement plan sheets. Stationing for restrained joint lengths shall be called out. Elevations shall be called-out at all changes in pipe elevation. With the exception of single-family residential services, the size of all connections to the main and the specific fitting required shall be called out on the profile. Certain standard drawings require installation of gate valves as part of the construction of a water appurtenance. Each of those gate valves shall be shown on the plan view with the use of the correct valve symbol, except that above-ground gate valves in backflow prevention assemblies shall not be shown.
 5. Commercial, industrial, and multi-family improvement plans with a water easement shall have a note that states, "Utilities shall not be located within water easement(s) except for crossings made as close to perpendicular to the water main as practical".
 6. All plans shall include the most recent version of the standard SCWA Water Notes. The most recent version of the standard SCWA Recycled, Raw, and Landscape Water notes shall also be included as necessary. Water Supply will provide the notes upon request.
 7. Water construction notes shall be numbered. The number of a note shall not vary within a plan set. The notes applicable to a drawing shall be listed on that drawing. The water plan shall include a complete list of all water construction notes.
- B. Distribution Main Location -- All water distribution mains shall be installed within public rights-of-way or easements.

1. The centerline of the water distribution main shall be located 3 feet from the lip of the gutter on the northerly or westerly side of the street. A deviation from these criteria may be allowed if approved by Water Supply in consultation with other affected utility providers. If it should be necessary because of existing improvements or possible conflict with other utilities, and with the approval of Water Supply, the distribution mains may be installed within a 15-foot wide easement immediately adjacent to and behind the property line fronting on the public right-of-way.
2. Water easements for water distribution mains located in commercial, industrial, and multi-family properties shall have a minimum width of 15 feet. The water main shall be centered in the easement. Signed easements shall be provided to the Water Agency prior to plan approval. Normally, the easement area shall not contain the following items: structures, footings, light standards, parallel sidewalks, fences, roof overhangs, parallel utilities (crossings are O.K.), parallel curbs or gutters, and parking stalls.
3. If it is necessary to install a water distribution main within a landscape corridor, no trees shall be planted within 8 feet of the water main, water services, or water appurtenances, measured centerline to centerline. The water distribution main shall be centered within a 15-foot wide water easement. The landscape plans for the corridor shall be submitted prior to approval of the improvement plans.
4. If a water distribution main is required to be installed between residential homes, the pipe material shall be Class 350 ductile iron pipe. The minimum depth shall be 4 feet to top of pipe and the center of the main shall be centered within a 15-foot wide water easement.
5. Water Distribution Main Separation -- Separation shall comply with Section 64572 "Water Main Separation" of the California Code of Regulations. Separation may vary if approved by both the State Water Resources Control Board and by Water Supply.
6. Distribution mains shall not be located under portland cement concrete pavements unless approved by Water Supply. If it is necessary to locate a distribution main under a decorative AC pavement, valves and fittings shall be located outside of the decorative area and pipe in the decorative area shall be restrained Class 350 ductile iron.

7. Normal minimum cover under roadways shall be 36 inches and as necessary (a.) to provide a minimum of 6 vertical inches between the top of the main and the bottom of the street subgrade scarification zone, (b.) to ensure that gate valve stems are a minimum of 6 inches below the street subgrade, and (c.) to provide sufficient main depth for air release/vacuum valve lines to be installed beneath the street subgrade scarification zone. A minimum cover of 30 inches for ductile iron pipe may be allowed if approved by Water Supply. When not avoiding other utilities, mains shall have a maximum depth of 60 inches unless otherwise approved by Water Supply. Cover depth shall be measured from gutter flow-line (existing, new, or future) to top of pipe. Mains installed in easements between residences shall have a minimum cover of 48 inches.
 8. Water distribution mains not conforming to Items 1 through 4 above may be approved by Water Supply in consultation with other affected utility providers.
- C. Distribution Main Layout and Sizing -- The distribution system, whenever possible, shall be in grid form so that pressures throughout the system tend to become equalized under varying rates and locations of maximum demand, and to provide system redundancy. The minimum pressures and flows as specified in Sections 8-10, 8-11, and 8-12 shall govern design of the system. The following conditions are to be considered for the distribution system design:
1. Mains shall be sized as necessary to deliver the required fire flow. In general, the minimum pipe size for looped systems shall be 8 inches in diameter in areas requiring 1500 gpm fire flow, and 10 inches in diameter in areas requiring 3000 gpm fire flow.
 2. Dead end runs without a hydrant may be 6 inches in diameter. Dead end runs with a hydrant and hydrant laterals shall be sized to meet fire flow requirements.
 3. The maximum degree of bend for elbow fittings shall be 45 degrees for horizontal bends and 22.5 degrees for vertical bends, unless approved by Water Supply.
- D. Distribution Main Pipe Restraint -- Pipes shall be restrained from movement as a result of thrust on the fittings and valves of the water system. Thrust restraint shall be provided at all valves, bends, reducers, tees, crosses, and dead ends.

Restrained Joints -- Restrained joints shall be used to resist thrust at valves. Restrained joints shall also be used to resist thrust at fittings in thrust configurations not covered in Standard Drawing 8-3A.

If the type of pipe within a restrained joint length is restricted to ductile iron or to another specific pipe type, it shall be called out.

The Standard Drawings for lateral water appurtenances include the necessary requirements for joint restraint and pipe type for the construction of the appurtenance.

Water distribution main stub-outs for future extension shall be restrained for the length necessary for a dead end or the length of the stub, whichever is shorter.

- E. Distribution Main Pipe Type and Pipe Deflection -- Pipe used in the construction of water distribution systems shall be AWWA C151 ductile iron or AWWA C900 PVC. For ductile iron pipe, deflection at joints shall not exceed 2.5 degrees as described in Standard Drawing 8-9A. Pipe deflections greater than 2.5 degrees shall require a fitting. Joint deflection of PVC pipe is not allowed. Bending of PVC pipe shall not exceed the limits described in Standard Drawing 8-9B.
- F. Abandonment of Existing Distribution Mains, Services, and Appurtenances -- Existing water mains, stubs, services, and appurtenances that are no longer required for service shall be abandoned as required by Water Supply. Abandonment shall be mandatory, even in new pavements, because of the necessity to remove potential sources of stagnate water and the associated potential contamination from the water system. This requirement does not apply to private water facilities that are outside the limits of ROW, PUE, and water easements.

8-16 DISTRIBUTION MAIN WATER SYSTEM APPURTENANCES: Water system appurtenances include valves, fire hydrants, water service lines, water meters, back-flow devices, air release/vacuum valve assemblies, and blow-off valves.

- A. Valves:
 - 1. A valve shall be placed on the distribution main at the connection point to a transmission main.
 - 2. Valves shall be spaced a maximum of 500 feet apart. In residential areas, valves shall be spaced such that no single shut-down will result in shutting down more than 15 services.

3. Valves shall be spaced so that in no case shall more than two fire hydrants be removed from service by a shut-down.
 4. Valves shall be located so that any section of main can be shut down without going to more than three locations to close valves.
 5. Valves at intersections shall be located within the curb returns and set as close to minimum pipe depth as possible. As a minimum three valves shall be placed where mains cross and two valves where mains tee.
 6. If it is necessary to install valves between street intersections, they shall be located on property lines between lots.
 7. Each section of pipeline between crosses or tees shall have a minimum of one valve.
 8. At distribution main stub-outs for future extension, a valve shall be located on the stub line at the tee or cross.
 9. Valves 8 inches in diameter and smaller shall be gate valves. Ten-inch valves may be gate or butterfly valves. Valves larger than 10 inches in diameter shall be butterfly valves. The depth of the water line shall be adjusted to locate the stem of gate valves a minimum of 6 inches below the street subgrade. Butterfly valve symbols shall indicate on which side of the pipe to install the offset right-angle gear drive valve operator. Operators shall be located as near as possible to center of lanes or lane lines. No more than one butterfly valve operator shall be located in a single quadrant of a tee or cross.
- B. Fire Hydrants and End-of-Line Blow-off Assemblies -- Fire hydrants and end of line blow-off assemblies shall comply with the requirements of this section, the local fire district, and Water Supply. Fire hydrants and end-of-line blow-off assemblies shall be located as follows:
1. Fire hydrants shall be connected to distribution mains only. Fire hydrants shall not be connected to transmission mains.
 2. Fire hydrants shall be placed at street intersections wherever possible, and located to minimize the hazard of damage by traffic. Hydrants shall have a maximum normal spacing of 500 feet measured along the street frontage in residential developments, and a maximum normal spacing of 300 feet in commercial developments, or closer if deemed necessary by the local fire district. Hydrants located at intersections shall be installed at the

curb return. Within residential areas, all other hydrants shall be located on property lines between lots. See Standard Drawings 8-2A and 8-2B for specifications and typical installation details. In areas with separated sidewalks, hydrants shall normally be located behind the curb as required by the local fire district.

3. A fire hydrant or 4-inch blow-off assembly shall be installed on all permanent dead-end runs including cul-de-sacs. If the local fire district requires a hydrant at the end of a dead-end run, then a blow-off assembly is not required. Two-inch temporary blow-off valve assemblies shall be used if dead-end runs are temporary. Wherever possible, the blow-off assemblies shall be installed in street right-of-way a minimum distance of 3 feet from the lip of gutter. In no case shall the location be such that there is a possibility of back-siphon into the distribution system. For specifications and typical installation details see Standard Drawings 8-12 and 8-13.

- C. Water Service Lines -- Provide separate water services to each parcel and separate water services to each building. Service lines from the water distribution main to the meter shall be installed at the time the main is constructed. For specifications and typical installation details see the Standard Drawing 8-6 series and Drawing 8-1.

Service line design shall be in accordance with the following:

1. Service lines shall be located a minimum distance of 10 feet from a sanitary service, 3 feet from the edge of the nearest storm drain inlet, 3 feet from a fire hydrant, and 5 feet from an electrolier, vault, or pullbox. The order of precedence from highest to lowest in locating service lines away from other utilities shall be sanitary service, storm drain inlet, electrolier, pullbox, vault, and lastly, fire hydrant.
2. Single-family residential service lines shall be located on the side of the lot opposite the driveway. In new residential subdivisions, the water service line shall generally be located between 9 inches and 30 inches from the side property line. Service lines to corner lots shall normally be located at or near a curb return at the side of the lot closest to a main.
3. Fire sprinkler service to single-family detached residences and to each unit of a duplex shall normally be delivered by the domestic metered service line. The fire sprinkler service shall branch off of a service line downstream of the meter box assembly and outside of the PUE/PUPF. A reduced pressure backflow prevention

assembly shall be provided on the service line unless the sprinkler piping inside the residence is designed to connect to a remotely located water closet with a minimum one-half-inch outlet to ensure routine purging of water in the system.

Other types of residences and buildings shall be provided with a separate fire service that has a separate connection to the water main.

4. The size of a standard single-family residential service line shall be 1.5 inches in diameter, with a 1-inch water meter. The size of a single-family residential service line for lots 30,000 square feet and larger, and for homes with a combined fire/domestic flow exceeding 50 gpm, shall be 1.5 inches in diameter, with a 1.5-inch water meter.
 5. For all other services, the design domestic demand and the design maximum-day irrigation demand shall be calculated and submitted to Water Supply. Separate service lines and meters shall be provided for domestic and irrigation services if either (a.) the sum of the two numbers exceeds 50 gallons per minute, or (b.) the size of the irrigated landscape exceeds 5,000 square feet.
 6. The normal minimum size of a commercial service line shall be 1.5 inches in diameter. Commercial, industrial, multi-family units, schools, parks, and landscape projects with higher water demands shall be provided with larger services, subject to approval by Water Supply.
 7. Parks and landscape projects with non-irrigation water uses (bathrooms, fountains, water play, etc.) shall be provided with separate service lines and meters for domestic and irrigation services. Except that a single service may be used if the only non-irrigation demand is for drinking fountains.
 8. Service lines shall be designed without bends when possible. For 2-inch and smaller services, if a bend is necessary, the bend shall be shown on the plan as a curve to indicate bending of the polyethylene pipe or copper tubing.
- D. Water Meters -- Water meters shall be installed on all residential, commercial, industrial, multi-family, school, park, and irrigation water services. Except as noted in Section 8-16.C.4, the size of water meter shall be the same size as the service line between the main and meter unless approved by Water Supply. The maximum allowable design flow shall be in accordance with the following:

METER SIZE (inches)	METER TYPE	MAXIMUM ALLOWABLE DESIGN FLOW* (gpm)
1	Positive Displacement	25
1.5	Floating Ball Technology Compound	50
2	Floating Ball Technology Compound	80
3	Floating Ball Technology Compound	220
4	Floating Ball Technology Compound	390
6	Floating Ball Technology Compound	880
* Not including fire sprinkler flow.		

See the Standard Drawing 8-6 series for the required meter model and typical installation details.

The maximum allowable combined design flow for meters conveying water for both consumptive use and fire sprinklers shall be the meter manufacturer's published maximum flow rate for the meter model and the maximum flow rate recommended by AWWA for the meter type, whichever is less.

Meter box assemblies for single-family residential services shall be installed by the contractor installing facilities shown on the improvement plan at the time the water service lines are installed, except for the water meter itself which shall be deferred to the home builder for installation after building permits are issued. As an option, the water meter may be installed by the improvement plan contractor. All other meter box assemblies shall be installed by the improvement plan contractor at the time the water service lines are installed, including the water meter, unless approved by Water Supply. See the Standard Drawing 8-6 series for specifications and typical installation details.

- E. Fire Service Double Check Detector Valves -- A double check detector valve with bypass meter shall be required on each fire service line into a building. The size of the valve shall not be less than the size of the fire

service main. See Standard Drawing 8-7 for specifications and typical installation details.

- F. Back Flow Devices -- Back-flow devices are required in accordance with Title 17, Chapter V, and Sections 7583-7622 of the California Administrative Code.
 - 1. Double Check Detector Valves -- A double detector-check valve shall be required at each connection of a private water main to the public distribution system. The size of the valve shall not be less than the size of the main. See Standard Drawing 8-8C for specifications and typical installation details.
 - 2. Reduced Pressure Principle Back Flow Devices -- A reduced pressure principle back flow device shall be required on the following services: commercial, industrial, school, park, irrigation, multi-family residential buildings, and services to any parcel or premises served water from a private well. Reduced pressure principle devices are for use on service lines only. See Standard Drawings 8-8A, 8-8B, and 8-8C for specifications and typical installation details.

- G. Air Release/Vacuum Valve Assemblies -- Air release/vacuum valve assemblies shall be required at high points in a distribution system as determined by Water Supply. Distribution mains shall require a 1-inch air release vacuum valve. See Standard Drawing 8-14A for specifications and typical installation details.

In streets with roadside ditches, provide profiles of ARV lines and boxes. ARV boxes shall be located beyond the ditch. ARV lines shall not daylight in the ditch crossing.

- H. Blow-off Valves -- Blow-offs valves shall be required as specified in this section.
 - 1. Temporary Blow-off Valve -- A 2-inch temporary blow-off valve shall be required at the end of water mains that will be extended in the future. See Standard Drawing 8-12 for specifications and typical installation details.
 - 2. End of Main Blow-off Valve -- A 4-inch blow-off valve shall be required at the permanent end of water mains. See Standard Drawing 8-13A for specifications and typical installation details.
 - 3. Cul-De-Sac Blow-off Valve -- A 4-inch blow-off valve shall be required at the end of a water main in a cul-de-sac, except in the

case that the line ends in a fire hydrant. The blow-off gate valve shall be located 2 feet past the last water service connection. See Standard Drawing 8-13B for specifications and typical installation details.

4. In-Line Blow-off Valve -- A 4-inch in-line blow-off valve shall be required at low points in the water distribution main as approved by Water Supply. See Standard Drawing 8-13C for specifications and typical installation details.

In streets with roadside ditches, provide profile views of blow-off lines and boxes. When possible, blow-off valves and boxes shall be located beyond the ditch.

- I. Locating Wire Stations -- Locating wire stations shall be placed on distribution mains when the distance between valves and/or permanent and in-line blow-offs exceeds 600 feet. See Standard Drawing 8-4B for specifications and typical installation details.
- J. Water Sample Stations – Water sample stations shall be provided at the rate of not less than one for every 500 new and existing units and at locations required by Water Supply. Water sample stations shall normally be located within a streetscape in a PUE. Alternate locations may be approved by Water Supply. Water Supply will provide typical installation details upon request. A water sample station shall consist of a 1-inch water service terminated inside a G-5 valve box with a 1-inch curb stop.

8-17 RECYCLED WATER TRANSMISSION AND DISTRIBUTION MAIN

DESIGN: Recycled water facilities may be required by the Water Agency for use in specified areas as determined by Water Supply. Design flows and demands for recycled water systems shall be determined by the Water Agency. The design of recycled water transmission mains and distribution mains shall comply with the design requirements for potable water transmission mains and distribution mains with the following special provisions:

1. Recycled water mains shall be located on the south and east side of a street. A deviation from these criteria may be allowed if approved by Water Supply in consultation with other affected utility providers.
2. Recycled Water Main Separation -- Separation between recycled water mains and potable water mains and raw water mains shall comply with Section 64572 “Water Main Separation” of the California Code of Regulations. Separation may vary if approved by both the State Water Resources Control Board and by Water Supply.

3. To avoid cross connection of the potable and recycled water systems, recycled water facilities shall be clearly marked through appropriate coloring of pipe materials and above ground appurtenances.
4. All above ground facilities shall be marked with a sign to caution against drinking water from the recycled water system. All signs shall be made and placed in such a manner as to become a permanent part of the facility or appurtenance. Park sites, large turf areas, and other publicly used areas may require warning signs of the appropriate size as determined by Water Supply or other regulatory agency. See Standard Drawing 8-16 for specifications and installation details.
5. Recycled water services shall not be equipped with a back flow device.
6. Recycled water main plans shall include the standard SCWA Recycled Water Notes as provided by Water Supply.

8-18 RAW WATER TRANSMISSION MAIN DESIGN: Raw water transmission main facilities may be required by the Water Agency for use in specified areas as determined by Water Supply. Design flows and demands for raw water systems shall be determined by the Water Agency. The design of raw water transmission mains shall comply with the design requirements for potable water transmission mains with the following special provisions:

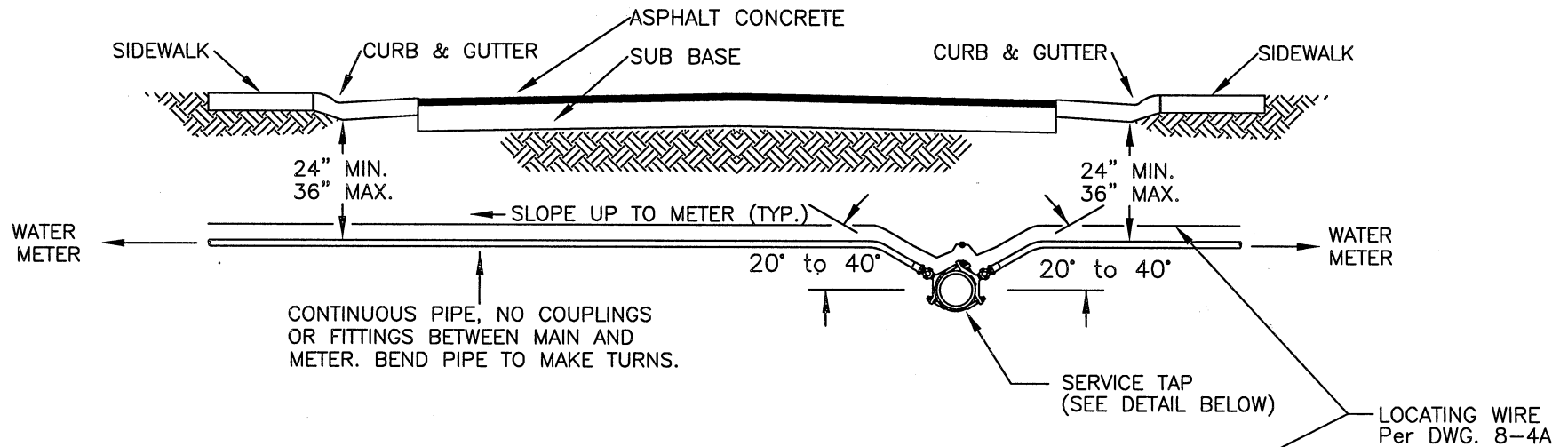
1. Raw water transmission mains shall be located on the north and west side of a street.
2. Raw Water Transmission Main Separation -- Separation shall comply with the requirements for "supply lines" in Section 64572 "Water Main Separation" of the California Code of Regulations. Separation may vary if approved by both the State Water Resources Control Board and by Water Supply.
3. Raw water plans shall include the standard SCWA Raw Water Notes as provided by Water Supply.

8-19 RECORD PLANS: Record Drawings shall be in accordance with Section 2-11 "Record Plans" of these Improvement Standards and shall also include the following water facility information:

1. The notation "Record Drawing" conspicuously stamped on each sheet.
2. The record information for changes to locations and stationing, and for changes to plan and profile of mains, pipes, valves, fittings, air release/vacuum valves, blow-off assemblies, hydrants, and water services.

