



Construction Improvement Standards

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Section 1: Purpose and Definitions

1.1 Purpose

The purpose of these Construction Improvement Standards is to provide minimum standards to guide the design and construction of water system improvements within Carmichael Water District that are to be dedicated to the public and accepted by Carmichael Water District (District) for maintenance or operation. These Construction Improvement Standards shall apply to regulate and guide construction of water supply facilities and related public improvements within the jurisdiction of the District.

1.2 Order of Precedence

These Construction Improvement Standards do not prescribe methods or means; these are the responsibility of the project proponent. All work shall comply with these Construction Improvement Standards and as directed by the District through the plan check and approval process. The following order of precedence shall apply should conflicts arise between these Construction Improvement Standards and other project documents:

Project Specific Conditions of Approval by the Carmichael Water District shall take precedence over these Construction Improvement Standards. These Construction Improvement Standards shall take precedence over all other documents for materials, installation, testing and approval of facilities to be dedicated to the Carmichael Water District. All other public works shall comply with the standards of the local permitting jurisdiction.

1.3 Periodic Updates and Modifications

The District will periodically review and make amendments and changes to these standards to produce an updated Construction Improvement Standard document superseding the prior document for all work approved by the District subsequent to the date of the updated standards. The District will review the standards for possible updating at least once every five (5) years.

The District may from time to time update or otherwise modify these standards to address specific changes not resulting from the periodic review process and at that time shall make available a supplemental standards sheet describing all such updates and modifications.

It is the user's responsibility to confirm with the District that they are using the current standards subject to all updates and modifications prior to proceeding with a design submittal or application to the District for plan check and review. Failure to obtain and use the current standards may result in the rejection of a submittal and necessitate resubmittal at additional cost to the applicant.

1.4 Definitions

Whenever the following terms or titles are used in these specifications, or in any document or instrument where these specifications govern, the intent and meaning shall be as herein defined:

- A. Acceptance – Formal action through District Policy accepting dedication of completed facilities.
- B. Applicant – Shall mean the same as the Developer or their consulting engineer working on their behalf.
- C. Approved Plans – Shall mean all plans prepared for construction of improvements, reviewed, approved, and signed by the Carmichael Water District.
- D. AWWA – Shall mean the American Water Works Association. All references to the specifications of the AWWA are understood to refer to the current specifications as revised or amended at the date of construction.
- E. Board – The Board of Directors of the Carmichael Water District.
- F. Cal/OSHA – Shall mean the California Occupational Safety and Health Regulations. All references to the regulations of the Cal/OSHA are understood to refer to the current regulations as revised or amended at the date of construction.
- G. Connection Fee – Shall mean the fees as described in the latest adopted District resolution or resolutions establishing, amending, or setting forth the required District construction charges, connection fees, tap fees, facilities fees, and other costs for establishing water service for new development and/or reconnection of existing developed parcels.
- H. Construction Standard Details – Shall mean the standard construction drawings as set forth in these Construction Improvement Standards and included herein, approved by the District Representative and as amended.
- I. Consulting Engineer – Shall mean any person or persons, firm, partnerships or corporation legally authorized to practice civil, mechanical, geotechnical, electrical engineering, or other engineering discipline in the State of California who prepares or submits improvement plans and specifications to the Carmichael Water District for approval.
- J. Contractor – Shall mean any person or persons, firm, partnerships, corporation or combination thereof, licensed to perform the type of work involved, who has entered into a contract with any person, corporation or company, or their legal representatives, for the construction of any improvements, or portions of any improvements, within the Carmichael Water District.
- K. County – Shall mean the County of Sacramento, State of California.

- L. Developer – Shall mean any persons, firm, partnership, corporation, or combination thereof, financially responsible for the work involved.
- M. Development – Shall mean the act or process of any construction or improvements to public or private properties.
- N. District – Shall mean the Carmichael Water District, its officers, authorized employees and agents.
- O. District Representative – Shall mean the District's General Manager or authorized representative acting as Carmichael Water District Representative.
- P. Improvement Plans – Shall mean all engineered plans depicting the proposed facilities submitted for Carmichael Water District review.
- Q. Laboratory – Shall mean any testing agency or testing firm, which has been approved by the District.
- R. Notice of Completion – Shall mean the District executed formal acceptance of the constructed improvements by the Carmichael Water District after which time the District assumes the duty of maintenance and operation, except for the Contractor's obligations under the maintenance warranty period.
- S. Potable Water – Shall mean water suitable for human consumption and complying with the requirements of the State of California's State Drinking Water Standards.
- T. Record Drawings – A clean set of project drawings used only to show the final as-built facilities, including all revisions to the original plans, depth of all utilities crossed, all field modifications, and other pertinent information as directed by the District.
- U. Relative Compaction – The in place compacted soil density as measured by accepted field or laboratory practices divided by the theoretical maximum dry density, as determined by accepted laboratory practices, expressed as a percentage.
- V. Soils Report – Shall mean a report as prepared by any person or persons, firm, partnership, or corporation legally licensed to prepare "Soils Reports" in the State of California.
- W. State – As used in State of California Department of Transportation Standard Specifications, shall mean the Carmichael Water District.

Section 2: Contractor's and Developer's Responsibilities

2.1 General

All improvements for acceptance by the Carmichael Water District (District) shall be installed in accordance with the approved improvement plans and specifications, the Carmichael Water District Construction Improvement Standards, and the Sacramento County Improvement Standards. The Contractor shall follow all applicable City, County, State and Federal laws and regulations relating to construction of the improvements.