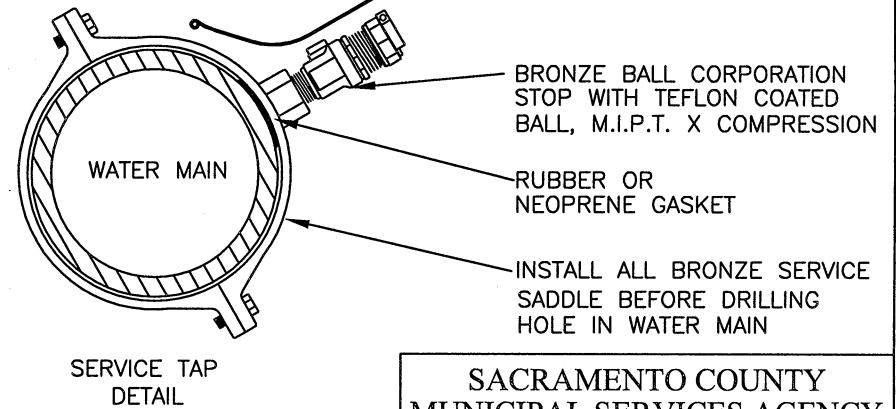
3. Field-surveyed as-built top-of-pipe elevations at all ends of water mains equipped with a temporary blow-off valve or blind flange.
4. The pipe type and class of the water pipe installed at every location, clearly notated on each sheet, with the station of transitions between pipe types marked and notated.
5. The type of end fitting installed at the ends of all water mains equipped with a temporary blow-off valve.

Record Drawings shall be approved by Water Supply prior to final acceptance of the project.



NOTES:

1. CORPORATION STOP, METER CURB STOP AND WATER SERVICE LINE SHALL BE THE SAME SIZE.
2. SERVICE SADDLES SHALL BE A BRONZE SINGLE WIDE STRAP FOR PVC PIPE AND A BRONZE DOUBLE STRAP FOR DUCTILE IRON PIPE. BRONZE 'U' BOLTS MAY BE USED ON CAST IRON AND DUCTILE IRON WATER MAINS.
3. SERVICE SADDLES, CORPORATION STOPS, COUPLING NUTS, BOLTS, AND ALL APPURTENANCES SHALL BE BRONZE.
4. SERVICE TAP SHALL BE MADE BETWEEN 20 DEGREES TO 40 DEGREES ABOVE THE SPRING LINE OF THE PIPE.
5. SERVICE TAPS SHALL BE SPACED A MINIMUM OF 18" APART ON THE WATER MAIN AND SHALL BE A MINIMUM OF 24" FROM PIPE JOINTS.
6. INSULATED LOCATING WIRE SHALL BE PROVIDED ON ALL SERVICE LINES, PER DRAWING 8-4A. WIRE SHALL BE CONNECTED TO LOCATING WIRE ALONG WATER MAIN FOR CONTINUITY.
7. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.



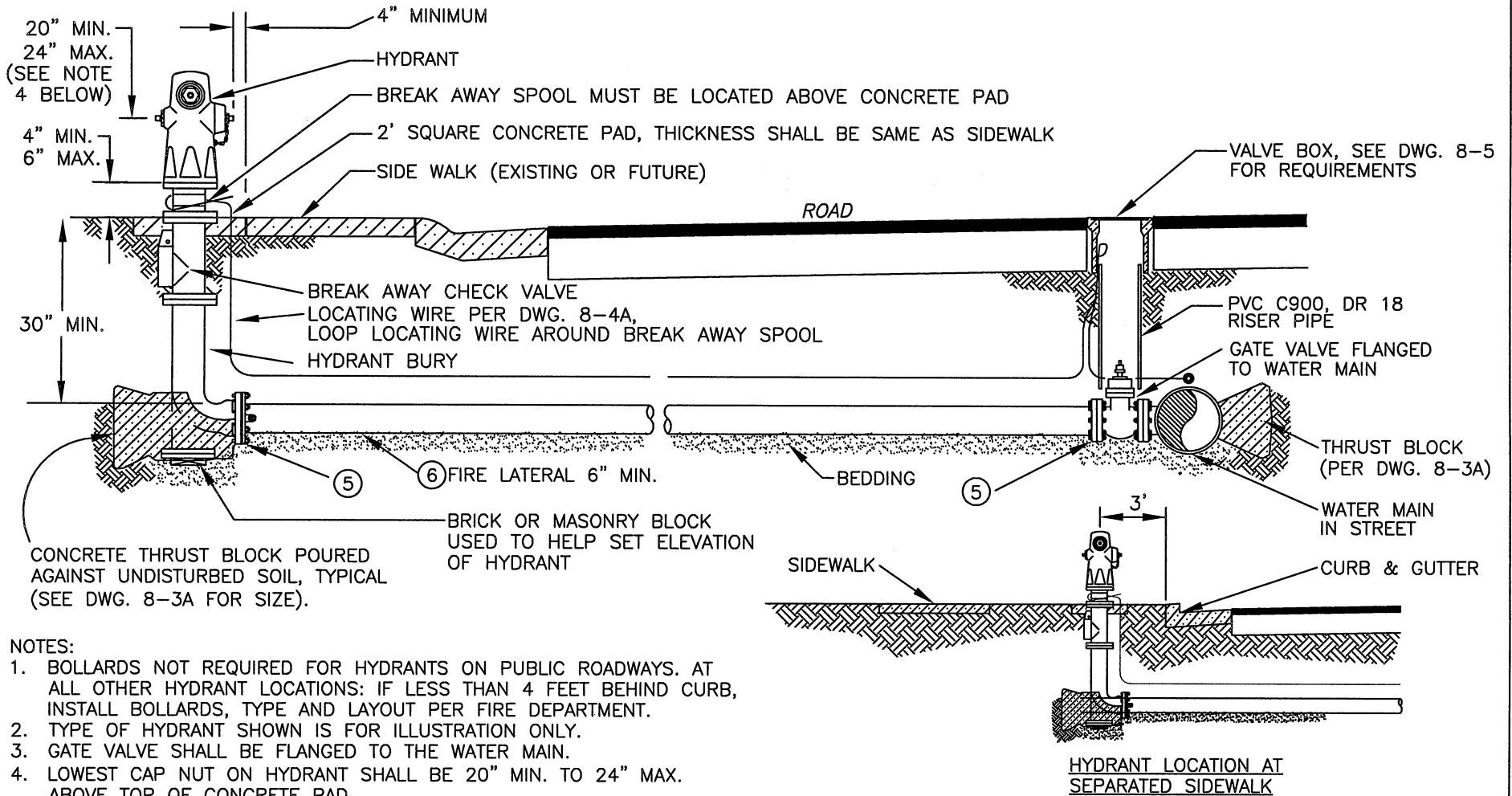
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

**1"-2" WATER SERVICE
INSTALLATION**

Michael Peterson
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SCALE: NONE
DATE: 8/13

8-1

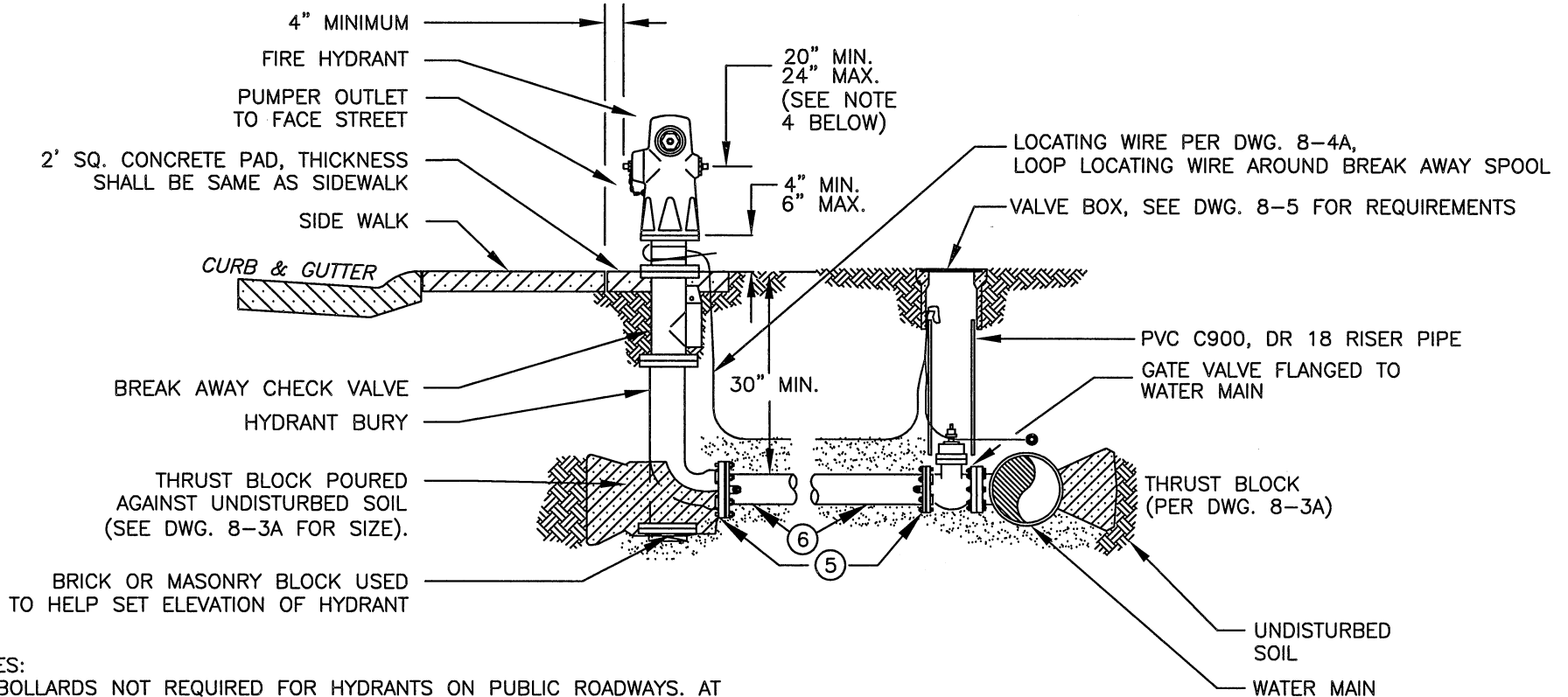


NOTES:

1. BOLLARDS NOT REQUIRED FOR HYDRANTS ON PUBLIC ROADWAYS. AT ALL OTHER HYDRANT LOCATIONS: IF LESS THAN 4 FEET BEHIND CURB, INSTALL BOLLARDS, TYPE AND LAYOUT PER FIRE DEPARTMENT.
2. TYPE OF HYDRANT SHOWN IS FOR ILLUSTRATION ONLY.
3. GATE VALVE SHALL BE FLANGED TO THE WATER MAIN.
4. LOWEST CAP NUT ON HYDRANT SHALL BE 20" MIN. TO 24" MAX. ABOVE TOP OF CONCRETE PAD.
5. THESE JOINTS MAY BE FLANGED OR RESTRAINED MECHANICAL JOINT WITH AN APPROVED RESTRAINED DEVICE.
6. FIRE LATERAL: RESTRAIN ALL JOINTS. DUCTILE IRON PIPE, C900 PVC PIPE ALLOWED IF RUN IS LESS THAN ONE PIPE LENGTH AND INSTALLED WITHOUT PVC-TO-PVC JOINTS.
7. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.

Michael Peterson
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY MUNICIPAL SERVICES AGENCY	
FIRE HYDRANT INSTALLATION WATER MAIN IN STREET	
SCALE: NONE DATE: 8/13	8-2A



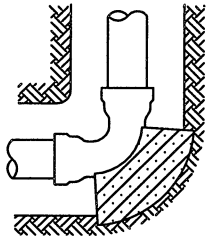
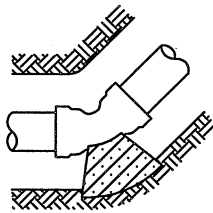
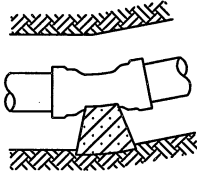
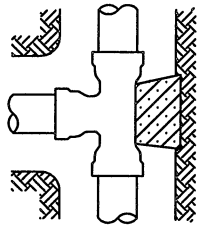
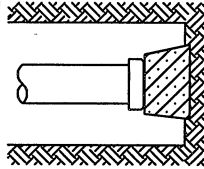
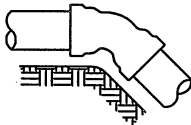
NOTES:

1. BOLLARDS NOT REQUIRED FOR HYDRANTS ON PUBLIC ROADWAYS. AT ALL OTHER HYDRANT LOCATIONS: IF LESS THAN 4 FEET BEHIND CURB, INSTALL BOLLARDS, TYPE AND LAYOUT PER FIRE DEPARTMENT.
2. TYPE OF HYDRANT SHOWN IS FOR ILLUSTRATION ONLY.
3. GATE VALVE SHALL BE FLANGED TO THE WATER MAIN.
4. LOWEST CAP NUT ON HYDRANT SHALL BE 20" MIN. TO 24" MAX. ABOVE TOP OF CONCRETE PAD.
5. THESE JOINTS MAY BE FLANGED OR RESTRAINED MECHANICAL JOINT WITH AN APPROVED RESTRAINED DEVICE.
6. FIRE LATERAL: RESTRAIN ALL JOINTS. DUCTILE IRON PIPE; C900 PVC PIPE ALLOWED IF RUN IS LESS THAN ONE PIPE LENGTH AND INSTALLED WITHOUT PVC-TO-PVC JOINTS.
7. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.

Michael Peterson
 DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY MUNICIPAL SERVICES AGENCY	
FIRE HYDRANT INSTALLATION WATER MAIN NOT IN ROADWAY	
SCALE: NONE DATE: 8/13	8-2B

REQUIRED BEARING AREA IN TOTAL SQUARE FEET

TYPE OF FITTING	90° BEND	45° BEND	11-1/4° BEND 22-1/2° BEND	TEE	DEAD END	VERTICAL DOWN BEND
TYPICAL INSTALLATION					 SEE NOTE 5	
SIZE OF PIPE	4"	2	1	1	2	THRUST BLOCKS NOT ALLOWED. USE RESTRAINED JOINTS WITH RESTRAINED LENGTH PER PLANS AND WATER NOTES.
	6"	4	2	1	3	
	8"	7	4	2	5	
	10"	12	6	3	8	
	12"	16	10	5	12	

NOTES

1. THRUST BLOCKS SHALL BE CONSTRUCTED OF CLASS "B" CONCRETE.
2. BEARING AREAS GIVEN ARE FOR TEST PRESSURES OF 150 PSI IN SOIL WITH MINIMUM 2,000 PSF BEARING CAPACITY. IF TEST PRESSURE IS HIGHER OR SOIL BEARING CAPACITY IS LOWER, THRUST BLOCK SIZE SHALL BE RE-DESIGNED & APPROVED BY THE WATER UTILITY.
3. THRUST BLOCKS SHALL BE POURED AGAINST UNDISTURBED SOIL. IF THIS CANNOT BE DONE, USE RESTRAINED JOINTS TO RESIST THRUST OVER RESTRAINED LENGTHS APPROVED BY THE WATER UTILITY.
4. PIPE JOINTS SHALL BE KEPT CLEAR OF CONCRETE.
5. FOR DEAD ENDS: INSTALL TEMPORARY BLOW OFF PER DWG. 8-12.


 DIRECTOR, DEPARTMENT OF WATER RESOURCES

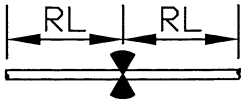
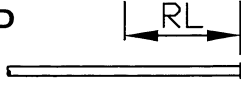
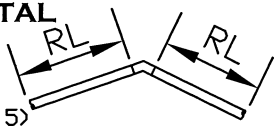
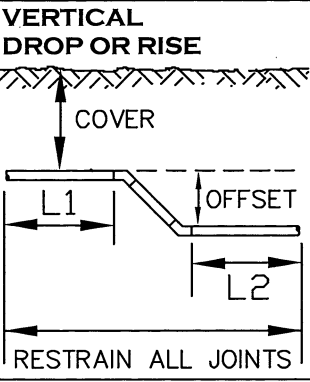
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

THRUST BLOCK BEARING AREA

SCALE: NONE
DATE: 8/13

8-3A


RESTRAINED LENGTH IN FEET

PIPE CONFIGURATION	30" COVER AND GREATER								60" COVER AND GREATER								
	DIP				PVC				DIP				PVC				
	6"	8"	10"	12"	6"	8"	10"	12"	6"	8"	10"	12"	6"	8"	10"	12"	
RL = RESTRAINED LENGTH																	
NA = PVC PIPE NOT ALLOWED IN RESTRAINED LENGTH, USE ONLY DUCTILE IRON.																	
IN LINE VALVE 	46	59	71	83	NA				24	31	38	45	NA				
DEAD END W/O THRUST BLOCK (SEE NOTE 5) 	69	88	10	12	NA				36	47	57	67	NA				
HORIZONTAL BEND  (SEE NOTE 5)	11.25°	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	22.5°	6	6	7	8	6	6	7	8	6	6	6	6	6	6	6	6
	45°	9	12	14	16	9	12	14	16	6	6	7	9	6	6	7	9
VERTICAL DROP OR RISE  RESTRAIN ALL JOINTS	OFFSET = 1.5-3.4 FT.	11.25°	L1	10	14	17	21	10	14	17	NA		6	6	7	9	
		L2	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	OFFSET = 3.5 FT.	22.5°	L1	25	33	41	48	NA		12	17	21	25	12	17	NA	
		L2	7	9	11	13	NA		6	6	6	6	6	6	NA		
	OFFSET ≥ 3.5 FT.	11.25°	L1	7	9	11	12	NA		6	6	6	7	NA			
		L2	6	6	6	6	NA		6	6	6	6	NA				
	OFFSET ≥ 3.5 FT.	22.5°	L1	23	31	38	45	NA		10	14	18	22	10	14	18	NA
		L2	6	7	9	11	NA		6	6	6	6	6	6	6	NA	
	TEE, CROSS & ASSOCIATED VALVES	PIPE RESTRAINT REQUIRED. SEE RESTRAINED LENGTHS SHOWN ON PLANS. (SEE NOTE 2)															

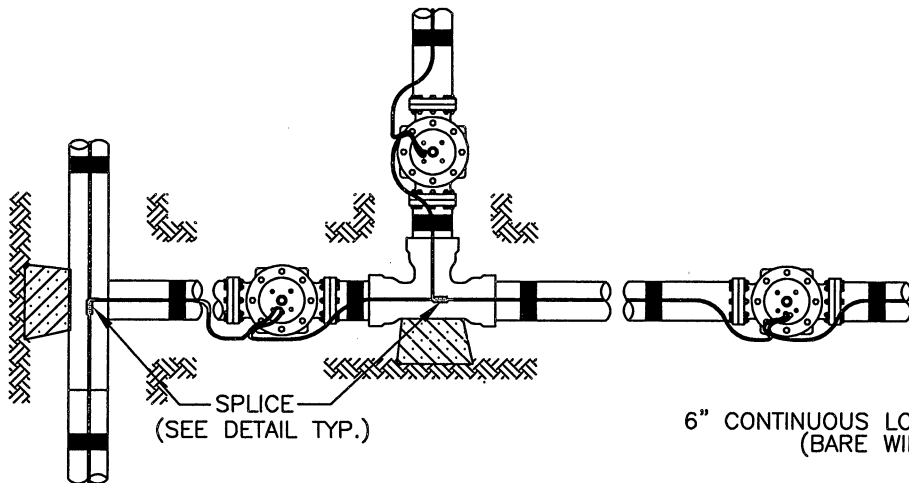
***** RESTRAINED LENGTHS SHOWN ON THE PLANS SUPERSEDE THIS TABLE *****

NOTES:

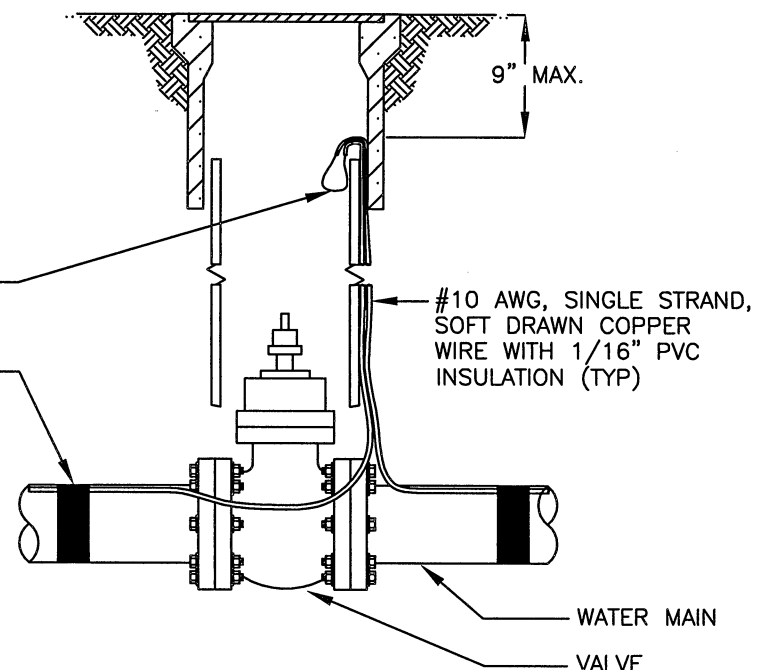
1. ALL JOINTS WITHIN THE RESTRAINED LENGTH SHALL BE RESTRAINED. NO JOINTS WITHIN 6 FEET OF FITTINGS, UNLESS OTHERWISE SPECIFIED.
2. RESTRAINED LENGTHS ARE REQUIRED AT TEES AND CROSSES. IF NOT SPECIFIED ON THE PLANS, RESTRAINED LENGTHS SHALL BE DESIGNED BY THE CIVIL ENGINEER OF RECORD AND APPROVED BY THE WATER UTILITY.
3. RESTRAINING DEVICES FOR MJ'S: FOR DUCTILE IRON USE EBAA MEGALUG 1100, STAR PIPE PRODUCTS STARGRIP 3000, OR SIGMA ONE-LOK SLDE; FOR PVC PIPE USE EBAA 2000PV, STAR PIPE PRODUCTS STARGRIP 4000, OR SIGMA ONE-LOC SLCE.
4. RESTRAINING DEVICES FOR PUSH-ON JOINTS: FOR DUCTILE IRON USE U.S. PIPE FIELD LOK GASKETS, U.S. PIPE TR FLEX PIPE, OR APPROVED EQUAL; RESTRAINED PVC PUSH-ON JOINTS NOT ALLOWED, USE DUCTILE IRON PIPE ONLY FOR RESTRAINED PUSH-ON JOINTS.
5. FOR DEAD ENDS AND HORIZONTAL BENDS ONLY: IF A THRUST BLOCK IS INSTALLED BEHIND THE FITTING IN ACCORDANCE WITH DWG. 8-3A, RESTRAINED JOINTS NOT REQUIRED UNLESS OTHERWISE SPECIFIED.
6. RESTRAINED LENGTHS ARE BASED ON 150 PSI TEST PRESSURE. IF HIGHER PRESSURES OR HIGHER SURGES ARE ANTICIPATED, THIS TABLE SHALL NOT APPLY AND RESTRAINED LENGTHS SHALL BE DESIGNED BY THE CIVIL ENGINEER OF RECORD AND APPROVED BY THE WATER UTILITY.


 DIRECTOR, DEPARTMENT OF WATER RESOURCES

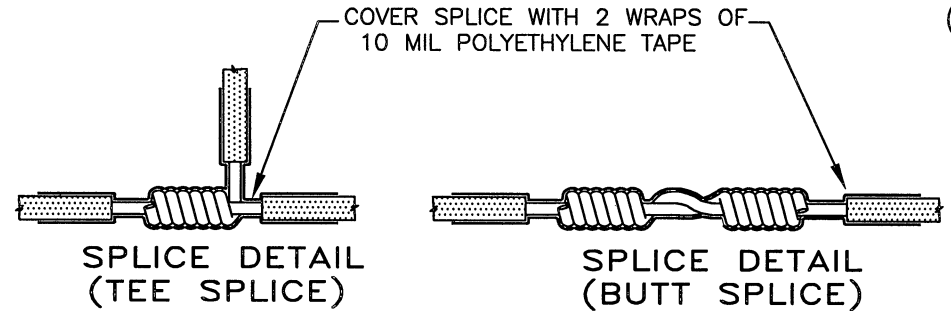
SACRAMENTO COUNTY MUNICIPAL SERVICES AGENCY	
PIPE RESTRAINED LENGTH	
SCALE: NONE DATE: 11/15	8-3B



TYPICAL LAYOUT



VALVE DETAIL



SPLICE DETAIL (TEE SPLICE)

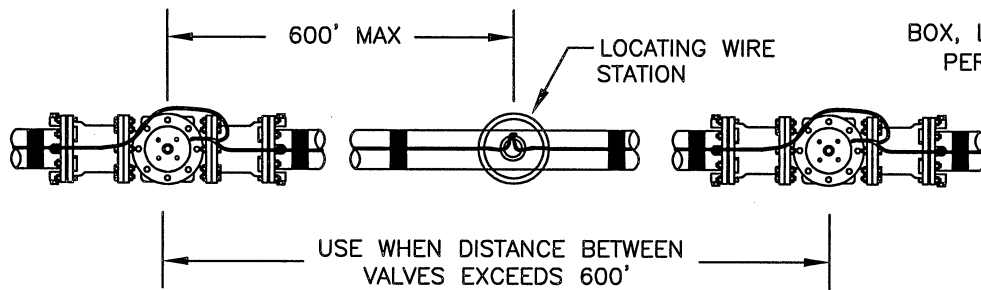
SPLICE DETAIL (BUTT SPLICE)

NOTES:

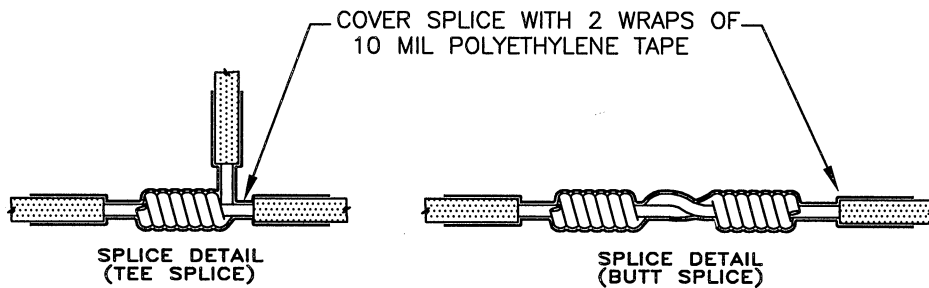
1. WIRE SHALL BE CONTINUOUS, EXCEPT WHERE SPLICES ARE REQUIRED AT TEES, CROSSES, AND CONNECTIONS TO EXISTING LOCATING WIRES.
2. LOCATING WIRE SHALL BE LAID ON TOP OF THE WATER MAIN, AND SHALL BE TAPED TO IT OR THE POLYETHYLENE ENCASEMENT AT 10' INTERVALS AND TAPED AT ALL FITTINGS. TAPE SHALL BE 10 MIL POLYETHYLENE.
3. CONTINUITY TESTS SHALL BE PERFORMED ON EACH SPLICE PRIOR TO BACKFILL, AND ON THE FULL WIRE SYSTEM AFTER IT IS FINISHED.
4. **ALL SPLICES SHALL BE SOLDERED AND TAPED.**

Michael L. Peterson
 DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY MUNICIPAL SERVICES AGENCY	
LOCATING WIRE FOR WATER MAINS AND SERVICES	
SCALE: NONE DATE: 8/13	8-4A



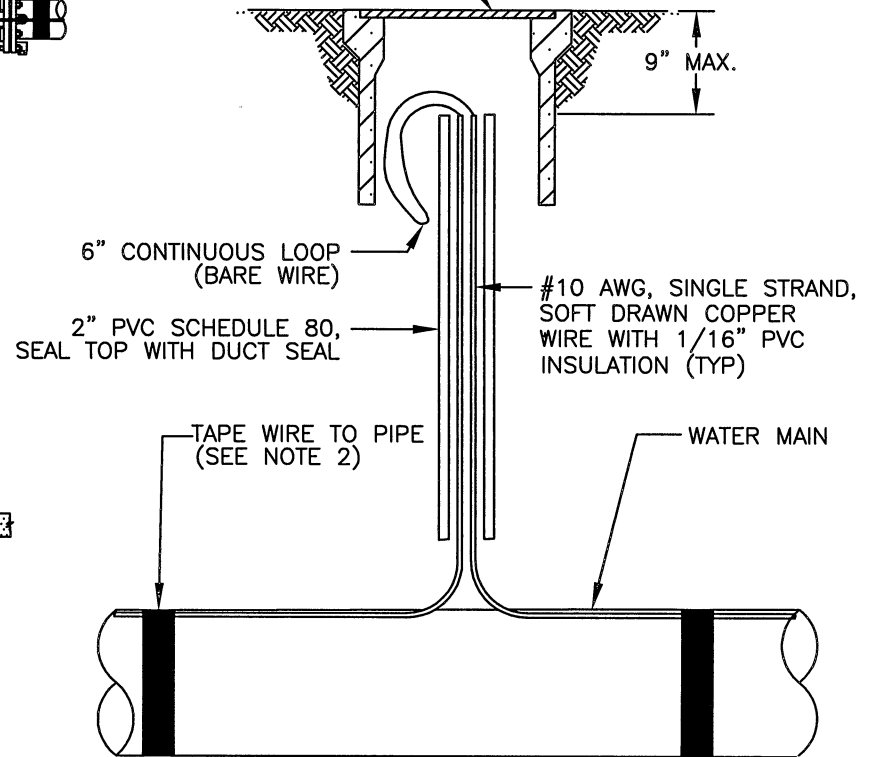
TYPICAL LAYOUT



NOTES:

1. WIRE SHALL BE CONTINUOUS, EXCEPT WHERE SPLICES ARE REQUIRED AT TEES AND CROSSES.
2. LOCATING WIRE SHALL BE LAID ON TOP OF THE WATER MAIN, AND SHALL BE TAPED TO IT OR THE POLYETHYLENE ENCASEMENT AT 10' INTERVALS AND TAPED AT ALL FITTINGS. TAPE SHALL BE 10 MIL POLYETHYLENE.
3. CONTINUITY TESTS SHALL BE PERFORMED ON EACH SPLICE PRIOR TO BACKFILL, AND ON THE FULL WIRE SYSTEM AFTER IT IS FINISHED.
4. **ALL SPLICES SHALL BE SOLDERED AND TAPED.**
5. LABELING AND COATING OF BOX AND LID SHALL COMPLY WITH THE REQUIREMENTS OF DWG. 8-5.

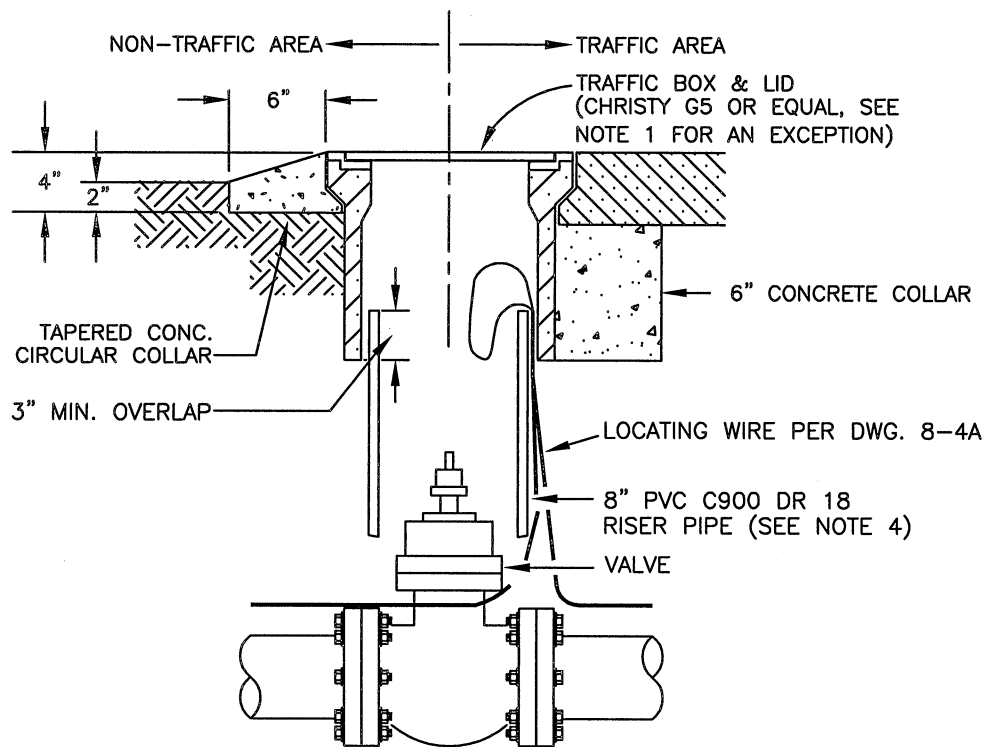
BOX, LID, AND CONCRETE COLLAR PER DWG. 8-5. (SEE NOTE 5)



LOCATING WIRE STATION

SACRAMENTO COUNTY MUNICIPAL SERVICES AGENCY	
LOCATING WIRE STATION	
SCALE: NONE DATE: 8/13	8-4B

Michael J. Peters
DIRECTOR, DEPARTMENT OF WATER RESOURCES

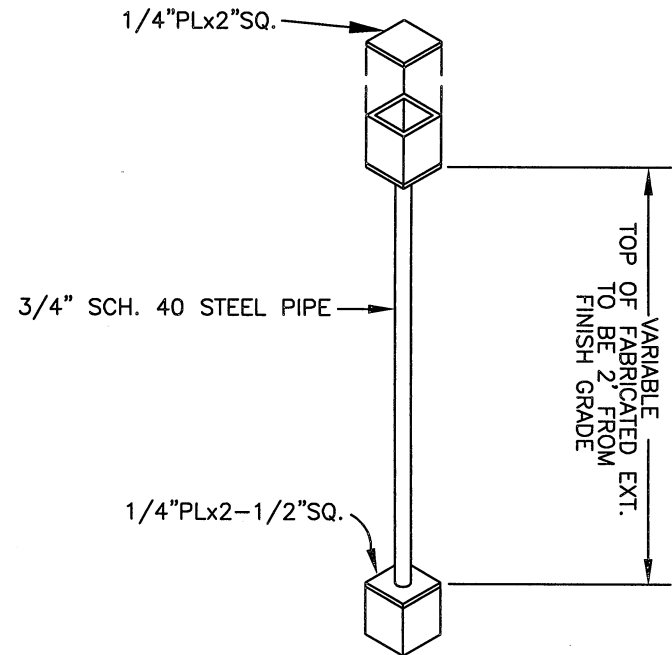


TRAFFIC VALVE BOX

NOTES:

1. BOXES IN MAJOR ROADS (ULTIMATE PLANNED WIDTH \geq 70 FT BOC TO BOC) SHALL BE CHRISTY G5VP BOLT-DOWN LID AND BOX, OR EQUAL.
2. VALVE BOX AND RISER SHALL BE SET PLUMB AND CENTERED OVER WATER VALVE NUT.
3. SET VALVE BOX TO FINAL FINISH GRADE. IN AREAS WHERE FINISH GRADE HAS NOT BEEN DEFINED, PLACE 4"x4" LOCATING POST WITHIN 1 FOOT OF VALVE BOX. POST SHALL BE 6 FEET IN LENGTH AND BURIED 3 FEET. PAINT POST BLUE FOR POTABLE WATER, PURPLE FOR RECYCLED AND NONPOTABLE WATER, GREEN FOR RAW WATER.
4. RISER PIPE SHALL BE BLUE OR WHITE FOR POTABLE WATER, WHITE FOR RAW WATER, OR PURPLE FOR RECYCLED AND NONPOTABLE WATER. FOR RAW WATER ONLY: PAINT BOX INTERIOR & TOP 1 FT. OF RISER GREEN.
5. LIDS SHALL BE LABELED WITH CAST OR BEAD WELDED LETTERS: "WATER" FOR POTABLE, "RECYCLED WATER" FOR RECYCLED AND NONPOTABLE WATER, "RAW WATER" FOR RAW WATER.
6. RECYCLED AND NONPOTABLE WATER: TOP OF FRAME AND COVER SHALL BE COATED PURPLE PRIOR TO INSTALLATION PER STANDARD SPECIFICATIONS.
7. LIDS SHALL NOT BE INTERCHANGED INTO DIFFERENT MAKE OR MODEL BOXES.

Michael Peterson
DIRECTOR, DEPARTMENT OF WATER RESOURCES



VALVE OPERATING NUT EXTENSION

REQUIRED WHERE VALVE NUT IS IN EXCESS OF 10 FEET BELOW FINISH GRADE.

<p>SACRAMENTO COUNTY MUNICIPAL SERVICES AGENCY</p>	
<p>VALVE BOX INSTALLATION AND OPERATING NUT EXTENSION</p>	
<p>SCALE: NONE DATE: 8/13</p>	<p>8-5</p>

LANDSCAPE PROHIBITIONS:

1. NO TREES WITHIN 8 FT. OF BOX.
2. NO PLANTINGS EXCEPT TURF PERMITTED WITHIN 30" OF BOX.

18" MAX. FINISHED GRADE

METER BOX SHALL NOT BE LOCATED IN A DRIVEWAY UNDER ANY CIRCUMSTANCES

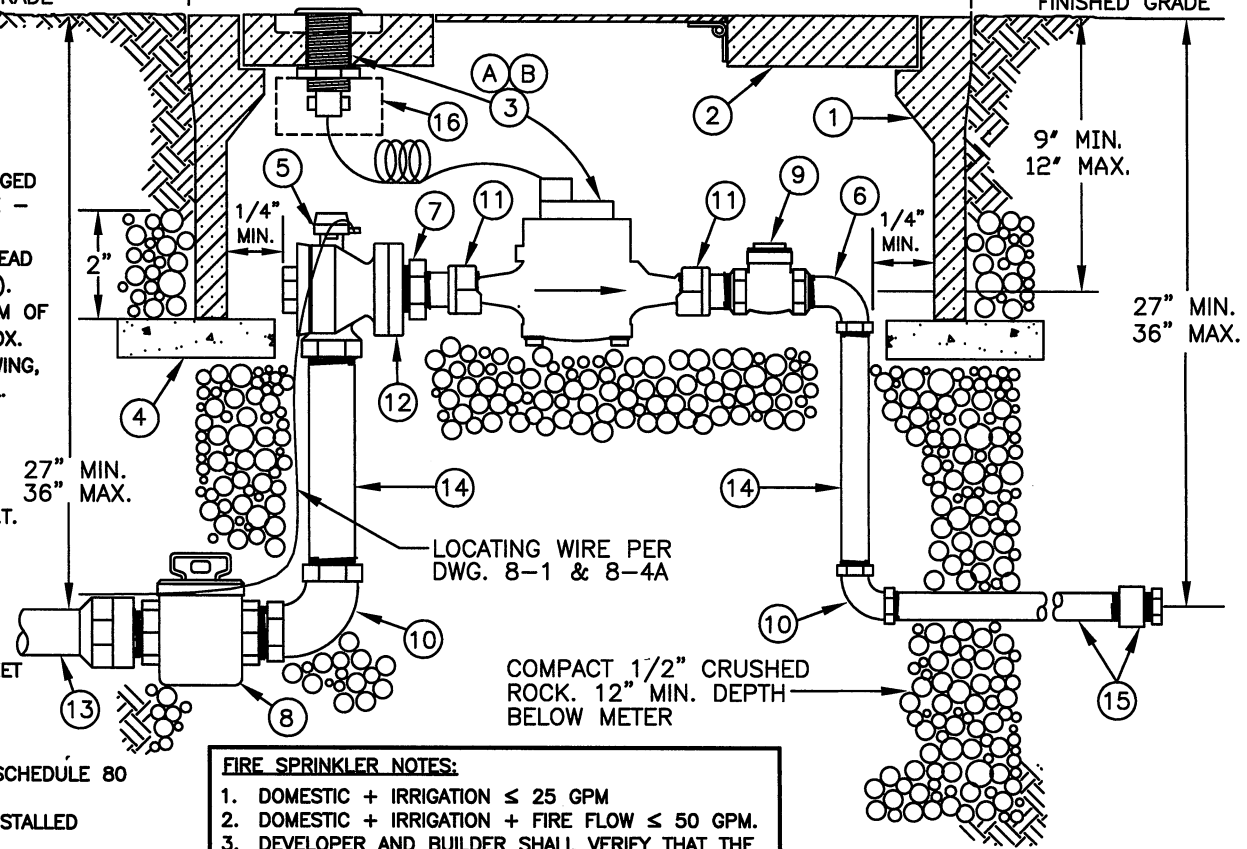
MAINTAINED BY WATER UTILITY AFTER OCCUPANCY | MAINTAINED BY OWNER

FINISHED GRADE

- ① REINFORCED CONCRETE UTILITY BOX - CHRISTY (B30) OR EQUAL.
- ② REINFORCED CONCRETE COVER MARKED "WATER" WITH HINGED CAST IRON LID AND PRE-CAST RECESSED PIT READ HOLE - CHRISTY (B30GP-FLEXNET) COVER OR EQUAL.
- ③ 1" SENSUS SR II-EB TR/PL WATER METER AND TOUCH READ MODULE WITH HOUSING (1 CU. FT. REGISTER RESOLUTION).
- ④ 3/4" TO 1"x4"x16" CONCRETE SUPPORT BLOCKS. MINIMUM OF ONE BLOCK ON ALL FOUR SIDES/CORNERS OF UTILITY BOX.
- ⑤ 1.5" BRONZE ANGLE METER STOP VALVE WITH PADLOCK WING, FULL PORT, 300 PSIG, AND FLUOROCARBON COATED BALL. F.I.P.T. X METER FLANGE.
- ⑥ 1" BRONZE STREET 90° ELBOW - M.I.P.T. X F.I.P.T.
- ⑦ 1.5" M.I.P.T. x 1" F.I.P.T. BRONZE BUSHING REDUCER.
- ⑧ 1.5" BRONZE CURB STOP VALVE, 300 PSIG, FULL PORT, AND FLUOROCARBON COATED BALL. COMPRESSION X F.I.P.T.
- ⑨ 1" BRONZE SWING CHECK VALVE (MILWAUKEE UP509-1) OR APPROVED EQUAL.
- ⑩ 90° BRONZE ELBOWS, 1.5" & 1" - F.I.P.T X F.I.P.T.
- ⑪ 1" BRONZE STRAIGHT METER COUPLING, M.I.P.T. x METER SWIVEL NUT.
- ⑫ 1.5" BRONZE METER FLANGE x F.I.P.T. WITH FLANGE GASKET AND STAINLESS STEEL OR BRASS NUTS & BOLTS.
- ⑬ 1.5" WATER SERVICE PER STD. DWG. 8-1.
- ⑭ 1.5" & 1" BRASS NIPPLES, LENGTHS AS REQUIRED.
- ⑮ 1" x 36" BRASS NIPPLE, SPEARS SOCKET X SR-F.I.P.T. SCHEDULE 80 COUPLING WITH PVC PLUG.
- ⑯ FUTURE SENSUS FLEXNET RADIO UNIT, FURNISHED AND INSTALLED BY WATER UTILITY.