2.2 Approved Contractors for Constructing Public Water Assets

Any Contractor that modifies, repairs, or installs public or District-owned water assets must be approved by the District before construction may begin. Work performed by a non-approved Contractor which modified, repaired, or installed public water assets may be required to remove or replace those assets at the Developer's expense. Contractor may apply for approval by the District by submitting a "letter of request for approval" to the District with the following information:

- A. Name(s) of Contractor and Owner(s) of Contractor
- B. Contact Information and Mailing Address of Contractor
- C. Expected Work to Perform – Contractors should outline the work they expect to be performing and requesting approval for.
- D. Licenses, General Liability, Insurance Information – Contractors may be required to demonstrate an adequate contractor or plumbing license, property and personal injury insurance coverage, and other insurance requires as necessary for the work expected to be performed.
- E. Year(s) in Business – Contractors may be required to demonstrate at least 5 years of active business.
- F. List of Employed Drinking Water Treatment and Distribution System Operators – Operators must be certified by the California State Water Resources Control Board (SWRCB) Operator Certification Program and be in good standing with the program. Depending on the expected work to perform, Contractors may be required to employ a minimum of one person with at least a D2-grade drinking water distribution operator.

Address the letter to Carmichael Water District at 7837 Fair Oaks Blvd., Carmichael CA 95608, ATTN: General Manager. District staff may request additional information during their processing and review. District staff will approve or deny the "letter of request for approval" within 60 days of receipt of the request.

2.3 Contractor's Responsibility

It shall be the Contractor's responsibility for:

- A. Plan Check & Review Schedule and Fee Schedule – Read and conform to the necessary submittal requirements and approval conditions per the District's specification and schedules.
- B. Plans – Perform construction per the signed and approved plans by Carmichael Water District. Any additions, deletions, or changes to the approved plans shall be submitted to the District for review and approval prior to construction. Failure to obtain approval may result in delay or rejection of a District Notice of Completion.
- C. Plan Sheet Scale Requirements – The initial submittal to the District shall be prepared on full-sized sheets (ANSI D - 22" x 34"). Scales permitted are: 1" = 20', 40', or 50', and vertical 1" = 2', 4', or 5'.
- D. Permits – Obtain and comply with all required permits for the conduct of the work. This shall include, but not be limited to, the following
 1. Sacramento County permits and approvals for encroachment, traffic control, and use of County facilities during the conduct of the work.
 2. Cal/OSHA trenching, tunneling, safety and special permits
 3. State of California Agency Permits
 - a) Regional Water Quality Control Board,
 - b) NPDES permits
 - c) Department of Fish and Game
 - d) State Lands
 - e) Department of Water Resources
 - f) Reclamation Board
 4. Sacramento Metropolitan Air Resources Control Board permits
 5. American River Flood Control District
 6. Army Corp of Engineers
- E. Notification – the Contractor shall schedule a preconstruction meeting with the District. The meeting shall take place a minimum of 48 hours prior to the start of construction. The Contractor shall provide a minimum 2 working day advance notice to the District as the proposed time and date of the preconstruction meeting. Fees and plans must be paid and approved prior to scheduling a preconstruction meeting.
- F. Notification Prior to Digging – Contractor shall call Underground Service Alert (USA) a minimum of 48 hours prior to starting any excavation. Contractor shall identify the proposed work using white paint to indicate areas for utility pre-marking by USA. Any areas not clearly identified for USA pre-marking shall not be excavated until additional pre-marking is completed. The Contractor will be responsible for any damage resulting from excavation in unmarked areas. The Contractor or Applicant who requested the USA markings shall be responsible for the removal of the USA markings upon completion of the work.

- G. Testing – Contractor is responsible for all testing unless specifically identified otherwise in these Construction Improvement Standards or the conditions of approval of the plans. Constructed utilities shall be tested in accordance with these Construction Improvement Standards. Testing shall be witnessed and reviewed by the District. Testing of backflow assembly shall be conducted by Carmichael Water District.
- H. Hazardous Materials – Should construction operations uncover hazardous materials, or materials which the Contractor believes may be hazardous waste, as defined in Section 25117 of the Health and Safety Code that is required to be removed to a Class 1, Class II, or Class III disposal site in accordance with provisions of existing law, the Sacramento Metro Fire Department should be contacted immediately, the Owner Notified, and Carmichael Water District provided a description of the materials discovered. No water facilities shall be installed in any location suspected to include a hazardous material or waste.
- I. Working Hours – Working Hours shall be in accordance with applicable County of Sacramento noise ordinances.

Normal working hours for services to be provided by the District are 8:00 a.m. to 4:00 p.m. on Monday through Friday (Subject to seasonal changes). Inspections or other services made by the District, requested by or made necessary as a result of the actions of the Developer, or Contractor, outside of these hours, or on Saturdays, Sundays, or holidays must be scheduled and approved by the District, and paid for by the Applicant in advance, at the District Fee Schedule.

There may be additional limitations placed on working hours specified in the project's approved plans, conditions of approval, special provisions, or encroachment permit.