NOTES:

- A. THE CONTRACTOR INSTALLING FACILITIES SHOWN ON THE IMPROVEMENT PLANS SHALL INSTALL ALL ITEMS ON THIS DRAWING EXCEPT THAT A METER IDLER PIPE SHALL BE INSTALLED IN PLACE OF THE METER. IDLER PIPE MATERIAL SHALL BE BRASS, GALV. STEEL, OR SCHED. 80 PVC AND SUPPLIED BY A WATER MATERIAL SUPPLIER. (SEE NOTE B)
- B. THE HOME BUILDER SHALL INSTALL THE METER AND TOUCH READ MODULE. AS AN OPTION, THE IMPROVEMENT PLAN CONTRACTOR MAY INSTALL THE METER AND TOUCH READ MODULE.
- C. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.



- FIRE SPRINKLER NOTES:**
1. DOMESTIC + IRRIGATION ≤ 25 GPM
 2. DOMESTIC + IRRIGATION + FIRE FLOW ≤ 50 GPM.
 3. DEVELOPER AND BUILDER SHALL VERIFY THAT THE FLOW AND PRESSURE REQUIRED BY THEIR FIRE SPRINKLER DESIGN CAN BE DELIVERED BY THE WATER SYSTEM AND WATER SERVICE BASED ON THE WATER UTILITY'S LATEST MODELED PEAK-HOUR SCENARIO.
 4. PASSIVE-PURGE SPRINKLER, DESIGN MANDATORY.

M. J. Peters
 DIRECTOR, DEPARTMENT OF WATER RESOURCES

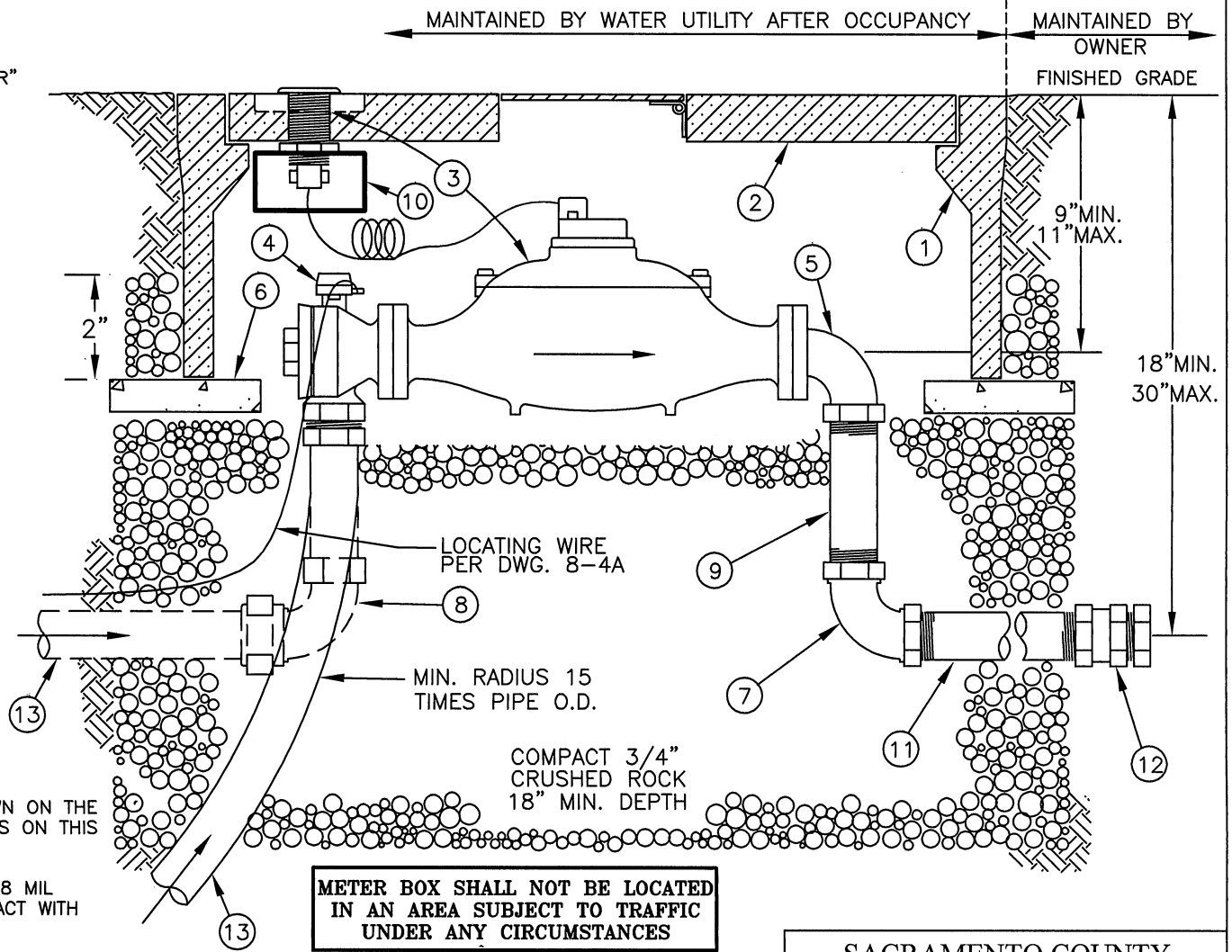
SACRAMENTO COUNTY
 MUNICIPAL SERVICES AGENCY
**1.5" RESIDENTIAL
 WATER SERVICE WITH
 1" WATER METER**

SCALE: NONE
 DATE: 12/15
8-6A-1

- ① REINFORCED CONCRETE UTILITY BOX (CHRISTY B36) OR EQUAL.
- ② REINFORCED CONCRETE COVER MARKED "WATER" WITH A HINGED CAST IRON LID AND A PRE-CAST RECESSED PIT READ HOLE - (CHRISTY B36G-FLEXNET) OR EQUAL.
- ③ SENSUS OMNI C² TR/PL WATER METER AND TOUCH READ MODULE WITH HOUSING (1 CU. FT. REGISTER RESOLUTION).
- ④ FLANGED WINGED ANGLE METER STOP VALVE WITH TEFLON COATED BALL.
- ⑤ OVAL FLANGED 90° BRONZE ELBOW FITTING.
- ⑥ 3/4" TO 1"x4"x16" CONCRETE BLOCK TO HELP SUPPORT VALVE BOX, USE ONE BLOCK ON ALL FOUR SIDES OF METER BOX. COVER ANY OPENINGS OR HOLES IN THE SIDE OF THE UTILITY BOX WITH CONCRETE BLOCK.
- ⑦ BRONZE 90° ELBOW, THREADED.
- ⑧ BRONZE 90° ELBOW, THREADED OR COMPRESSION.
- ⑨ BRASS NIPPLE, LENGTH AS REQUIRED
- ⑩ FUTURE SENSUS FLEXNET RADIO UNIT, FURNISHED AND INSTALLED BY WATER UTILITY.
- ⑪ 36" BRASS NIPPLE.
- ⑫ BRASS COUPLING WITH BRASS M.I.P.T. PLUG.
- ⑬ WATER SERVICE LINE PER STD. DWG. 8-1, WITH TWO CONFIGURATION OPTIONS.

NOTES:

- A. THE CONTRACTOR INSTALLING FACILITIES SHOWN ON THE IMPROVEMENT PLANS SHALL INSTALL ALL ITEMS ON THIS DRAWING.
- B. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.
- C. RECYCLED AND NONPOTABLE SERVICES: BOX SHALL HAVE A PURPLE POLYETHYLENE FACE RING, READING LID SHALL BE LABELED "RECYCLED WATER" WITH BEAD WELDED OR ENGRAVED LETTERS, AND TOP OF THE COVER SHALL BE COATED PURPLE PER STANDARD SPECIFICATIONS.
- D. SIZE OF SERVICE LINE, PIPING, AND FITTINGS SHALL BE THE SAME SIZE AS METER.



Michele P. [Signature]

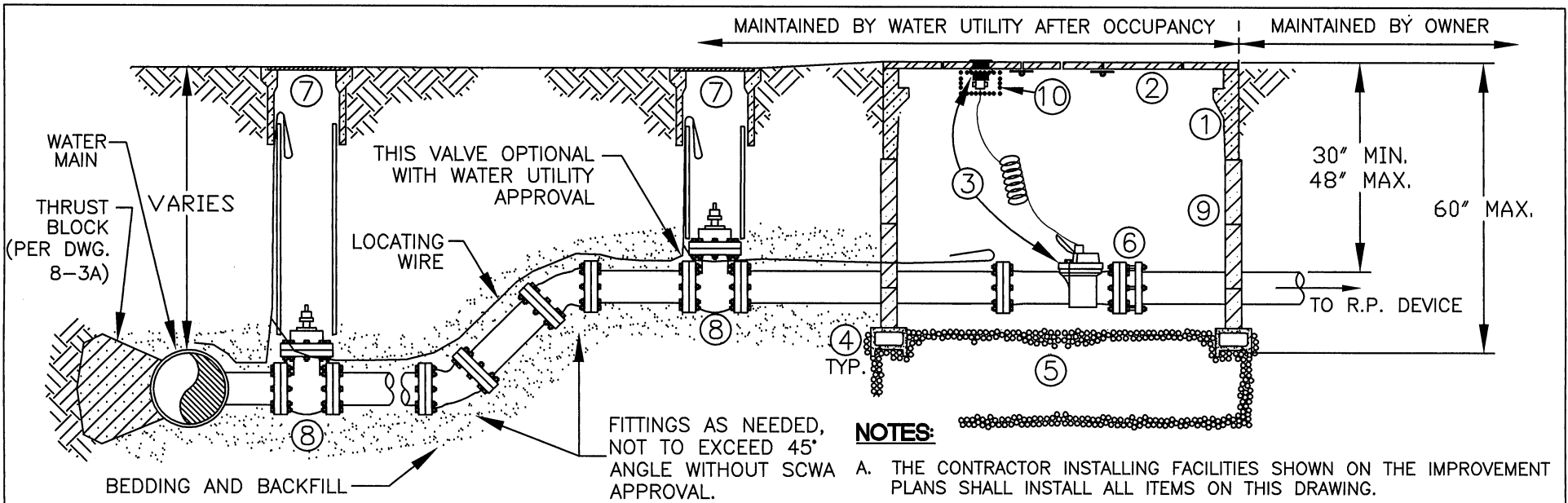
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

**1-1/2" OR 2"
COMMERCIAL METERED
WATER SERVICE**

SCALE: NONE
DATE: 11/15

8-6B



- ① REINFORCED CONCRETE UTILITY BOX WITH EXTENSIONS (CHRISTY B48).
- ② 2 PIECE GALVANIZED STEEL CHECKER PLATE W/ TWO 10" ROUND SELF-CLOSING READING LIDS AND 1-3/4" HOLE FOR TOUCH READ MODULE IN ONE READING LID (CHRISTY B48-62G PIT READ COVER).
- ③ SENSUS OMNI C² TR/PL METER AND TOUCH READ MODULE WITH HOUSING (1 CU. FT. REGISTER RESOLUTION).
- ④ CONCRETE BLOCKS SHALL BE PLACED ALONG THE ENTIRE PERIMETER TO SUPPORT BOX.
- ⑤ 3/4" CRUSHED ROCK, 12" TO 18" DEEP, COMPACTED.
- ⑥ FLANGED COUPLING ADAPTER, EPOXY COATED WITH STAINLESS STEEL HARDWARE.
- ⑦ VALVE BOX, SEE DWG. 8-5 FOR REQUIREMENTS.
- ⑧ GATE VALVE, BOTH ENDS FLANGED.
- ⑨ METER BOX EXTENSION (TYPICAL).
- ⑩ FUTURE SENSUS FLEXNET RADIO UNIT, FURNISHED AND INSTALLED BY WATER UTILITY.

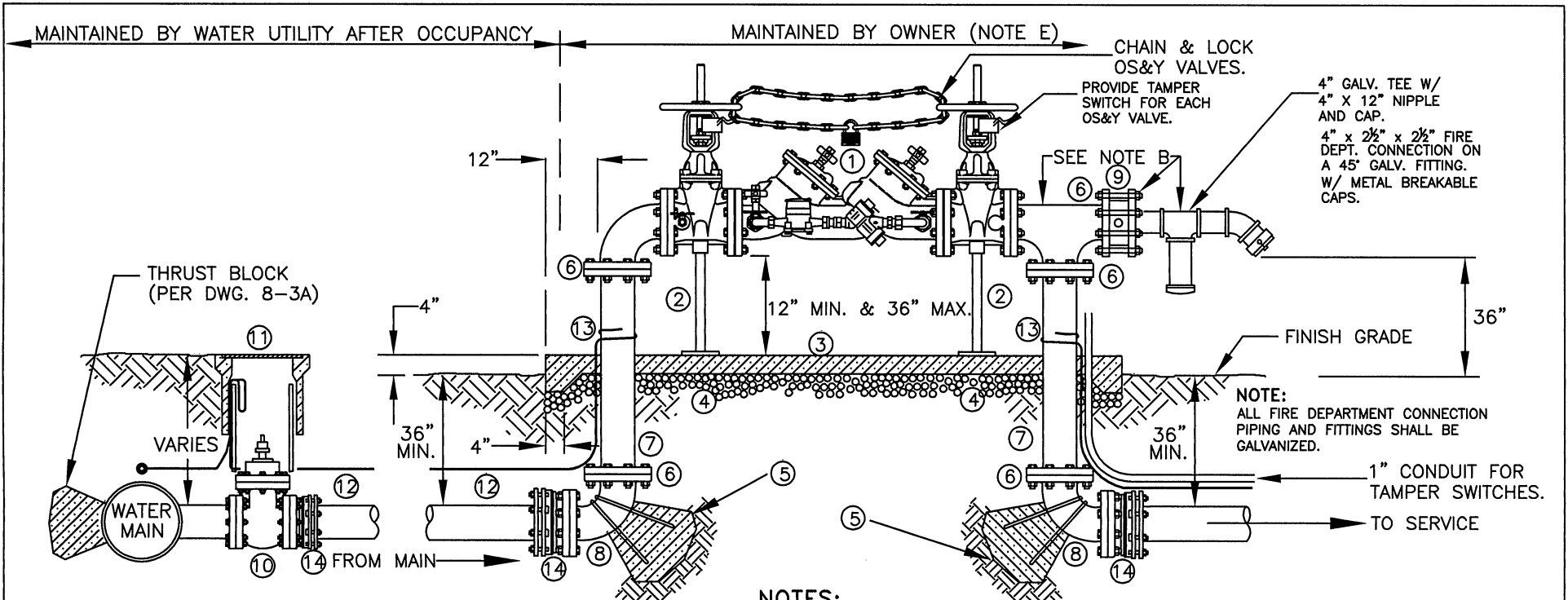
NOTES:

- A. THE CONTRACTOR INSTALLING FACILITIES SHOWN ON THE IMPROVEMENT PLANS SHALL INSTALL ALL ITEMS ON THIS DRAWING.
- B. 4" TO 6" DIA. PIPE BETWEEN WATER MAIN AND METER SHALL BE DUCTILE IRON. 3" PIPE SHALL BE TYPE K COPPER OR DUCTILE IRON. JOINTS BETWEEN MAIN AND METER SHALL BE RESTRAINED. RESTRAINING DEVICES SHALL BE APPROVED BY WATER UTILITY.
- C. INSTALL LOCATING WIRE PER DWG. 8-4A.
- D. CONCRETE BLOCKS SHALL BE USED TO BLOCK ANY OPENING OR CUT-OUT PORTIONS OF THE METER BOX NOT UTILIZED (MINIMUM 1" THICK BLOCK).
- E. SIZE OF SERVICE LINE, PIPING, AND FITTINGS SHALL BE THE SAME SIZE AS METER.
- F. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.
- G. RECYCLED AND NONPOTABLE SERVICES: COVER SHALL BE LABELED "RECYCLED WATER" WITH BEAD WELDED LETTERS AND TOP OF COVER SHALL BE COATED PURPLE PER STANDARD SPECIFICATIONS.

METER BOX SHALL NOT BE LOCATED IN AN AREA SUBJECT TO TRAFFIC UNDER ANY CIRCUMSTANCES

Michael L. Pate
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY MUNICIPAL SERVICES AGENCY	
3" TO 6" WATER SERVICE & METER INSTALLATION	
SCALE: NONE DATE: 11/15	8-6C



- ① DOUBLE CHECK DETECTOR ASSEMBLY W/ FLANGED OS&Y VALVES.
- ② PIPE SUPPORT, 2" GALVANIZED SCH 40 AT MINIMUM.
- ③ 4" CONCRETE SLAB - 24" WIDE WITH VARYING LENGTH.
- ④ 6" OF CRUSHED AGGREGATE COMPACTED TO 95% COMPACTION.
- ⑤ THRUST BLOCK (PER DWG. 8-3A) WITH #5 REBARS. WRAP THE PORTION OF THE REBAR THAT IS NOT EMBEDDED IN THE CONCRETE WITH 20 MIL POLYETHYLENE TAPE.
- ⑥ FLANGED CONNECTION ONLY.
- ⑦ FLANGE X FLANGE SPOOL, DUCTILE IRON. WRAP WITH TWO LAYERS OF 20 MIL TAPE AT SLAB PENETRATION.
- ⑧ FLANGE X FLANGE 90° ELBOW, DUCTILE IRON.
- ⑨ WAFER CHECK VALVE.
- ⑩ GATE VALVE, FLANGE X FLANGE.
- ⑪ VALVE BOX, SEE DWG. 8-5 FOR REQUIREMENTS.
- ⑫ DUCTILE IRON PIPE, PUSH ON JOINTS. RESTRAIN WITH U.S. PIPE FIELD LOK GASKETS OR APPROVED EQUAL.
- ⑬ LOCATING WIRE PER DWG. 8-4A. LOOP WIRE AROUND PIPE AT TOP OF SLAB.
- ⑭ FLANGE X MJ ADAPTER. RESTRAIN MJ WITH EBAA MEGALUG 1100 OR APPROVED EQUAL.

NOTES:

- A. DOUBLE CHECK DETECTOR ASSEMBLY SHALL BE APPROVED BY THE STATE OF CALIFORNIA DIVISION OF DRINKING WATER AND BE ON THE MOST RECENT LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES. (www.emd.saccounty.net/EC/Pages/CrossConnection.aspx) (www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Publications.shtml) (www.usc.edu/dept/fccchr/list.html)
- B. IF SPECIFICALLY CALLED OUT ON THE PLANS, DO NOT PROVIDE FIRE DEPARTMENT CONNECTION. IN THAT CASE, INSTALL FL X FL 90° ELBOW INSTEAD OF FL X FL TEE.
- C. PIPE SHALL BE DUCTILE IRON. FLANGES SHALL BE CLASS D.
- D. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.
- E. BYPASS DETECTOR ASSEMBLY SHALL BE MAINTAINED IN OPERABLE CONDITION AT ALL TIMES BY OWNER.

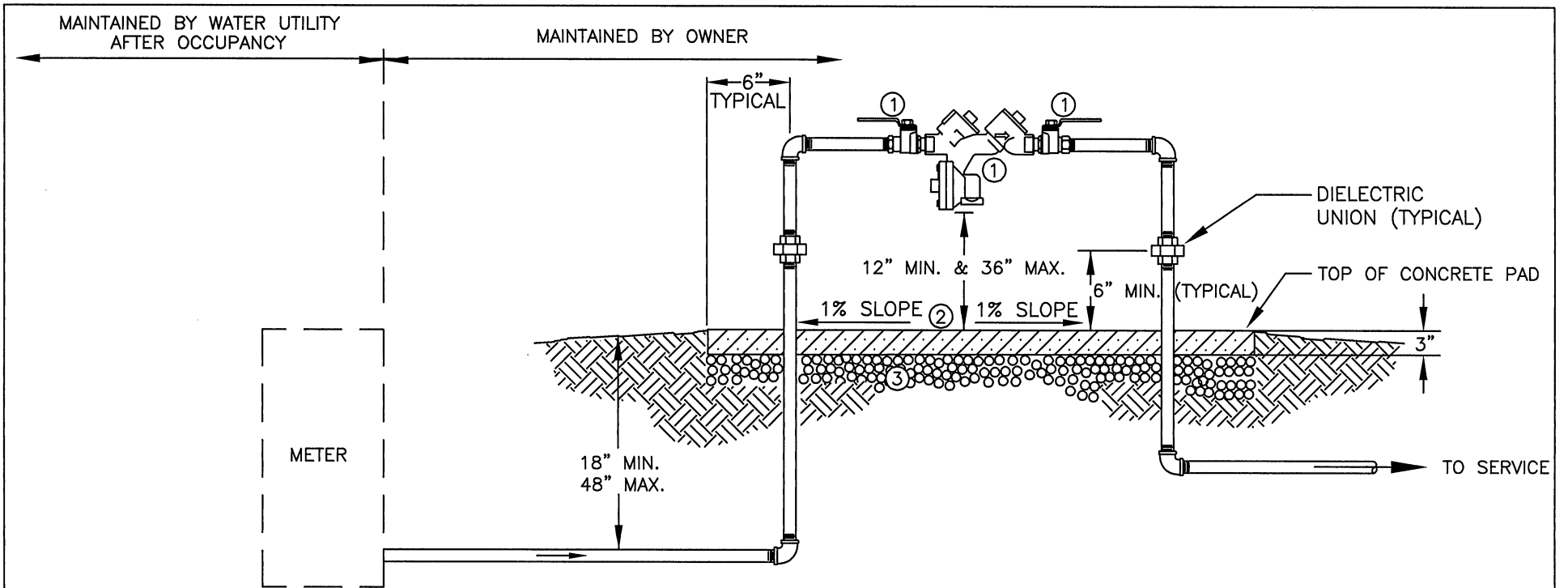
**SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY**

**FIRE PROTECTION
DETAIL**

Michael L. Peterson
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SCALE: NONE
DATE: 11/15

8-7



NOTES:

- A. REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY SHALL BE APPROVED BY THE STATE OF CALIFORNIA DIVISION OF DRINKING WATER AND BE ON THE MOST RECENT LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES.
(www.emd.saccounty.net/EC/Pages/CrossConnection.aspx)
(www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Publications.shtml)
(www.usc.edu/dept/fccchr/list.html)
- B. ALL PIPE SHALL BE GALVANIZED SCHEDULE 40 STEEL, TYPE K COPPER, OR BRASS. BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE WRAP OR 10 MIL POLYETHYLENE TAPE SO THAT NO SOIL IS IN CONTACT WITH METAL.
- C. GALVANIZED PIPE SHALL HAVE ANODE BAG PER COUNTY CODE SECTION 16.24.100. INSTALL DIELECTRIC COUPLING OR FITTING BETWEEN DISSIMILAR METALS.

- ① REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY, WITH 2 BRONZE RESILIENT SEATED BALL VALVES MINIMUM WORKING PRESSURE 175 PSI.
- ② 3" SLAB - 18" WIDE WITH VARYING LENGTH
- ③ 1/2" OR 3/4" CRUSHED ROCK, 4" MINIMUM THICKNESS, MECHANICALLY COMPACTED TO 95% COMPACTION.

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

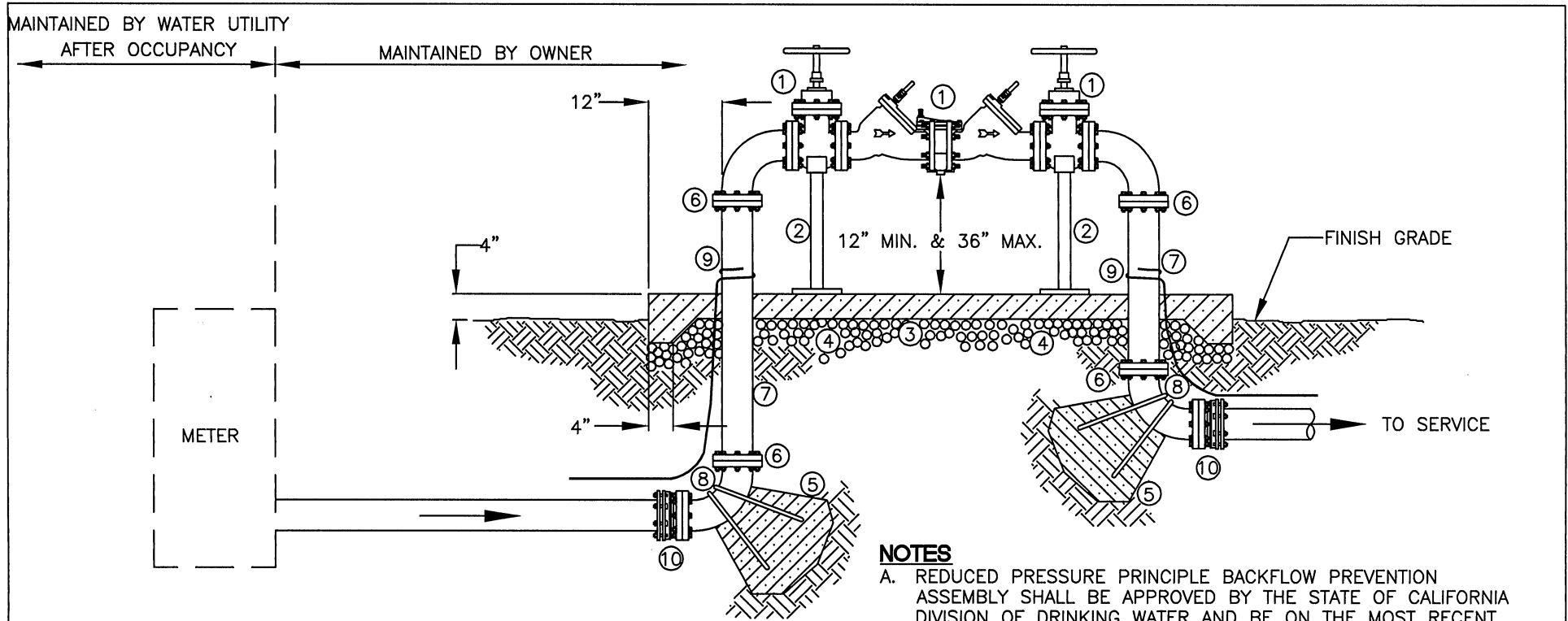
**REDUCED PRESSURE BACKFLOW
PREVENTER 1" TO 2"**

Michael J. Peters

DIRECTOR, DEPARTMENT OF WATER RESOURCES

SCALE: NONE
DATE: 11/15

8-8A

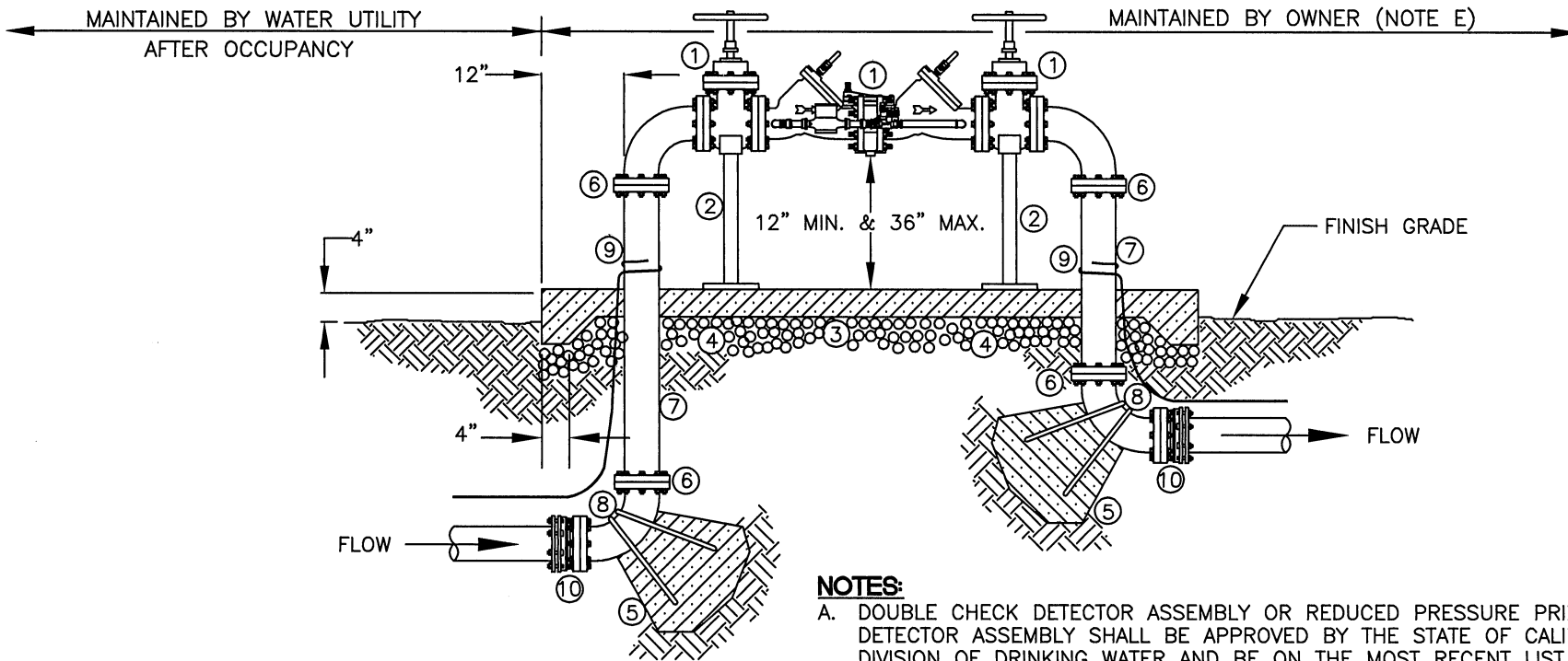


- ① REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY, WITH 2 RESILIENT WEDGE GATE VALVES, FLANGED, WITH HANDWHEEL OPERATORS.
- ② PIPE SUPPORT, MIN. 2" GALVANIZED SCH 40.
- ③ 4" CONCRETE SLAB - 24" WIDE WITH VARYING LENGTH.
- ④ 6" CRUSHED AGGREGATE COMPACTED TO 95% COMPACTION
- ⑤ THRUST BLOCK (PER DWG. 8-3A) WITH #5 REBARS. WRAP THE PORTION OF THE REBAR NOT EMBEDDED IN CONCRETE WITH 20 MIL POLYETHYLENE TAPE .
- ⑥ FLANGE CONNECTION ONLY.
- ⑦ FLANGE X FLANGE SPOOL, DUCTILE IRON. WRAP WITH 2 LAYERS 20 MIL TAPE AT SLAB PENETRATION
- ⑧ FLANGE X FLANGE 90° ELBOW, DUCTILE IRON.
- ⑨ LOCATING WIRE PER DWG. 8-4A. LOOP WIRE AROUND PIPE AT TOP OF SLAB.
- ⑩ FLANGE X MJ ADAPTER, RESTRAINED.

- NOTES**
- A. REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY SHALL BE APPROVED BY THE STATE OF CALIFORNIA DIVISION OF DRINKING WATER AND BE ON THE MOST RECENT LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES.
www.emd.saccounty.net/EC/Pages/CrossConnection.aspx
www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Publications.shtml
www.usc.edu/dept/fccchr/list.html
 - B. PIPE SHALL BE DUCTILE IRON. FLANGES SHALL BE CLASS D.
 - C. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL. POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.

Michael J. Geller
 DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY MUNICIPAL SERVICES AGENCY	
REDUCED PRESSURE BACKFLOW PREVENTER 3" AND LARGER	
SCALE: NONE DATE: 11/15	8-8B



NOTES:

- A. DOUBLE CHECK DETECTOR ASSEMBLY OR REDUCED PRESSURE PRINCIPLE DETECTOR ASSEMBLY SHALL BE APPROVED BY THE STATE OF CALIFORNIA DIVISION OF DRINKING WATER AND BE ON THE MOST RECENT LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES.
www.emd.saccounty.net/EC/Pages/CrossConnection.aspx
www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Publications.shtml
www.usc.edu/dept/fccchr/list.html
- B. PIPE SHALL BE DUCTILE IRON. FLANGES SHALL BE CLASS D.
- C. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL. POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.
- D. PROVIDE TAMPER SWITCHES AND CHAIN LOCK IF REQUIRED BY FIRE DEPARTMENT.
- E. BYPASS DETECTOR ASSEMBLY SHALL BE MAINTAINED IN OPERABLE CONDITION AT ALL TIMES BY OWNER.

- ① DOUBLE CHECK DETECTOR ASSEMBLY OR RP PRINCIPLE DETECTOR ASSEMBLY. TYPE AS CALLED OUT ON PLANS, WITH 2 RESILIENT WEDGE GATE VALVES, FLANGED, WITH HANDWHEEL OPERATORS.
- ② PIPE SUPPORT, MIN. 2" GALVANIZED SCH 40.
- ③ 4" CONCRETE SLAB - 24" WIDE WITH VARYING LENGTH.
- ④ 6" CRUSHED AGGREGATE COMPACTED TO 95% COMPACTION
- ⑤ THRUST BLOCK (PER DWG. 8-3A) WITH #5 REBARS. WRAP THE PORTION OF THE REBAR NOT EMBEDDED IN CONCRETE WITH 20 MIL POLYETHYLENE TAPE.
- ⑥ FLANGE CONNECTION ONLY.
- ⑦ FLANGE X FLANGE SPOOL, DUCTILE IRON. WRAP WITH 2 LAYERS 20 MIL TAPE AT SLAB PENETRATION.
- ⑧ FLANGE X FLANGE 90° ELBOW, DUCTILE IRON.
- ⑨ LOCATING WIRE PER DWG. 8-4A. LOOP WIRE AROUND PIPE AT TOP OF SLAB.
- ⑩ FLANGE X MJ ADAPTER, RESTRAINED.

Mickel

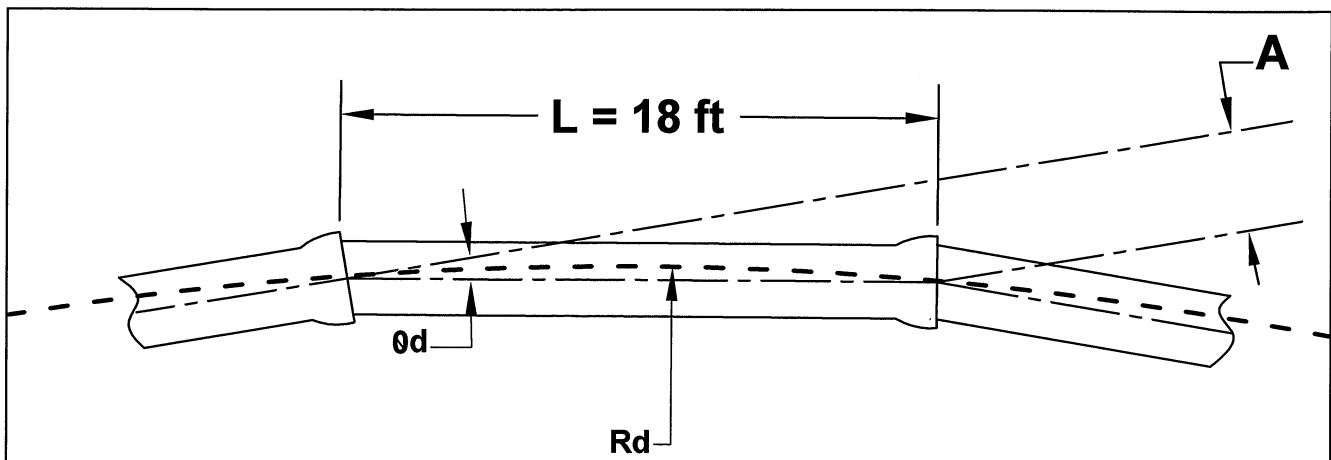
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

**DOUBLE CHECK DETECTOR
OR RP PRINCIPLE DETECTOR
6" AND LARGER**

SCALE: NONE
DATE: 11/15

8-8C



θd = Maximum joint deflection angle (degrees)

A = Offset at the end of the pipe (inches)

Rd = Minimum radius of curve produced by succession of joints (feet)

MAXIMUM JOINT DEFLECTION FOR DUCTILE IRON PIPE						
Size Of Pipe (inches)	UNRESTRAINED JOINTS			RESTRAINED JOINTS		
	Maximum Deflection Angle, " θd " (degrees)	Minimum Radius, " Rd " (feet)	Offset At Free End, " A " (inches)	Maximum Deflection Angle, " θd " (degrees)	Minimum Radius, " Rd " (feet)	Offset At Free End, " A " (Inches)
4	2.5	400	10	2.5	400	10
6	2.5	400	10	2.5	400	10
8	2.5	400	10	2.5	400	10
10	2.5	400	10	2.5	400	10
12	2.5	400	10	2.5	400	10
14	2.5	400	10	2.0	500	8
16	2.5	400	10	2.0	500	8
18	2.5	400	10	2.0	500	8
20	2.5	400	10	1.25	800	5
24	2.5	400	10	1.25	800	5
30	2.5	400	10	1.00	1100	4
36	2.5	400	10	0.75	1400	3
42	2.0	500	8	0.25	4000	1

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

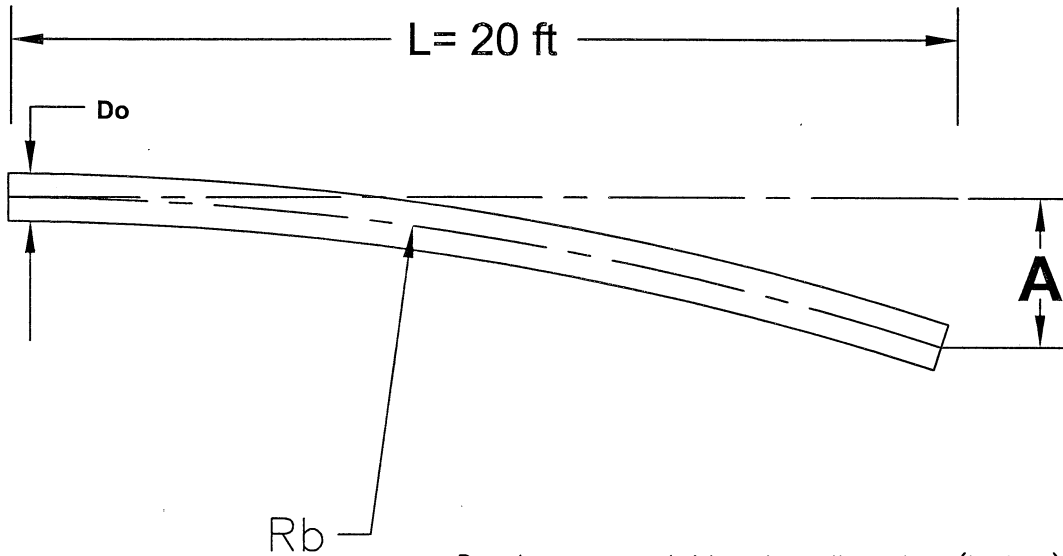
Michael J. Peter

DIRECTOR, DEPARTMENT OF WATER RESOURCES

**MAXIMUM DEFLECTION
FOR DUCTILE IRON PIPE**

SCALE: NONE
DATE: 8/13

8-9A



Do=Average outside pipe diameter (inches)
 A=Offset at the end of the pipe (inches)
 Rb=Minimum bending radius (feet)

MAXIMUM BENDING DEFLECTION FOR PVC PIPE				
Nominal Pipe Diameter	Average Outside Pipe Diameter "Do"	Minimum Wall Thickness	Minimum Bending Radius "Rb"	Offset at Free End, "A"
(inches)	(inches)	(inches)	(feet)	(inches)
AWWA C900 CLASS 150 DR 18				
4	4.800	0.267	120	20
6	6.900	0.383	185	13
8	9.050	0.503	240	10
10	11.100	0.617	400	6
12	13.200	0.733	800	3
AWWA C905 CLASS 235 DR 18				
14	15.300	0.850	1500	2
16	17.400	0.967	1500	2
18	19.500	1.083	1500	2

JOINT DEFLECTION OF AWWA C900 & C905 PVC PIPE IS PROHIBITED.

Michael Stever
 DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
 MUNICIPAL SERVICES AGENCY

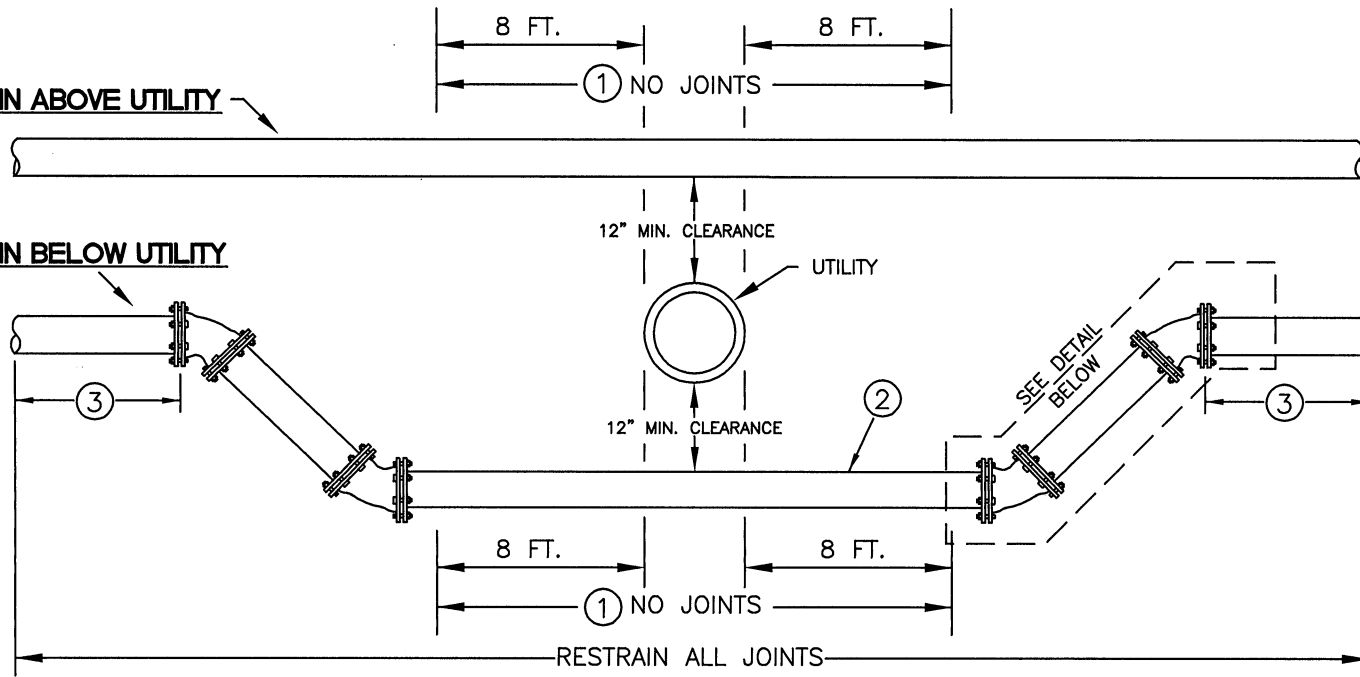
**MAXIMUM DEFLECTION
 FOR PVC PIPE**

SCALE: NONE
 DATE: 8/13

8-9B

WATER MAIN ABOVE UTILITY

WATER MAIN BELOW UTILITY



① THE "NO JOINTS" RESTRICTION APPLIES ONLY TO NEW WATER PIPE INSTALLED ABOVE OR BELOW STORM DRAINAGE, SEWER, RECYCLED WATER, OR HAZARDOUS FLUIDS (SEE NOTE A).