- J. Traffic Control – A traffic control plan shall be submitted whenever required by the County of Sacramento Public Works Agency, Division of Transportation (Department of Transportation). The County of Sacramento has jurisdiction regarding traffic control. Permits and Traffic Control Plans must be approved by the County of Sacramento prior to any work being performed.
- K. Preservation of Existing District Facilities – The Contractor shall take extreme care to protect existing District facilities at the site and adjacent improvements from damage. The Contractor shall be responsible for all damage resulting from the construction and shall repair or make replacement at the Contractor's own expense to the satisfaction of the District.
- L. Personnel – Only personnel competent in the particular trade undertaken shall be employed for the construction work.
- M. Weather – Construction work shall not commence or progress when the weather jeopardizes a safe working environment or the quality of the project in any manner.

- N. Trenching – Contractor shall comply with all Cal/OSHA safety orders. Copies of Cal/OSHA specifications shall be made available at the job-site.
- O. Street Cleaning – Where dirt or mud is tracked onto public street pavement, the Contractor shall clean the streets daily, or as directed by the County Inspector.
- P. Interruption of Parking Areas – Parking interruption within public right-of-ways shall be approved by the County of Sacramento.
- Q. Construction Safety – Construction safety within the District shall be governed by the Construction Safety Orders of the Occupational Safety and Health Standards of Title 8 of the California Code of Regulations and any amendments. It is the Contractor's responsibility to enforce and maintain a safe working environment.

2.4 Developer's Responsibility

It shall be the Developer's responsibility for:

- A. Inspection Costs – Developer shall pay the District inspection costs.
- B. Record Drawings – One hard copy set of drawings, and one electronic copy of the design documents are to be submitted to District within two weeks of completion of the improvements and are required prior to scheduling for Notice of Completion proceedings.
- C. Recorded Easement(s) – Provide copies of recorded easements to the District. Receipt of recorded easement documents shall be required prior to signing of plans and shall be a condition of filing a Notice of Completion accepting the work.

2.5 Performance of Work and Character of Worker

If any Contractor or subcontractor, or person employed by Developer fails or refuses to carry out the directions and requirements of the Carmichael Water District standards or appears to the District to be incompetent or to act in a disorderly or improper manner, such person or persons shall be removed from the Project immediately on the request of the District, and such person or persons shall not again be employed on the work. Such removal shall not be the basis for any claim for compensation or damages against the District.

2.6 Guarantee and Warranty

The Developer shall guarantee and warrant all materials supplied as being fit for the purposes intended. The Contractor shall guarantee and warrant all work performed as having been accomplished in a proper and workmanlike manner.

Should any failure of work occur within the warranty period, the Contractor shall promptly make the needed repairs at the Contractor's own expense. Should such failure of work result in excessive maintenance by the District, or in the opinion of the District, the failure is best left

unrepaired, the Contractor shall incur the additional maintenance cost. The cost shall be equal to the annual maintenance cost divided by the current prime rate.

Should the Contractor not make or undertake the necessary repairs within 30 days of having received written notification from the District Representative, the District may make the repairs and the Contractor shall pay the entire cost thereof. In emergency cases, where in the opinion of the District Representative (provided a reasonable attempt has been made to notify the Contractor) delay would cause serious loss or damages, or a serious hazard to the public, the repairs may be made without prior notice to the Contractor and the Contractor shall pay the entire cost thereof.

The procedures for review, repair and release of guarantee and warranty obligations shall be as follows:

A. Improvements – The guarantee and warranty shall continue for a period of one year from the date on the signed Letter of Acceptance. The following procedures shall be followed for completion of the guarantee and warranty requirements for Improvements:

1. The District shall complete a guarantee and warranty inspection approximately 30 days prior to the expiration of the guarantee and warranty period. The District will then prepare and deliver a final punch list to the Contractor.
2. Within 30 days of receipt of the final punch list (during the eleventh month of the warranty period), the Contractor shall repair or address all deficiencies indicated. The District shall be notified for re-inspection of repairs during this period. Within 30 days of notifying the Contractor (by the end of the eleventh month), the District shall re-inspect the repaired improvements. Upon the District's approval of the repairs, the maintenance bond will be allowed to expire, at the conclusion of one year following the Certificate of Completion. If the Contractor does not complete the required work by the end of the eleventh month, the list of repairs will be referred to the District Attorney's office for further management.

2.7 District Water Line Easements

Water lines constructed by or for the District shall be constructed within public utility, road or street right-of-ways, except where the District has expressly authorized the construction to be made within a permanent right-of-way easement granted by a private property owner. Developer shall grant to the District a dedicated utility easement not less than 20 feet wide covering the pipeline and water facilities to be maintained by the District. In exceptional cases, the General Manager may accept a permanent easement less than 20 feet in width on condition that the landowner grants to the District an adequate temporary easement for construction purposes and a right of access to the permanent easement for purposes of maintenance and repair of the water line to be installed. In specific cases, an easement greater than 20 feet in width may be necessary in the sole discretion of the District. The center of the easement shall be aligned with the water facility centerline whenever possible unless otherwise shown in the Standard Details. If other utility lines are allowed in the easement, the water pipeline shall be located no less than 5 feet from the edge of the easement.

All easements granted to the District shall be recorded with the County of Sacramento and a copy of the recorded documents provided to the District as described in these standards. The District will not issue a Letter of Acceptance for projects that require granting a dedicated utility easement to the District until the dedicated utility easement is filed with the County of Sacramento and approved by the Sacramento County Clerk/Recorder Office.