② IF SUBJECT TO THE "NO JOINTS" RESTRICTION, MINIMUM LENGTH SHALL BE 16 FT. + OUTER DIAMETER OF UTILITY.

③ MINIMUM PER 8-3B, UNLESS OTHERWISE CALLED OUT ON PLANS SIGNED BY WATER UTILITY. IF PIPE IS EXISTING, REMOVE AND REPLACE WITH CLASS 350 DIP.

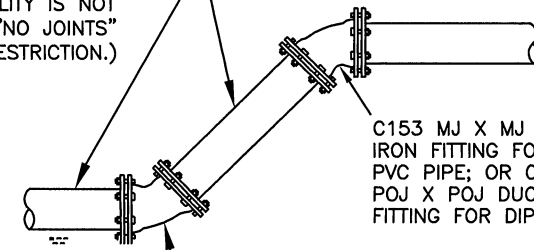
LEGEND:

- DIP = DUCTILE IRON PIPE
- MJ = MECHANICAL JOINT
- PVC = POLYVINYL CHLORIDE PIPE
- POJ = PUSH ON JOINTS

NOTES:

- A. APPLICABILITY: (1) DETAIL APPLIES TO 12" & SMALLER WATER MAINS; (2) PER 2008 CALIFORNIA WATER REGULATIONS, NEW POTABLE WATER MAINS SHALL NOT BE INSTALLED BELOW STORM DRAINAGE, SEWER, RECYCLED WATER, OR HAZARDOUS FLUIDS. WRITTEN APPROVAL FROM CALIFORNIA DIVISION OF DRINKING WATER SHALL BE RECEIVED BY WATER UTILITY PRIOR TO INSTALLATION OF NON-COMPLIANT WATER MAINS. ADDITIONAL DESIGN REQUIREMENTS WILL APPLY.
- B. BENDS SHALL NOT EXCEED 22.5° OF BEND UNLESS OTHERWISE SPECIFIED ON PLANS SIGNED BY THE WATER UTILITY.
- C. RESTRAINING DEVICES FOR MJ'S: FOR DUCTILE IRON USE EBAA MEGALUG 1100, STAR PIPE PRODUCTS STARGRIP 3000, OR SIGMA ONE-LOK SLDE; FOR PVC PIPE USE EBAA 2000PV, STAR PIPE PRODUCTS STARGRIP 4000, OR SIGMA ONE-LOK SLCE.
- D. RESTRAINING DEVICES FOR PUSH-ON JOINTS: FOR DUCTILE IRON USE U.S. PIPE FIELD LOK GASKETS, U.S. PIPE TR FLEX PIPE, OR APPROVED EQUAL; RESTRAINED PVC PUSH-ON JOINTS NOT ALLOWED, USE DUCTILE IRON PIPE ONLY FOR RESTRAINED PUSH-ON JOINTS.
- E. INSTALL LOCATING WIRE PER 8-4A.
- F. ALL BURIED METAL SHALL BE ENCASED WITH AWWA C105 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.

C151 CLASS 350 DIP
(C900 PVC DR 18 MAY BE USED IF UTILITY IS NOT SUBJECT TO "NO JOINTS" RESTRICTION.)



DEGREE OF BEND PER PLAN AND PROFILE SHEET (TYPICAL)

Michael J. [Signature]

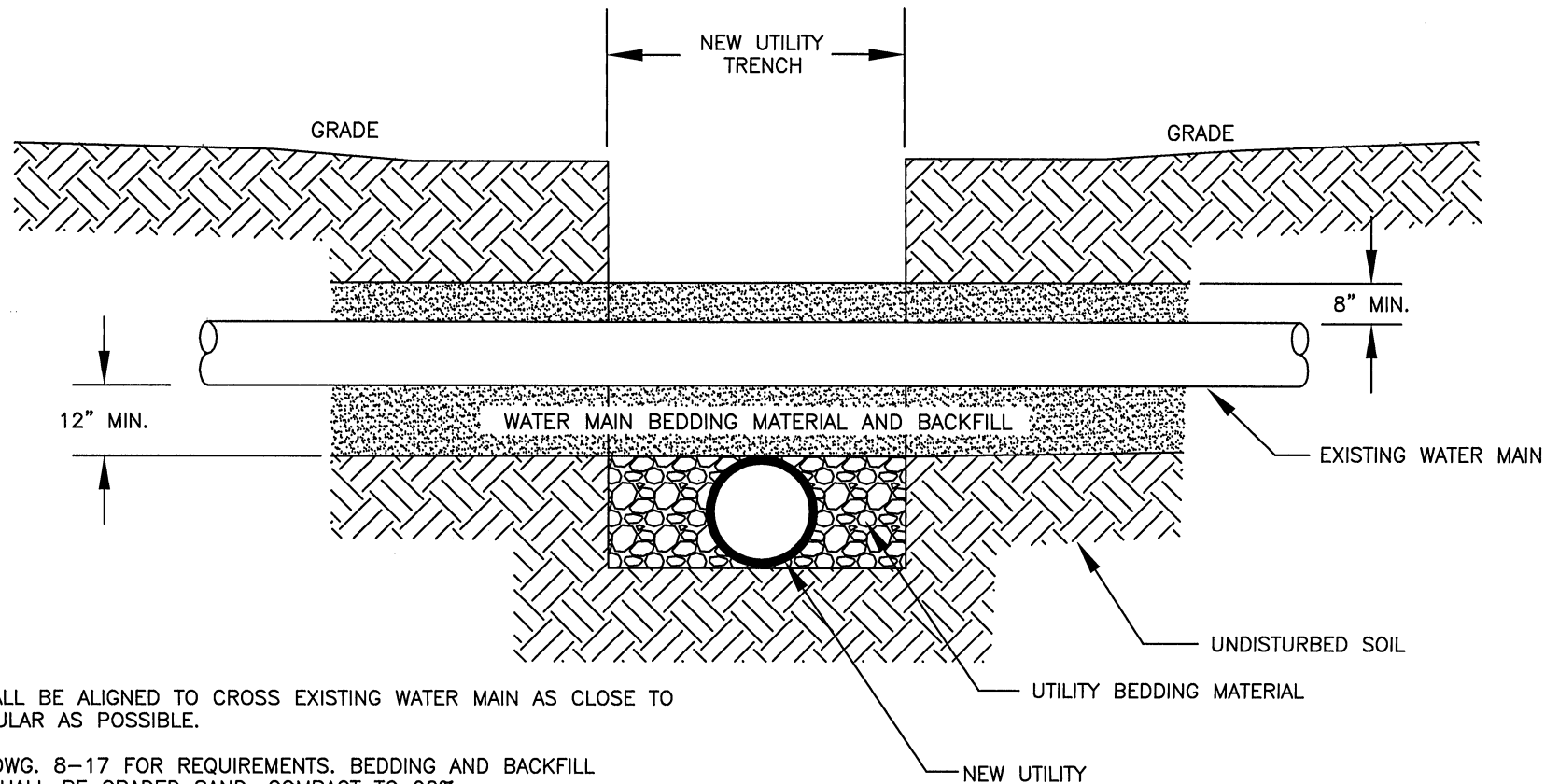
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY MUNICIPAL SERVICES AGENCY

UTILITY CROSSING

SCALE: NONE
DATE: 11/15

8-10



NOTES:

1. UTILITY SHALL BE ALIGNED TO CROSS EXISTING WATER MAIN AS CLOSE TO PERPENDICULAR AS POSSIBLE.
2. SEE STD. DWG. 8-17 FOR REQUIREMENTS. BEDDING AND BACKFILL MATERIAL SHALL BE GRADED SAND. COMPACT TO 90%.
3. REPAIR OR REPLACE EXISTING LOCATING WIRE, POLYETHYLENE ENCASEMENT, AND UNDERGROUND MARKING TAPE.
4. FOR EXISTING ASBESTOS CEMENT (ACP) WATER MAINS:
 PRIOR TO EXCAVATION OF NEW UTILITY TRENCH, EXCAVATE AND REMOVE EXISTING ACP 5 TO 10 FEET BEYOND THE PLANNED TRENCH LIMITS OF NEW UTILITY TO AN EXISTING ACP JOINT AND REPLACE WITH CLASS 350 DUCTILE IRON PIPE (DIP) USING TRANSITION COUPLINGS (SMITH-BLAIR OMNI 442 WITH 12-INCH SLEEVE AND S.S. HARDWARE). WRAP DIP AND COUPLINGS WITH 8 MIL POLYETHYLENE AND BACKFILL WITH CLSM 6 INCHES UNDER DIP TO SPRINGLINE WITHIN 5 FEET OF ACP. BACKFILL REST OF PIPE ZONE WITH SAND. COMPLY WITH WRITTEN REQUIREMENTS OBTAINED FROM THE WATER UTILITY FOR THE REPLACEMENT.

Michael J. Jones
 DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
 MUNICIPAL SERVICES AGENCY

**UTILITY CROSSING UNDER
 EXISTING WATER MAIN**

SCALE: NONE
 DATE: 11/15

8-11

A 2" TEMPORARY BLOW OFF IS SHOWN. FOR 3" TEMPORARY BLOW OFF, USE 3" BRONZE BALL VALVE OR 3" AWWA GATE VALVE, WITH 3" BRONZE PLUG, 3" GALVANIZED PIPE & FITTING, 3" THREADED TAP AT MJ CAP/PLUG, AND CHRISTY B1324 TRAFFIC BOX, OR EQUAL.

BOLT DOWN H2O TRAFFIC RATED GALVANIZED STEEL COVER. COVER SHALL BE LABELED WITH BEAD WELDED LETTERS: "WATER" FOR POTABLE, "RECYCLED WATER" FOR RECYCLED AND NON-POTABLE WATER, "RAW WATER" FOR RAW WATER. (SEE NOTE 1)

BRONZE PLUG W/ 1/2" SQUARE INDENTED NUT

10"x17" BOX WITH H/20 TRAFFIC LOADING: CHRISTY B1017BOX, BROOKS 3 1/2-T PB, OR APPROVED EQUAL.

2" BRONZE BALL CURB STOP WITH TEFLON COATED BALL, F.I.P.T. x F.I.P.T. WITH LOCKWING.

3/4" TO 1"x4"x16" CONCRETE BLOCKS TO HELP LEVEL AND SUPPORT BOX. USE MINIMUM OF ONE BLOCK ON ALL FOUR SIDES OF BOX. COVER ANY OPENINGS OR HOLES IN UTILITY BOX WITH CONCRETE BLOCKS.

2" GALVANIZED SCH 40 STEEL PIPE & 90° ELBOW. WRAP WITH 10 MIL POLYETHYLENE TAPE, DOUBLE WRAP PIPE THREADS (TYPICAL). A STREET 90° ELBOW MAY BE USED IF THE END OF THE MJ CAP/PLUG IS FLAT.

THRUST BLOCK (12" AND SMALLER MAINS), SIZE FOR "DEAD END" PER DWG. 8-3A.

UNDISTURBED EARTH

3/4" CRUSHED ROCK, COMPACTED

MJ CAP OR MJ PLUG WITH 2" NPT THREADED OPENING

WATER MAIN

FOR MAINS LARGER THAN 12": DO NOT INSTALL THRUST BLOCK, USE RESTRAINED JOINTS OVER RESTRAINED LENGTH SHOWN ON PLANS.

NOTES:

1. RECYCLED AND NONPOTABLE WATER: TOP OF FRAME AND COVER SHALL BE COATED PURPLE PRIOR TO INSTALLATION PER STANDARD SPECIFICATIONS.

Michael J. Peterson

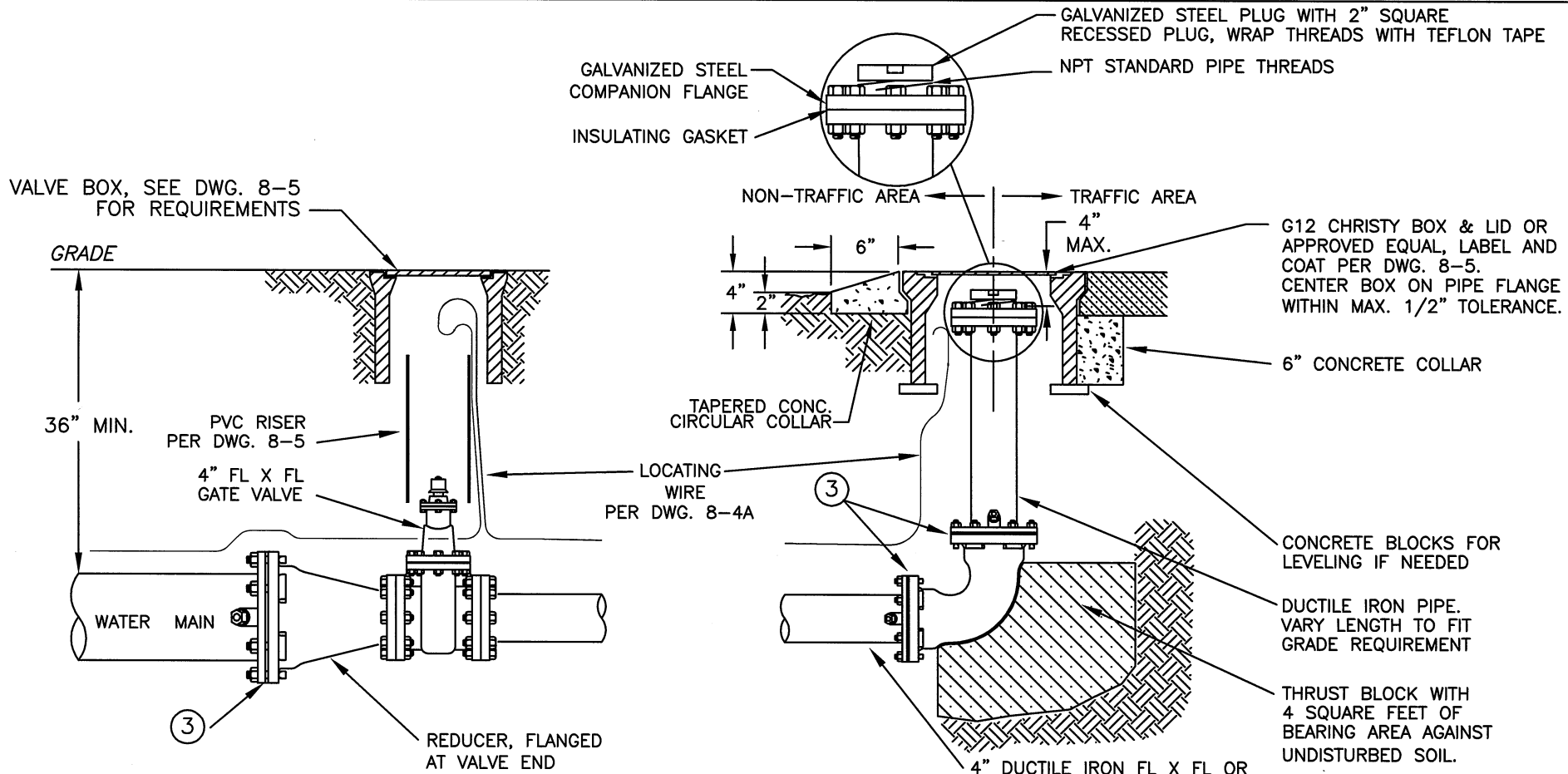
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

**TEMPORARY
BLOW OFF ASSEMBLY**

SCALE: NONE
DATE: 8/13

8-12

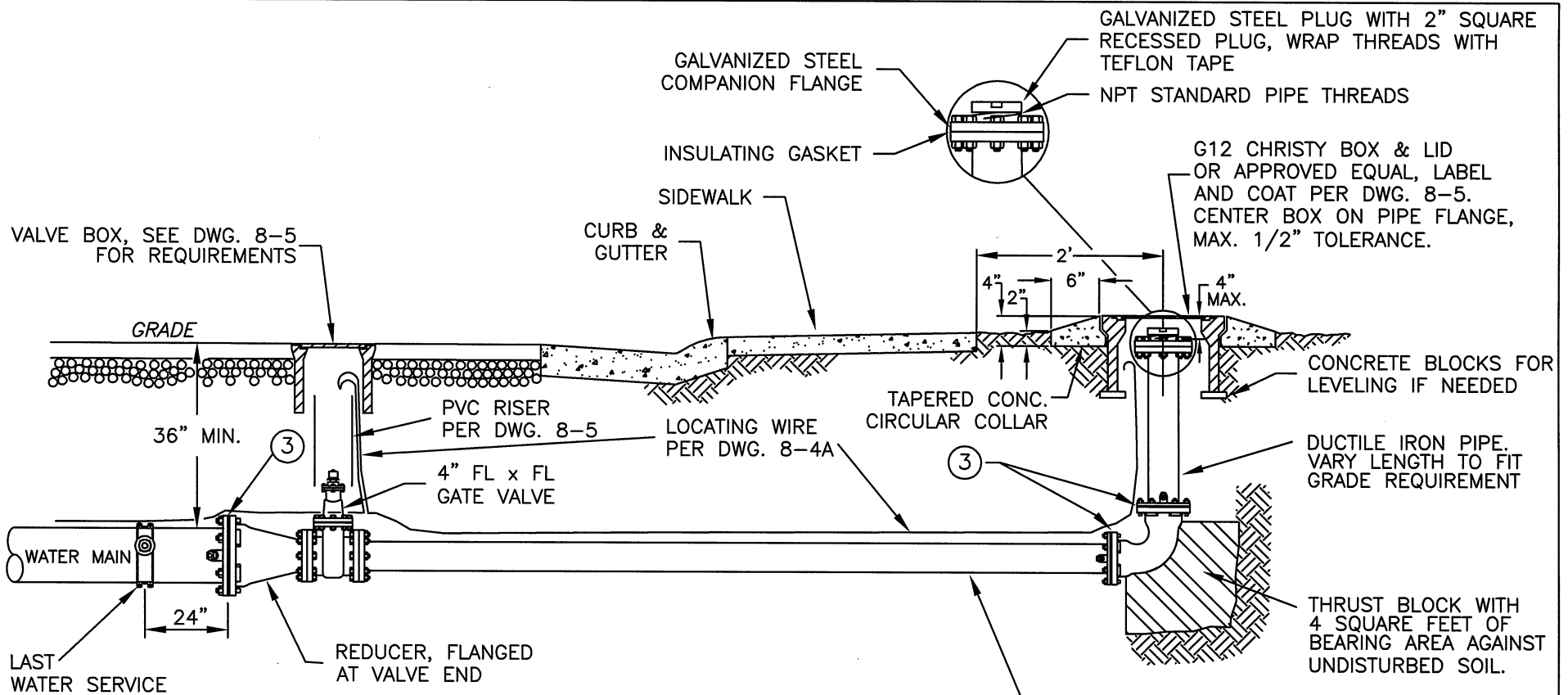


NOTES:

1. FITTINGS SHALL BE DUCTILE IRON, AWWA C110 OR C153.
2. PROVIDE 6 INCHES SAND BEDDING. BACKFILL WITH SAND TO 8 INCHES ABOVE THE TOP OF PIPE. COMPACT TO 90% RELATIVE COMPACTION.
3. THESE JOINTS MAY BE FLANGED, RESTRAINED MECHANICAL JOINT WITH APPROVED RESTRAINING DEVICES, OR PUSH-ON WITH U.S. PIPE FIELD-LOK GASKETS OR APPROVED EQUAL.
4. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.

Michael L. Peters
 DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY MUNICIPAL SERVICES AGENCY	
4" BLOW OFF ASSEMBLY AT END OF MAIN	
SCALE: NONE DATE: 8/13	8-13A



NOTES:

1. FITTINGS SHALL BE DUCTILE IRON, AWWA C110 OR C153.
2. PROVIDE 6 INCHES SAND BEDDING. BACKFILL WITH SAND TO 8 INCHES ABOVE THE TOP OF PIPE. COMPACT TO 90% RELATIVE COMPACTION.
3. THESE JOINTS MAY BE FLANGED, RESTRAINED MECHANICAL JOINT WITH APPROVED RESTRAINING DEVICES, OR PUSH-ON WITH U.S. PIPE FIELD-LOK GASKETS OR APPROVED EQUAL.
4. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.

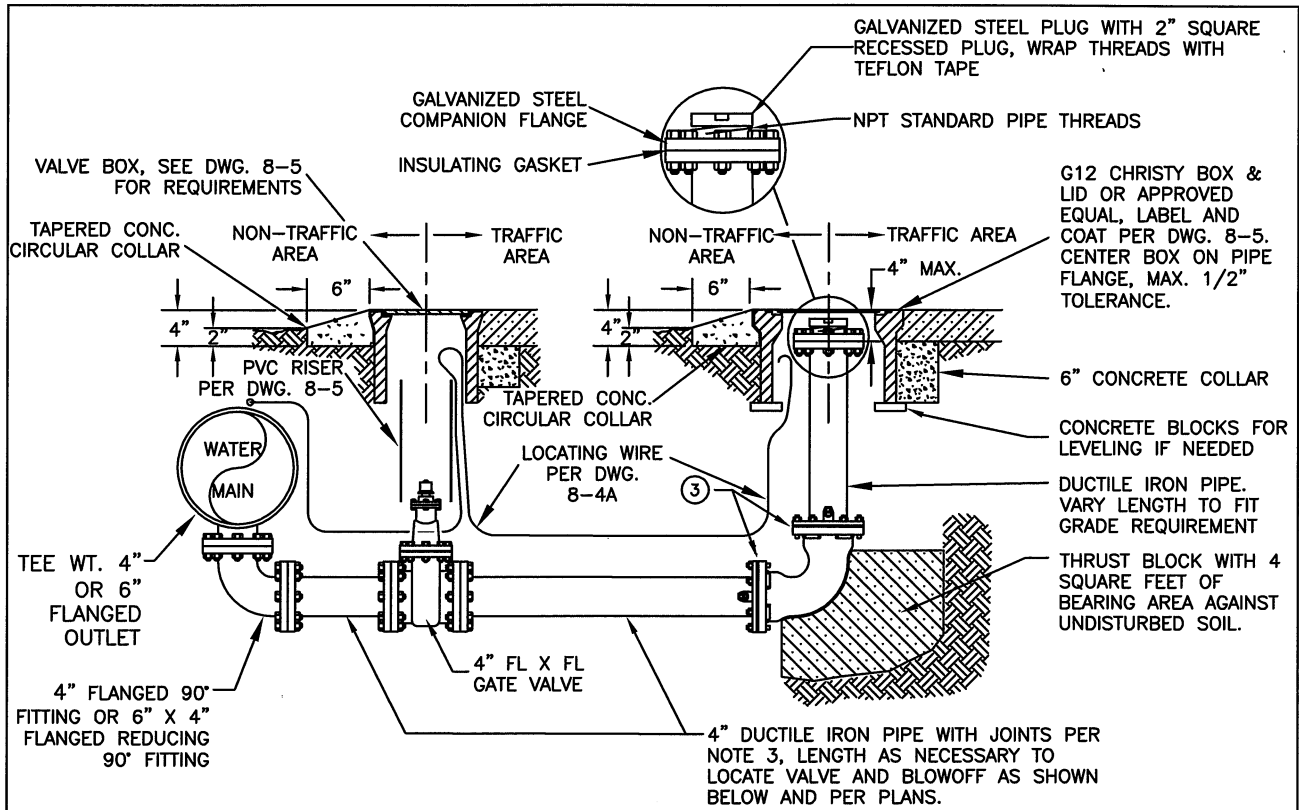
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

**4" BLOW OFF ASSEMBLY
AT END OF CUL-DE-SAC**

Michael L. Peters
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SCALE: NONE
DATE: 8/13

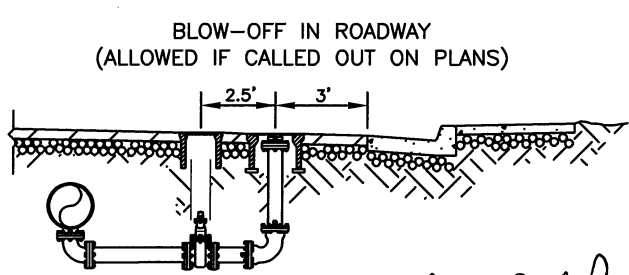
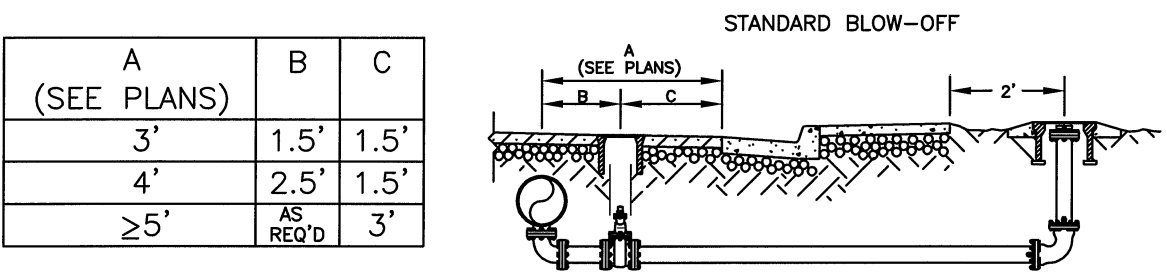
8-13 B



NOTES:

1. FITTINGS SHALL BE DUCTILE IRON, AWWA C110 OR C153.
2. PROVIDE 6 INCHES SAND BEDDING. BACKFILL WITH SAND TO 8 INCHES ABOVE THE TOP OF PIPE. COMPACT TO 90% RELATIVE COMPACTION.
3. JOINTS MAY BE FLANGED, RESTRAINED MECHANICAL JOINT WITH APPROVED RESTRAINING DEVICES, OR PUSH-ON WITH U.S. PIPE FIELD-LOK GASKETS OR APPROVED EQUAL.
4. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.
5. RECYCLED AND NONPOTABLE WATER: THE TOP SURFACES OF BOXES AND LIDS SHALL BE COATED PURPLE PRIOR TO INSTALLATION PER STANDARD SPECIFICATIONS.

UNLESS OTHERWISE SPECIFIED ON THE PLANS, LOCATION OF VALVE AND BLOW-OFF BOX SHALL CONFORM TO THE FOLLOWING:



**SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY**

**4" IN-LINE BLOW-OFF
ASSEMBLY**

SCALE: NONE
DATE: 8/13

8-13C

Michael L. Peterson
DIRECTOR, DEPARTMENT OF WATER RESOURCES

3/16" STEEL, 6" X 6" SQUARE TUBE 18" HIGH WITH AN 8-1/2" CAP, SPOT WELDED AT THE TOP.

2-3/8" BOLTS, GRADE 3 WITH WASHER.

1/4" THICK STEEL LID. TACK WELD 1/4" THICK BY 1" WIDE STEEL PLATE AROUND PERIMETER OF LID SO TOP OF LID IS FLUSH W/ TOP OF BOX. CUT 5" X 5" SQUARE HOLE IN TOP OF LID. SQUARE HOLE TO BE CENTERED RELATIVE TO WIDTH OF LID. LID SHALL BE BOLTED TO BOX. LID SHALL BE LABELED WITH BEAD WELDED LETTERS: "RECYCLED WATER" FOR RECYCLED AND NONPOTABLE WATER; "RAW WATER" FOR RAW WATER; AND UNLABELED FOR POTABLE WATER. LID & TUBE ASSEMBLY SHALL BE PWAE118M BY PLACER WATERWORKS OR EQUAL APPROVED BY THE WATER UTILITY.

WELD 2 LOCKING NUTS TO LID TO ACCEPT BOLTS.

1" SCHEDULE 40 GALVANIZED STEEL PIPE W/STEEL THREADED COUPLING AND 1" TO 3/4" PVC ADAPTER. OPERATOR MUST BE ABLE TO UNSCREW PVC RISER FROM COUPLING.

1" CRISPIN UL-10 COMBINATION AIR RELEASE/VACUUM VALVE OR SCWA APPROVED EQUAL

1"- 90° BRONZE FITTING (TYP)

1"- BRASS NIPPLE (TYP)

1 1/4" X 1" BRONZE THREADED BUSHING

COPPER PIPE, TYPE K PER AWWA C800 W/ POLYETHYLENE ENCASEMENT; CONTINUOUS PIPE, NO JOINTS PERMITTED (SEE NOTE 6 FOR AN EXCEPTION).

1" BRONZE BALL CORP. STOP WITH TEFLON COATED BALL.

CLEAN INTERIOR AND EXTERIOR SURFACES OF LID AND TUBE WITH DEVPREP 88 OR EQUAL, THEN COAT ALL SURFACES, NUTS AND BOLTS W/ DEVOE BAR-RUST 233H EPOXY UNDERCOAT, 2-3MILS, COLOR GRAY; THEN APPLY 2 COATS OF DEVOE ACRYLIC 1.5 MILS TO 2.0 MILS, EACH. COLOR SHALL BE HUNTER GREEN FOR POTABLE WATER AND RAW WATER; PURPLE FOR RECYCLED AND NONPOTABLE WATER.

3/4" SCHEDULE 40 PVC

#16 MESH BRONZE OR STAINLESS STEEL SCREEN

RIVET 1" X 4" STAINLESS STEEL NAME PLATE THAT READS "SACRAMENTO COUNTY WATER" TO TUBING.

H20 TRAFFIC RATED BOX TO ACCEPT BOLT DOWN METAL LID. BOX SHALL HAVE A 13" X 24" INSIDE DIMENSION AS MADE BY CHRISTY, BROOKS OR APPROVED EQUAL.

6" DIAMETER PVC SLEEVE

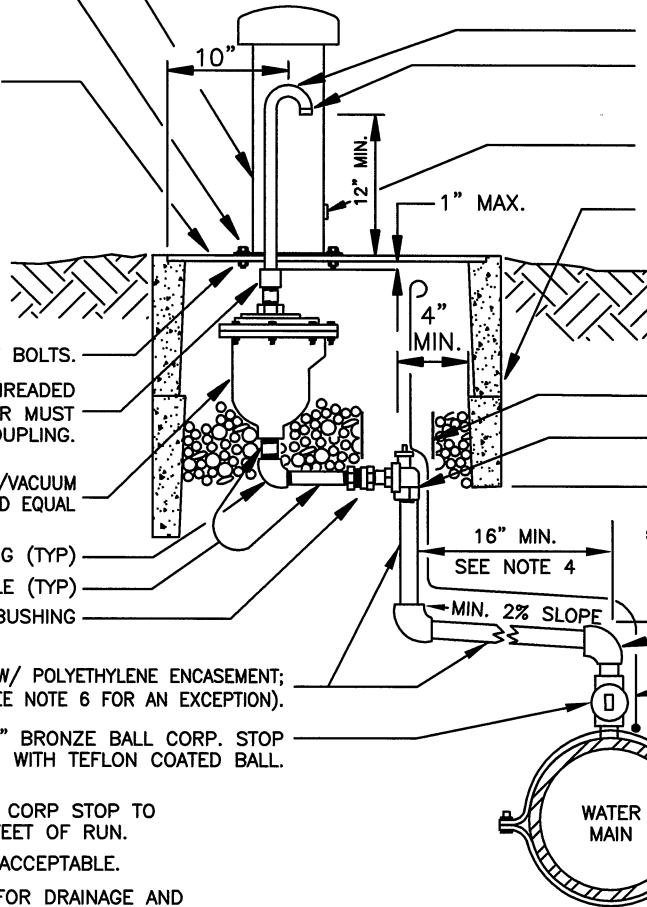
1" BRONZE ANGLE METER STOP BALL VALVE WITH TEFLON COATED BALL: JONES OR EQUAL APPROVED BY THE WATER UTILITY.

BACKFILL W/ SAND TO 12 INCHES ABOVE PIPE AND PLACE WARNING TAPE 12 INCHES ABOVE PIPE

1"- 90° COPPER FITTING (TYPICAL)

LOCATING WIRE PER DWG. 8-4A

BRONZE SERVICE SADDLE AND BOLTS, WRAP W/ 8 MIL POLYETHYLENE ENCASEMENT



NOTES:

1. MAINTAIN A MIN 2% CONTINUOUS UPWARD SLOPE FROM CORP STOP TO AIR VALVE. INSPECTOR SHALL VERIFY SLOPE EVERY 5 FEET OF RUN.
2. FLARE, SOLDER JOINT, OR COMPRESSION FITTINGS ARE ACCEPTABLE.
3. PROVIDE 3' X 3' X 3' OF 1/2" CRUSHED AGGREGATE FOR DRAINAGE AND SUPPORT UNDER VALVE, COMPACT TO 95%.
4. SEE PLANS FOR LOCATION INFORMATION. UNLESS OTHERWISE SPECIFIED, LOCATE BOX 2' BEHIND SIDEWALK.
5. BOX SHALL NOT BE INSTALLED IN LOCATIONS SUBJECT TO TRAFFIC.
6. IF IT IS NECESSARY TO RELOCATE AN EXISTING INSTALLATION THAT IS UNDER EXISTING PAVEMENT: NEW COPPER PIPE MAY BE JOINED TO EXISTING COPPER PIPE WITH A MUELLER 110 H-15403 CONNECTOR.

Michael L. Peters
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

**1" COMBINATION AIR/
VACUUM VALVE**

SCALE: NONE
DATE: 8/13

8-14A

CLEAN INTERIOR AND EXTERIOR SURFACES OF LID AND TUBE WITH DEVPREP 88 OR EQUAL, THEN COAT ALL SURFACES, NUTS AND BOLTS W/ DEVOE BAR-RUST 233H EPOXY UNDERCOAT, 2-3MILS, COLOR GRAY; THEN APPLY 2 COATS OF DEVOE ACRYLIC 1.5 MILS TO 2.0 MILS, EACH. COLOR SHALL BE HUNTER GREEN FOR POTABLE WATER AND RAW WATER; PURPLE FOR RECYCLED AND NONPOTABLE WATER.

3/8" THICK STEEL LID. IF NEEDED, TACK WELD 1/4" THICK BY 1" WIDE STEEL PLATE AROUND PERIMETER OF LID SO TOP OF LID IS FLUSH W/ TOP OF BOX. CUT 5" X 5" SQUARE HOLE IN TOP OF LID. SQUARE HOLE SHALL BE CENTERED RELATIVE TO WIDTH OF LID. LID SHALL BE BOLTED TO BOX. LID SHALL BE LABELED WITH BEAD WELDED LETTERS: "RECYCLED WATER" FOR RECYCLED AND NONPOTABLE WATER; "RAW WATER" FOR RAW WATER; AND UNLABELED FOR POTABLE WATER. LID & TUBE ASSEMBLY SHALL BE PWAE218M BY PLACER WATERWORKS OR EQUAL APPROVED BY THE WATER UTILITY.

WELD 2 LOCKING NUTS TO LID TO ACCEPT BOLTS.

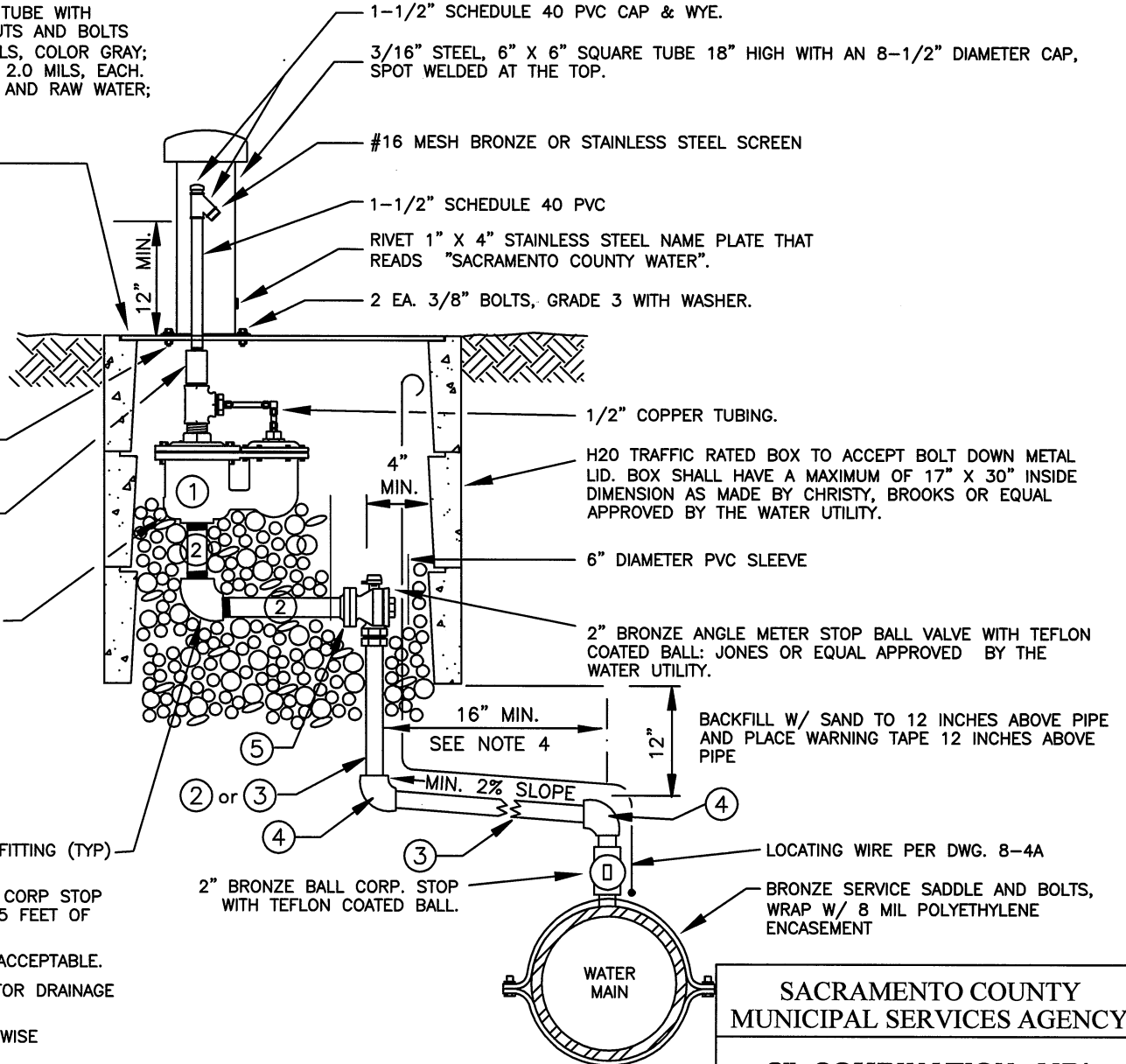
2" SCHEDULE 40 GALVANIZED STEEL PIPE W/STEEL THREADED COUPLING AND 2" TO 1-1/2" PVC ADAPTER. SCWA OPERATOR MUST BE ABLE TO UNSCREW PVC RISER FROM COUPLING.

- ① 2" CRISPIN C-20 OR UL-20 COMBINATION AIR RELEASE/VACUUM VALVE OR SCWA APPROVED EQUAL
- ② 2"- BRASS NIPPLE (TYP)
- ③ COPPER PIPE, TYPE K, PER AWWA C800 W/POLYETHYLENE ENCASEMENT; CONTINUOUS PIPE, NO JOINTS PERMITTED (SEE NOTE 6 FOR AN EXCEPTION).
- ④ 2"- 90° COPPER FITTING (TYP)
- ⑤ 2" BRONZE METER FLANGE

2"- 90° BRONZE FITTING (TYP)

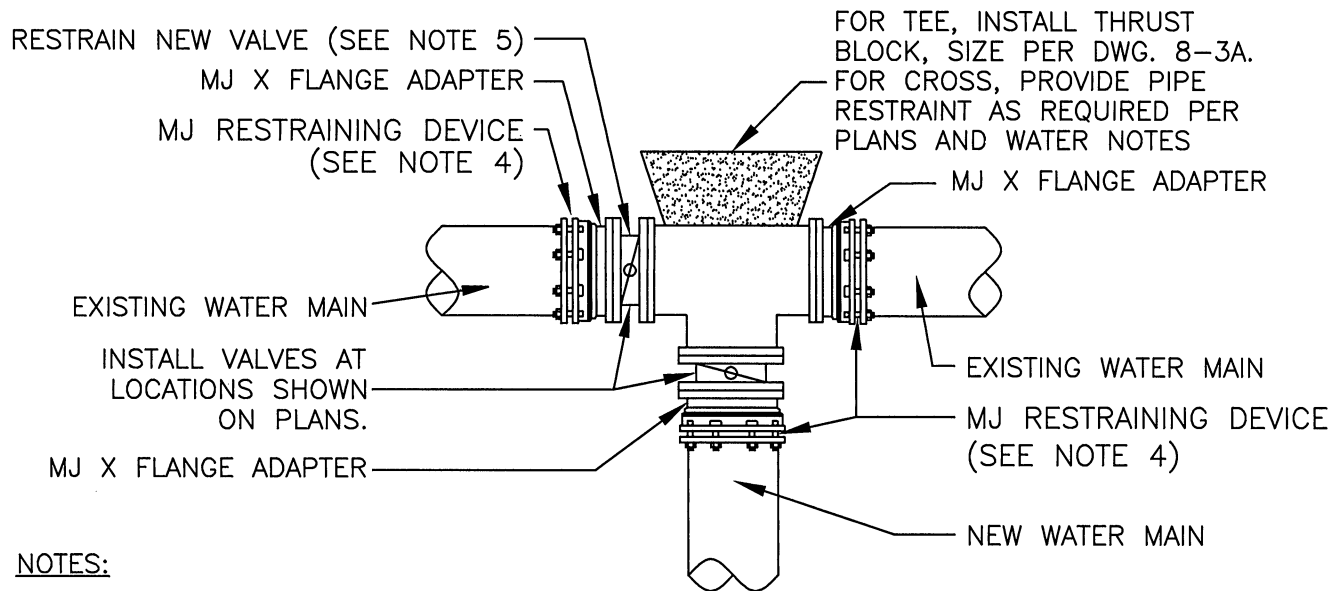
NOTES:

1. MAINTAIN A MIN 2% CONTINUOUS UPWARD SLOPE FROM CORP STOP TO AIR VALVE. INSPECTOR SHALL VERIFY SLOPE EVERY 5 FEET OF RUN.
2. FLARE, SOLDER JOINT, OR COMPRESSION FITTINGS ARE ACCEPTABLE.
3. PROVIDE 3' X 3' X 3' OF 1/2" CRUSHED AGGREGATE FOR DRAINAGE AND SUPPORT UNDER VALVE, COMPACT TO 95%.
4. SEE PLANS FOR LOCATION INFORMATION. UNLESS OTHERWISE SPECIFIED, LOCATE BOX 2' BEHIND SIDEWALK.
5. BOX SHALL NOT BE INSTALLED IN LOCATIONS SUBJECT TO TRAFFIC.
6. IF IT IS NECESSARY TO RELOCATE AN EXISTING INSTALLATION THAT IS UNDER EXISTING PAVEMENT: NEW COPPER PIPE MAY BE JOINED TO EXISTING COPPER PIPE WITH A MUELLER 110 H-15403 CONNECTOR.