2.8 Surveying Standards and Electronic Document Submittal

Developer shall submit as a condition of Final Acceptance a complete set of Record Drawings in electronic format. Drawings shall be in AutoCAD .dwg format and shall be geo-referenced based on the North American Datum (NAD) 83 Horizontal Datum and North American Vertical Datum (NAVD) 88 Vertical Datum. The Developer is advised that the NAD 83, and NAVD 88 monumentation is limited in the District and its use may require additional surveying effort to import the control for existing monuments not adjacent to the proposed project site.

Developer shall provide a minimum of two survey control points including, but not limited to, the following:

- A. One (1) at the centerline intersection of existing and newly constructed roads created by the project.
- B. One (1) at end of any cul-de-sac or dead-end road constructed as part of the project.

Survey control shall be clearly labeled on the Record Drawings and shall be permanently installed in the field to allow future control recovery by the District.

All surveying work shall be conducted by a California Licensed Land Surveyor and shall be completed to the minimum standards prescribed by law.

2.9 Record Drawings

Record Drawings shall depict the final improvement conditions, including depth of cover, with regard to all utilities including, but not limited to, the following:

- A. Water Mains, services, hydrants, valves, tees, elbows, and limits of restraint
- B. Electrical transmission, service, transformers, and appurtenances
- C. Natural gas mains, services, meters, regulators, and cathodic testing stations within the right of way.
- D. Sanitary sewer mains, manholes, cleanouts, and service lines including depths services at the property line
- E. Storm drain mains, manholes, drop inlet laterals, and other lines including depths
- F. Communications lines, cable television lines, and any other buried utility or service in the right of way

G. Survey control using NAD 83 and NAVD 88 reference. Record Drawings shall be prepared using georeferenced coordinate data based on NAD 83, NAVD 88, and the California Coordinate System suitable for insertion into the District Geographic Information System mapping at the true and accurate location.

Section 3: Water Supply System Construction

3.1 General

All water pipe, fittings, gate valves, fire hydrants, blow offs, and other appurtenances shall be installed in accordance with the requirements of the American Water Works Association (AWWA), these Construction Improvement Standards and as recommended by the manufacturer. The manufacturer's guidelines shall be present at the construction site at all times. The following are the minimal general specifications. The details are subject to change based on the plan/check and review process as well as the on-site inspection.

3.2 Construction Staking

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

3.3 Earthwork

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

- A. Excavations – Pipeline excavations shall be open-cut trenches, unless otherwise specified on the approved improvement plans, with vertical sides to the pipe crown, as specified on Construction Standard Detail W-2a and W-2b. Excavations shall conform to all applicable Federal and State safety requirements.
- B. Trench Width – The trench bottom width to 6 inches above top of pipe shall comply with Construction Standard Detail W-2a and W-2b, or as approved by District.
- C. Compaction – Compaction of the trench shall conform to Construction Standard Detail W-2a and W-2b. Compaction test results shall be supplied to District. **Jetting of trenches is not allowed.**
- D. Weather – During inclement weather, trenches shall be excavated only as far as pipe can be laid and backfilled during the course of the day.
- E. Existing Roadways – Trenching in existing roadways shall be limited to the length of pipe that can be laid that day. No open trenches shall be left overnight. Exposed trenches shall be plated or backfilled as approved by the County of Sacramento Public Works Agency, Department of Transportation.
- F. Excess Material – Excess material and materials determined unsuitable for backfill by the District Inspector shall be removed from the project site.

All earthwork shall be performed in strict accordance with applicable law, including local ordinances, applicable OSHA, Cal/OSHA, California Civil Code, and California Department of Industrial Safety requirements.

3.4 Trenches and Backfill

- A. General – All trench backfill shall be mechanically compacted native soil, mechanically compacted imported fill, mechanically compacted aggregate base, or slurry material, as required by these Construction Improvement Standards, the Construction Standard Details, and by the County of Sacramento Department of Public Works Standard Construction Specifications (County Specifications).
- B. Trench Backfill – Trench backfill within the County street rights-of-way shall conform to Construction Standard Details W-2a and W-2b. Moisture content shall be controlled to obtain the optimum density for the native soil type encountered. All compaction testing and reference shall be based on the maximum dry density as determined using ASTM D1557 (modified proctor test) and measured in place in accordance with ASTM D1556 (sand code method) or ASTM D6938 (nuclear method). Trench backfill compaction shall be tested and certified by the Developer's licensed geotechnical engineer. Certification shall be provided to the District Representative prior to the construction of surface improvements.
- C. Existing and Proposed Streets – Trench backfill in existing and proposed streets shall conform to County Specification SS20-02 for 3/4" AB.
- D. Jetting – Compaction of trench backfill by jetting methods is NOT allowed in Carmichael Water District right-of-way areas or over dedicated reclaimed water, storm, sewer, or water easements and mains.
- E. Pipe Bedding – Pipe bedding shall conform to Detail W-2b and the following:
 1. Imported bedding material shall be clean washed sand free from organic material, suitable for purposes intended, and of such size that 100% passing a No. 4 sieve and not more than 10% passing a No. 200 sieve. **Pea gravel shall not be used.**
 2. Bedding shall provide uniform and continuous support along the barrel of the pipe. The minimum depth of bedding material shall be provided under the bell. Blocking of the pipe is not permitted.
 3. Loose material shall be removed from the trench bottom and replaced with imported material.
 4. Where rocky, unyielding, or unsuitable foundation material is encountered, the subgrade shall be excavated a minimum of 12 inches below the pipe, and the trench width shall be increased a minimum of 12 inches. The over-excavation shall be replaced with imported material.

5. Where the trench bottom is soft, yielding, or unstable the trench bottom shall be over-excavated. Three-quarter inch crushed rock shall be placed in the trench to provide a stable foundation. The rock is in addition to the required pipe bedding used in the pipe zone.
6. Bell holes shall be excavated per manufacturer's recommendations. The minimum depth of bedding material shall be provided under the bell. Care shall be taken to ensure that the bell hole is no larger than necessary to accomplish proper joint assembly.

F. Native Material – Material for backfilled trenches shall contain no rocks, organic material, or soil lumps exceeding 4 inches in diameter. Controlled Density Fill (CDF) may be used on a case-by-case basis. The Contractor shall submit proposed CDF specifications to the District for review and approval prior to placement.

G. Placement of Material – Equipment shall be of a size and type satisfactory to the onsite District Inspector. Impact-type pavement breakers or compactors (hydrohammers) shall not be used within 5 feet from the top of any type pipe. Material for mechanically compacted backfill shall be placed in horizontal lifts which, prior to compaction, shall not exceed the depths specified below for the type of equipment employed. Actual maximum lift depth will vary with soil conditions and compaction equipment. The Contractor shall consult with a geotechnical engineer to determine the appropriate maximum depths. The Contractor shall be responsible for verifying compaction requirements in each lift.

H. Type of Compaction Equipment and Maximum Lift Depths

1. Maximum lift depth of four (4) inches, equipment type:
 - a) Portable, engine driven-type Jumping Jack Rammer
 - b) Portable vibratory plate
2. Maximum lift depth of twelve (12) inches, equipment type:
 - a) Backhoe mounted sheepsfoot
 - b) Vibratory smooth wheeled roller
 - c) Vibratory smooth wheel roller with pneumatic tires
3. Maximum lift depth of eighteen (18) inches, equipment type:
 - a) Excavator boom-mounted sheepsfoot
 - b) Walk behind, vibratory roller, "Rammax" or "Bomag" Backhoe/excavator boom-mounted vibratory plate "hoe-pack"

3.5 Dewatering

Dewatering for structures and pipelines shall commence when groundwater is first encountered and shall be continuous until the excavation is backfilled. All dewatering activities shall be in accordance with the NPDES General Permit, any specific Storm Water Pollution Prevention

Plan, and the Regional Water Quality Control Board, Central Valley – Region 5 requirements in effect. All water discharged shall be free of chlorine.

3.6 Concrete Cradles, Arches & Encasements

Concrete cradles, arches, and encasements shall conform to Construction Standard Detail W-3 and the following:

- A. The pipe shall be placed in proper position on temporary supports consisting of concrete block or bricks. When necessary, the pipe shall be rigidly anchored or weighted to prevent flotation when the concrete is placed.
- B. Concrete for cradles, arches, or encasements shall be placed uniformly along the pipe. Concrete placed beneath the pipe shall be sufficiently workable to fill the voids without excessive vibration. The concrete shall be allowed to cure and remain undisturbed for a minimum of 24 hours prior to backfill and compaction of the trench.
- C. Water shall not be permitted to enter, seep, or run onto the concrete while curing.

3.7 Water Main Installation

- A. All installations shall follow AWWA requirements unless otherwise noted on the approved plans. The manufacturer's installation guide shall be on the job site at all times.
- B. Wherever possible, new water main(s) shall be installed to loop the existing system and to avoid dead-end water main(s). The size(s) of the new water main(s) shall be determined during the plan check and review process, and assisted by the fire flow analysis and any new service line requirements of the project.
- C. All work performed during the water main installation shall be subject to inspection by the District. The Contractor shall provide the District at least 72 hours notice prior to beginning any portion of work requiring inspection, and work will be scheduled at the District's convenience. The Contractor shall provide, at no cost to the District, access to the work for inspection, including but not limited to removal of temporary plating or backfill, and re-excavation. The Contractor shall not proceed with any subsequent phase of work until the previous phase has been inspected and approved by the District. Inspection and approval by the District shall be obtained during and/or at the completion of the following portions of work, as determined by the District:
 1. Trench excavation and pipe bedding installation.
 2. Placing pipe, fittings, and structures, including identification tape, on all water main and service lines.
 3. Placing of all restraints.
 4. Placing and compacting the pipe zone backfill.

5. Backfilling balance of trench to grade. Copies of compaction test results shall be given to the District by the Applicant before final acceptance of the work.
6. Pressure testing of all mains and services.
7. Disinfecting and flushing of pipelines.

D. Improvements installed without proper inspection shall be exposed and inspected as required by the District Inspector. Cost associated with such inspections will be the responsibility of the Contractor.

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

F. Water Main - Unless noted on the approved plans, all water mains shall be Ductile Iron Pipe (DIP).

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

1. DIP shall be of Pressure Class 350 meeting AWWA C150 and C151 standards and specifications.
2. DIP shall be polyethylene encased in accordance with these Construction Improvement Standards and the standard for "Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids" (ANSI/AWWA C-105/A21.5). Polyethylene encased pipe shall be bedded and backfilled with sand 6" in all directions above the crown of pipe.
3. At the direction of the Carmichael Water District, the Contractor shall repair damages to the polyethylene encasement as described within ANSI/AWWA C-105/A21.5, or shall replace all damaged polyethylene film sections.