Michael Peters
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY MUNICIPAL SERVICES AGENCY	
2" COMBINATION AIR/ VACUUM VALVE	
SCALE: NONE	8-14B
DATE: 8/13	



NOTES:

1. APPLICABILITY: THIS DETAIL SHALL BE USED WHEN (A) THE PLANS REQUIRE BOTH A NEW CONNECTION AND NEW IN-LINE VALVE IN AN EXISTING MAIN, OR WHEN (B) CALLED OUT ON THE PLANS.
2. DIG SUMP UNDER THE CUT AND PUMP ALL WATER FROM EXISTING MAIN AWAY FROM CUT-IN LOCATION. DO NOT ALLOW ANY WATER TO ENTER EXISTING PIPE. SPRAY EXISTING PIPE, ALL FITTINGS AND VALVES WITH A SOLUTION OF SUPER CHLORINATED WATER JUST PRIOR TO INSTALLATION.
3. RESTRAIN ALL JOINTS.
4. RESTRAINING DEVICES FOR MJ'S: FOR DUCTILE IRON USE EBAA MEGALUG 1100, STAR PIPE PRODUCTS STARGRIP 3000, OR SIGMA ONE-LOK SLCE; FOR PVC PIPE USE EBAA 2000PV, STAR PIPE PRODUCTS STARGRIP 4000, OR SIGMA ONE-LOK SLCE.
5. RESTRAIN NEW IN-LINE VALVE WITH A CONCRETE ANCHOR BLOCK PER A DESIGN APPROVED BY THE WATER UTILITY. SUBMIT DESIGN TO WATER UTILITY FOR REVIEW AND APPROVAL.
6. CONNECT NEW LOCATING WIRE TO EXISTING LOCATING WIRE PER DWG. 8-4A.
7. FOR EXISTING ASBESTOS CEMENT (ACP) WATER MAINS: REMOVE EXISTING ACP 5 TO 10 FEET BEYOND EACH SIDE OF CUT-IN TO AN EXISTING ACP JOINT AND REPLACE WITH CLASS 350 DIP USING TRANSITION COUPLINGS (SMITH-BLAIR OMNI 442 WITH 12-INCH SLEEVE AND S.S. HARDWARE). PLACE CLSM 6-INCHES UNDER DIP TO SPRINGLINE WITHIN 5 FEET OF ACP.
8. BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.

Michael J. Galt
DIRECTOR, DEPARTMENT OF WATER RESOURCES

FIT UP PROCEDURE:

1. CAREFULLY MEASURE AND CUT A SECTION FROM THE EXISTING WATER MAIN 1/4" LARGER THAN THE COMBINED MAKE UP OF THE FITTINGS AND GASKETS.
2. BOLT UP THE ASSEMBLY WITH THE EXCEPTION OF THE MJ X FL ADAPTERS.
3. LOOSELY BOLT THE MJ ADAPTERS TO THE ENDS OF THE PIPE. TWO-HOLE THE FLANGES AND LEAVE THE MJ BOLTS SNUG.
4. DROP IN THE FLANGED TEE AND VALVE ASSEMBLY AND SUPPORT THE VALVE WITH BLOCKS.
5. INSTALL THE BOTTOM TWO FLANGE BOLTS (THIS WILL SECURE THE GASKET IN PLACE WHILE ADJUSTMENTS ARE MADE TO THE MJ ADAPTERS).
6. ADJUST EVERYTHING LEVEL AND TO GRADE AND INSTALL ALL OF THE BOLTS AND NUTS ON THE FLANGES AND TIGHTEN.
7. TIGHTEN THE BOLTS FOR THE MJ GLANDS.
8. LASTLY, TIGHTEN THE MJ RESTRAINING BOLTS.

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

**WATER MAIN
CUT - IN**

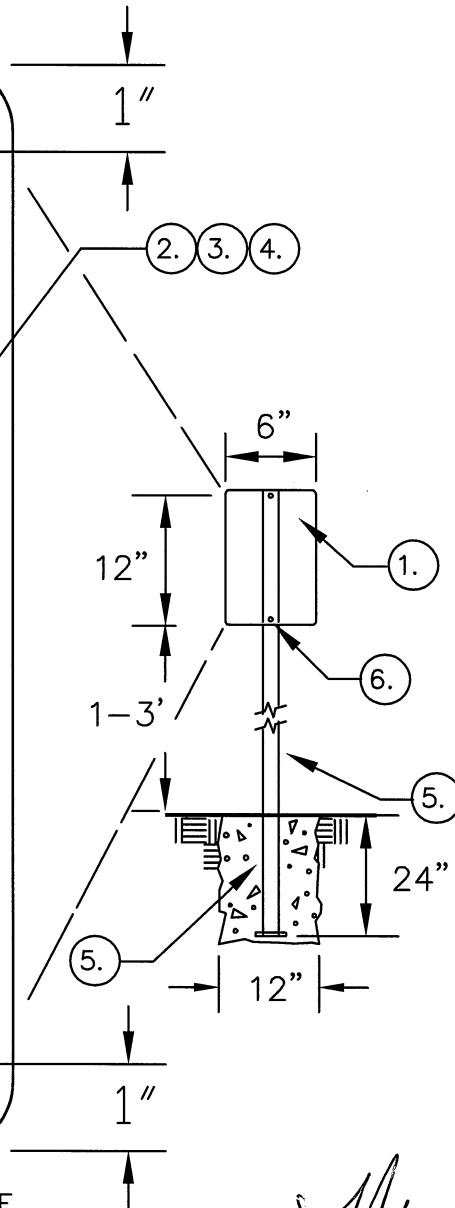
SCALE: NONE
DATE: 11/15

8-15

**RECYCLED
WATER
USED ON
LANDSCAPE**



**DO NOT DRINK
NO TOMAR**



NOTES:

1. 6"x 12" ALUMINUM SHEET ALLOY 6061-T6 0.080" GAUGE, ROUNDED CORNERS (1" RADIUS).
2. LETTER HEIGHT & SYMBOL SIZE SHALL BE PROPORTIONAL TO SIGN SIZE.
3. THE BACKGROUND SHALL BE WHITE. THE LETTERING SHALL BE PURPLE, THE GRASS GREEN, AND THE WATER BLUE.
4. LETTERING AND SYMBOL SHALL BE PRESSURE SENSITIVE VINYL. CLEAR COAT ENTIRE SIGN ONCE LETTERING AND SYMBOLS ARE ATTACHED.
5. 1"x1" SQUARE STEEL POST PAINTED WHITE TO MATCH SIGN BACKGROUND. CAP OFF POST AND FINISH CLEAN. PROVIDE REBAR AT END FOR CONCRETE INSTALLATION AT 24 INCH DEPTH.
6. 5/16"φ x 4-1/2" ZINC PLATED CARRIAGE BOLT WITH VANDAL PROOF NUTS. PAINT WHITE TO MATCH SIGN.

WHEN MOUNTING ON WALLS OR CHAIN LINK FENCE, PROVIDE 1/4 INCH HOLES IN ALL FOUR CORNERS.

3" x 4-1/2" PRESSURE SENSITIVE DECALS ARE REQUIRED FOR IRRIGATION CONTROLLERS AND OTHER ABOVE GROUND FACILITIES REQUIRING A WARNING SIGN. WHEN CONDITIONS AND/OR FACILITY CHARACTERISTICS RENDER THESE SPECIFICATIONS INAPPROPRIATE, ALTERNATIVE SIGNING SHALL BE SUBMITTED FOR REVIEW AND APPROVAL BY THE WATER UTILITY.

SIGN, LETTER HEIGHTS, & SYMBOL SIZE SHOWN ARE IN REQUIRED PROPORTIONS

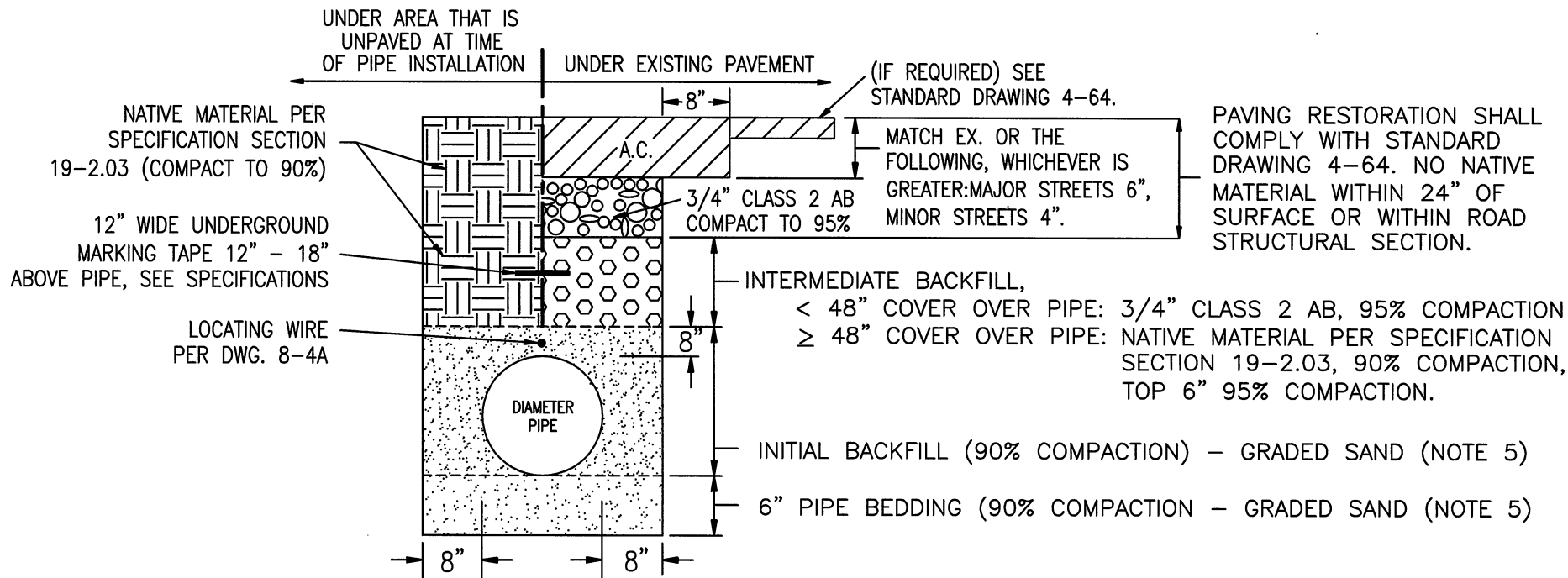
Michael Peters
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

RECYCLED WATER SIGN

SCALE: NONE
DATE: 8/13

8-16



NOTES:

1. SEE THE COUNTY OF SACRAMENTO STANDARD CONSTRUCTION SPECIFICATIONS, IMPROVEMENT STANDARDS, AND THE PROJECT WATER NOTES FOR REQUIREMENTS.
2. 6" & 8" DIMENSIONS SHALL INCLUDE DISTANCE BETWEEN PIPE BELL AND TRENCH WALL.
3. EXCAVATION, BEDDING, AND BACKFILL SHALL COMPLY WITH STANDARD SPECIFICATION SECTION 19.
4. COORDINATE COMPACTION TESTS WITH RESIDENT ENGINEER.
5. PIPE BEDDING AND INITIAL BACKFILL REQUIREMENTS ARE THE SAME FOR BOTH TYPES OF TRENCHES.
6. IF USED, BATCH-PLANT BASED TRENCH BACKFILL MATERIAL USED IN PLACE OF NATIVE MATERIAL SHALL BE DESIGNED WITH A 28-DAY COMPRESSIVE STRENGTH OF 100 PSI. STRONGER MIXES ARE NOT PERMITTED.

SACRAMENTO COUNTY
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TRENCH DETAIL

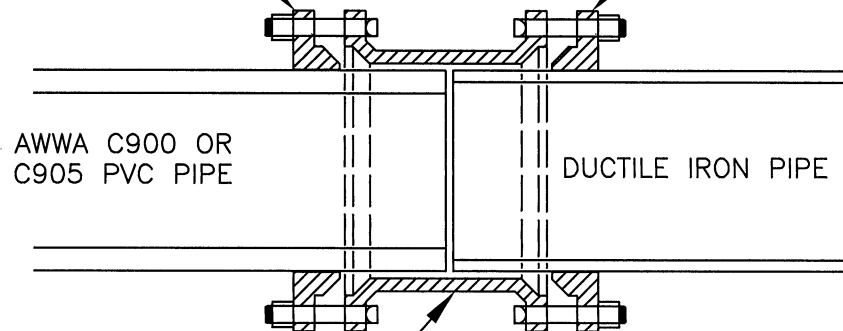
Michael L. Peterson
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SCALE: NONE
DATE: 8/13

8-17

MJ RESTRAINING DEVICE FOR
PVC PIPE (IF REQUIRED),
SEE NOTES

MJ RESTRAINING DEVICE FOR
DUCTILE IRON PIPE (IF REQUIRED),
SEE NOTES



AWWA C900 OR
C905 PVC PIPE

DUCTILE IRON PIPE

DUCTILE IRON MECHANICAL JOINT LONG
SLEEVE, AWWA C110 OR AWWA C153.

NOTES:

1. THIS DETAIL SHALL BE USED AT ALL IN-LINE TRANSITIONS BETWEEN PVC PIPE AND DUCTILE IRON PIPE.
2. TRANSITIONS SHALL BE LOCATED OUTSIDE OF RESTRAINED AREAS, UNLESS APPROVED BY THE WATER UTILITY.
3. TRANSITIONS LOCATED WITHIN RESTRAINED AREAS SHALL BE RESTRAINED. RESTRAINING DEVICE FOR THE PVC PIPE SIDE SHALL BE EBAA 2000PV, STAR PIPE PRODUCTS STARGRIP 4000, OR SIGMA ONE-LOK SLCE. RESTRAINING DEVICE FOR THE DUCTILE IRON PIPE SIDE SHALL BE EBAA MEGALUG 1100, STAR PIPE PRODUCTS STARGRIP 3000, OR SIGMA ONE-LOK SLDE.
4. RESTRAINING DEVICES NOT REQUIRED IF TRANSITION IS NOT IN A RESTRAINED AREA.
5. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.
6. FOR EXISTING ASBESTOS CEMENT (ACP) WATER MAINS:
CONNECT NEW WATER MAINS TO EXISTING ACP WITH SMITH-BLAIR OMNI 442 TRANSITION COUPLINGS, WITH 12-INCH SLEEVE AND S.S. HARDWARE.

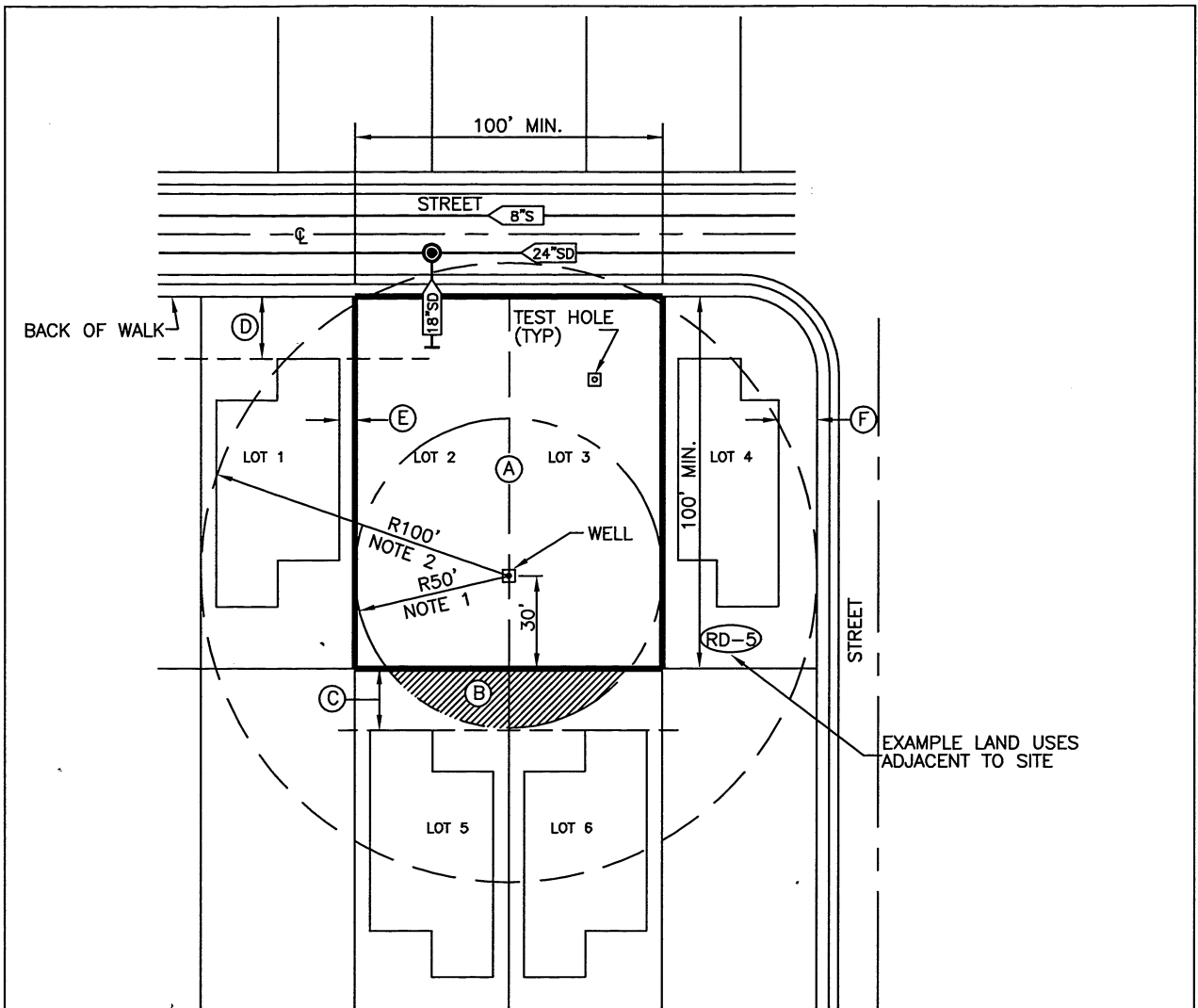
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

TRANSITION SLEEVE

SCALE: NONE
DATE: 11/15

8-18



EXAMPLE LAND USES
ADJACENT TO SITE

NOTES :

1. 50' RADIUS PRIMARY DRINKING WATER SOURCE PROTECTION ZONE: NO SEWER, STORMWATER, OR INDUSTRIAL LINES; NO LATERAL LINES; NO HOUSE FOUNDATIONS.
2. 100' RADIUS SECONDARY DRINKING WATER SOURCE PROTECTION ZONE: NO SEWER OR STORMWATER MAINS; NO DRAINAGE CHANNELS.
3. 200' SETBACK REQUIRED FROM FORCE MAINS (SEWER, STORMWATER, INDUSTRIAL), UNDERGROUND FUEL TANKS, SEPTIC TANKS, LEACH LINES, AND STABLES.
4. 500' SETBACK REQUIRED FROM PETROLEUM PIPELINES.
5. MINIMUM WELL LOT SIZE IS 100' X 100'. EXAMPLE RD-5 LOT SIZE TAKEN AS 50' X 120'.
6. ANY STRUCTURE(S) PROPOSED WITHIN THE SPECIAL PROVISION AREA ARE SUBJECT TO REVIEW AND APPROVAL BY THE WATER UTILITY FOR COMPLIANCE WITH THE DRINKING WATER SOURCE PROTECTION SETBACKS.
7. CONTACT THE WATER UTILITY FOR SPECIFIC INFORMATION ON A CASE-BY-CASE BASIS.
8. WELL SITES SHALL BE PROVIDED WITH A WATER SERVICE, A STORM DRAIN STUB SIZED FOR WELL CAPACITY (TYP. 1500 GPM), A 480V 3-PHASE 250-300 AMP ELECTRIC SERVICE, AND A 20-FOOT COMMERCIAL DRIVEWAY.

LEGEND :

- (A) WELL SITE IS TWO LOTS (TYPICAL)
- (B) SPECIAL PROVISION AREA
- (C) 20' MINIMUM SETBACK, REAR YARD.
- (D) 20' MINIMUM SETBACK, FRONT YARD.
- (E) 5' MINIMUM SETBACK, SIDE YARD.
- (F) 12.5' MINIMUM SETBACK, SIDE STREET YARD.

M. J. [Signature]
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

TYPICAL WELL SITE

SCALE: NONE
DATE: 11/15

8-19