H. DIP cuts shall be ground smooth and beveled to prevent damage to the gasket upon insertion into the bell.

I. Pipes shall be mechanically restrained to the length specified in the approved plans, using materials specified herein. Thrust blocks shall only be used where specifically shown on the plan/profile sheets and/or standard detail sheets. All fittings and appurtenances shall maintain the minimum length of restrained pipe in accordance to Specification 4.17 of these Construction Improvement Standards.

J. Care shall be taken when lowering pipe into the trench to protect the pipe from damage. Chains are not permitted. The pipe shall be laid carefully to the lines and grades shown without grade breaks, unless designed with such, or to minimum depths shown on the approved plans. If field conditions exist such that the pipe may not be laid to the specified grade, the approved plans will require revisions prior to proceeding with construction.

- K. Pipe sections shall be closely jointed to form a smooth flowline. Care shall be taken in placing the pipe and making field joints.
- L. All underground metal (ductile iron, valves, fittings, copper, brass, etc.) shall be wrapped in 10 mils minimum thickness polyethylene encasement.
- M. Extreme care shall be taken when consolidating the backfill around the pipe zone. For pipe 12 inches in diameter and smaller, no more than one-half of the pipe shall be covered prior to shovel slicing the haunches of the pipe. For pipe greater than 12 inches in diameter, no more than the lesser of 6 inches or one-third of the pipe shall be covered prior to shovel slicing. Sufficient care shall be taken to prevent movement of the pipe during shovel slicing. Shovel slicing shall be witnessed by the District inspector prior to shading the pipe. Sufficient care not to damage poly wrap.
- N. A continuous number 10 gauge insulated location wire shall be attached to mains and appurtenances per the Construction Standard Details W-7 and W-8 and the following:
 - 1. Location wire shall be continuous between main line valve boxes and fire hydrants.
 - 2. Location wires through valve boxes shall be placed outside of riser, but inside the box.
 - 3. Location wire in manholes and vaults shall be attached inside the facility within one foot of the rim.
 - 4. Splices in location wire shall be made as shown on Construction Standard Detail W-8 and as follows:
 - a) Twist the wire together with a minimum of five twists.
 - b) Install a copper split bolt connector on the splice.
 - c) Cover the splice with mastic tape and wrap with vinyl tape.
- O. A 12-inch wide, blue plastic non-detectable water pipe marking tape, marked "Buried Water Main Below", shall be placed in all mainline trenches, on top of the trench "bedding zone" as shown on Construction Standard Detail W-2b.

3.8 Borings for Installation of Water Lines

- A. Borings for installation of water lines shall be made as follows:
 - 1. The equipment, method and sequence of operation and conductor pipe grades shall be approved by the District. A minimum of 72 hours notice shall be given prior to the start of work. The work will be scheduled at the District's convenience.
 - 2. Contractor shall maintain a minimum cover of 42 inches and will be recorded on a boring log. The boring log is required to be submitted within 72 hours following the boring operations to County.

3. Excavation for the boring operation shall be the minimum necessary to satisfactorily complete the work. Bracing and shoring shall be adequate to protect workers and any adjacent structure or roadbed.
4. The conductor shall closely follow the boring operation. The bored hole shall not be more than 0.10 foot larger in diameter than the outside diameter of the conductor. Guide rails shall be accurately set to line and grade to insure installation of the conductor within allowable limits. The conductor diameter shall be sufficient to allow adjustment of line and grade of the conducted pipe to meet allowable tolerances and to allow sand to be placed between the conductor and the conducted pipe.
5. The inside diameter of the conductor shall be a minimum of 10 inches larger than the outside diameter of the conducted bell pipe or joint, as approved by the District. A minimum of 4 inches of clearance shall be required between the conducted pipe and the casing, taking the skids into consideration.
6. Conducted pipe shall be supported by a minimum of three sets of synthetic skids per stick of pipe, or as required by the District. Pipe sections shall be joined outside of the conductor. The skids and casing entrance shall be lubricated prior to sliding the conducted pipe into place. The height of the skids may be adjusted to meet specified grades.
7. The space between the conducted pipe and conductor shall be completely filled with clean, dry silica sand, blown into place. The method of placing sand in the void shall be approved by the District. Both ends of the casing shall be plugged with non-shrink grout a minimum of 12 inches into the casing.
8. Whenever, in the opinion of the Developer's design or District Representative, the nature of the soil indicates the likelihood of ground loss which would result in a greater space between the outer surface of the conductor than allowed, the Contractor shall take immediate steps to prevent such occurrences by installing a jacking head extending at least 18 inches from the leading edge of the conductor.
9. The jacking head shall cover the upper two-thirds of the conductor and project not more than 1/2 inch beyond the conductor outer surface. Excavation shall not be made in advance of the jacking head. Voids greater than allowable shall be filled with sand, soil cement, grout, or as approved by the District. Where voids are suspected, the design or District Representative may direct the Contractor to drill the conductor, to pressure inject grout to refusal and repair the drilled hole. Grouting pressure shall not exceed 50 pounds per square inch at the nozzle.

3.9 Connection to Existing Facilities

Connection to existing District water facilities may be made upon approval of The District Inspector.

- A. The District has the option of making a system tap as required on the plans. Should the District elect to perform the tap, the Contractor shall pay for such work on a time and

materials reimbursement basis. If the District performs work, payment must be made prior to final acceptance of the facilities. The Contractor shall be responsible for the following tasks associated with the tap as determined by the District:

1. Coordinating the work requested with the District and the District Inspector. This shall include discussions on provisions for materials and equipment required to complete the work.
2. Providing traffic control per County of Sacramento Public Works Agency, Department of Transportation requirements.
3. Excavating the work area, as agreed upon by the District Inspector.
4. Providing sheeting/shoring as required.
5. Backfilling and compacting the excavation(s) upon tap completion.

B. Connection to existing District water facilities will be detailed during the plan review stage. If it is discovered in the field that connection details or existing facilities differ from the original designed plans, the District will revise the connection details, and the Owner/Developer is responsible for acquiring, constructing, and installing the revised connection.

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

1. Care shall be taken to provide a clean, sanitary tie-in site.
2. Dewatering of both the new and existing water mains shall take place in a way that will prevent contamination by trench water. Contractor shall obtain any required permit for discharge of water to the sewer or storm drain as required by the County of Sacramento, the Regional Water Quality Control Board, and other entities having jurisdiction. All water taken from the system shall be de-chlorinated and tested prior to discharge to the storm drain system.
3. All material used in the tie-in shall be clean and swabbed with chlorine.
4. All tie-ins shall take place in the presence of the District Inspector.
5. Tie-ins may take place only after the newly constructed water system has successfully passed pressure testing and bacteriological testing and has been approved for service by the District.
6. Under no circumstances shall anyone other than a representative of the District open or close valves in a District operated system.

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

1. A PVC pipe spigot may be inserted into a DIP bell by cutting off the PVC bevel on the spigot, and leaving no more than a 1/2-inch taper.
2. Transitions may be made by the use of a DIP repair sleeve with mega lug type restraint.
3. AC pipeline shall only be cut using snap cutters. Hand or power tools that have the possibility of producing dust shall not be used. Only approved OSHA methods shall be used.
4. Certified contractor is responsible for the removal and disposal of AC pipe.

3.10 Service and Meter Installation

All new and replacement water services shall include a water meter and be installed in accordance with manufacturer's recommendations, Construction Standard Details W-21 through W-24, and with the following provisions:

- A. Water Meters – Water meters approved by the District are listed below and are equipped with factory potted Star Hexagram MTUs. Approved meters are as follows:
 1. $\frac{3}{4}$ " to 1" Meters – Neptune Mach-10 ultrasonic meter R900i E-Coder register
 2. 1.5" to 2" Meters – Neptune Mach-10 ultrasonic meter R900i E-Coder register
 3. 3" and larger Meters – Neptune Mach-10 ultrasonic meter R900i E-Coder register
 4. Irrigation-only Services – 1 $\frac{1}{2}$ " and Larger (only with District approval) Neptune High Performance Turbine CF R900i E-Coder register
 5. Fire Service Rated Meters – Neptune Protectus III Fire Service meter CF R900i E-Coder register
- B. Water services, service lines and appurtenant piping are to be installed by the Developer and Contractor, and shall be continuous from the main line to the meter box. Installation shall include a jumper in the place typically occupied by the meter, with care taken to ensure the length of the jumper is exactly equal to the lay length of the meter. All bends in copper tubing shall be made in a manner that does not crimp or flatten the tubing.
- C. Water Meter Boxes
 1. Meter boxes shall be as described below and shall be equipped with a non-skid steel lid.

Meter Size	Area Type or Location	Box Type	Lid Type	Size	MFG or Equal
$\frac{3}{4}$ " to 1"	Landscape	B30 Concrete Tier 8	B30 Polymer Concrete Tier 8 w/ Neptune Probe Hole	13" x 24"	Christy (Box)/Hubbell (Lid)
$\frac{3}{4}$ " to 1"	Residential: Concrete or Paved Driveway/Sidewalk	B30 Polymer Concrete Tier 22	B30 Polymer Concrete Tier 22 w/ Neptune Probe Hole	13" x 24"	Hubbell

Meter Size	Area Type or Location	Box Type	Lid Type	Size	MFG or Equal
$\frac{3}{4}$ " to 1"	Commercial: Concrete/ Paved Driveway or Roadway	B30 Polymer Concrete Tier 22	B30 Polymer Concrete Tier 22 w/ Neptune Probe Hole	13" x 24"	Hubbell
1 $\frac{1}{2}$ " to 2"	Landscape	B36 Concrete Tier 8	B36 Polymer Concrete Tier 8 w/ Neptune Probe Hole	17" x 30"	Christy (Box)/Hubbell (Lid)
1 $\frac{1}{2}$ " to 2"	Residential: Concrete or Paved Driveway/Sidewalk	B36 Polymer Concrete Tier 22	B36 Polymer Concrete Tier 22 w/ Neptune Probe Hole	17" x 30"	Hubbell
1 $\frac{1}{2}$ " to 2"	Commercial: Concrete/ Paved Driveway or Roadway	B36 Polymer Concrete Tier 22	B36 Polymer Concrete Tier 22 w/ Neptune Probe Hole	17" x 30"	Hubbell

Consult with the District for water meter vaults 3" and larger meters.

2. Water meters boxes shall be cleaned out, centered, set true, plumb, and to grade and comply with the District standards prior to requesting District to provide a water meter.
- D. The District will provide and install water meters less than 3" in diameter. Installation shall require a written request from the Developer or property owner and payment of all costs and fees. Meters 3" and larger will be provided by the District and installed by the qualified contractor for the Developer or property owner.
- E. Taps, service saddles, and fittings attached to mains shall be separated by a minimum of 24 inches.

F. Water service line installation standard elements

1. Water Service Line Standard for a single 1" water service on a one-inch service line

Water service line installation for a typical 1" water meter shall consist of: a water service saddle, a 1" corporation stop "MIP x FIP", sufficient 1" blue coated type K soft copper tubing from the water main to the meter box, a ball curb valve, brass 90 and brass pipe extending up into 1" angle meter valve, an idler for where the meter will be installed, another 1" angle meter valve on the customer side of the meter, and continuous brass or copper pipe extending out the back side of the meter box to facilitate connection by the plumber.

2. Water Service Line Standard for a 2" water service from a 2" service line

Water service line installation for a typical 2" water meter shall consist of: a service saddle with a 2" tap, a 2" corporation stop "MIP x FIP", sufficient 2" type K hard copper service line extending from the mainline to the water meter box. Service line

shall be wrapped with 10 mils minimum thickness polyethylene. At the meter box a ball curb valve shall be installed, a brass 90 and brass or copper pipe extending up into 2" angle meter valve, an idler for where the meter will be installed, another 2" angle meter valve on the customer side of the meter, and continuous brass or copper pipe extending out the back side of the meter box to facilitate connection by the plumber

3. Water Service Line Standard for services 3" and larger

Installation requirements and configuration for meters 3" and larger vary widely. Contact the District to determine installation requirements. Lead time of six (6) weeks is required for ordering meters. To avoid construction delays Contractor/Developer must contact the District in advance to order meters 3" and larger.

- G. Service saddles shall be wrapped in 10 mils minimum thickness polyethylene, taped securely to the pipe, sealed and secured with 10-mil tape, and backfilled with sand.
- H. Service lines shall be encased in 10 mils minimum thickness poly tubing, sealed and secured with 10-mil tape, and backfilled with sand.
- I. Service manifolds shall be constructed per the following criteria:
 - 1. Where a service line is extended a distance greater than 40 feet, a construction jumper shall be installed. The new service line and manifold shall be pressure and bacteriologically tested in accordance with these Construction Improvement Standards.
 - 2. Where a service line is extended a distance less than 40 feet, the extension shall be cleaned, swabbed with chlorine, and flushed in the presence of the District Inspector. The new service line and manifold shall be pressure tested in accordance with these Construction Improvement Standards. In both cases, the installation shall be fully restrained by an approved restraint system, starting at the main, and as required by the approved Improvement plans.
 - 3. Services 3-inches and larger shall be ductile iron.
 - 4. No water shall be drawn through a service prior to installation of the water meter. In addition, no water shall be drawn through a service and meter installation where a backflow device is installed, until the backflow device has been successfully tested by the District.
- J. A reduced pressure principle type backflow assembly shall be required for all non-residential service connections and/or a private well.
- K. All residential service connections servicing properties 0.25 acre and larger shall have a reduced pressure principle type backflow assembly. All residential service connections equipped with a fire sprinkler system that is not a continuous loop or passive-purge system shall have a reduced pressure principle type backflow assembly.

- L. Reduced pressure backflow assemblies shall be covered with a freeze protection insulated bag per these Construction Improvement Standards.
- M. The curb in front of residential water services shall be stamped with a "W" at the location of the water source line crossing the curb.

3.11 Services Abandonment

All water services requiring abandonment shall be disconnected from the main line and the pipe repaired with a full circle repair band. If the project requires new service lines, as noted on the plans, it is the Developer/Contractor's responsibility to abandon all of the old, existing service lines to the property, as part of the project. It is up to the District's discretion that in lieu of abandonment, it may be acceptable to upgrade existing saddles/service lines/etc., as noted on the plans. Service lines that are being abandoned must be removed from within 3 feet of any remaining active or planned water mains or service lines.

3.12 Appurtenances Installation

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

- A. All valves, fittings, DIP, copper, and underground brass shall be installed with a 10 mils minimum thickness polyethylene encasement. Damaged or scratched surfaces on epoxy coated valves and appurtenances shall be repaired with an epoxy kit per manufacturer recommendations and to the satisfaction of the District inspector prior to wrapping. Service lines are to be blue coated type K soft or hard copper with 10 mils minimum thickness polyethylene encasement.
- B. Gate valves shall be centered in a one-piece riser stock. An operator nut extension adaptor (American Flow Control Trench Adaptor or equal) shall be installed on valves where the operating nut exceeds 48 inches in depth from final grade, as shown in Construction Standard Detail W-11.
- C. Fire hydrants shall be marked with a blue reflector placed 1 foot off street centerline on the fire hydrant side of the street. Fire hydrants located at intersections shall be marked on both streets.
- D. Fire hydrants shall be painted with two coats safety yellow. When used as blow-offs, the tops shall be painted white and marked with an "X" with black enamel paint. Private hydrants shall be painted red.
- E. Permanent dead-end lines shall have a blow-off hydrant constructed per Construction Standard Detail W-12. Temporary dead-end lines shall have a blow-off constructed per Construction Standard Detail W-16.

F. Insulating kits shall be installed at transitions between dissimilar metal pipe per the Construction Standard Details and as required by the District.

3.13 Testing Procedures

Testing of the water system may proceed only after all utility crossings have been completed, sewer mains and services have been pressure tested, and subgrade elevations have been reached. Testing prior to subgrade placement may be subject to additional pressure tests at the discretion of the District Inspector.

A. Pressure Test:

1. The District Inspector will be present during the duration of the test.
2. Contractor shall verify with the District Inspector that all system valves are open prior to testing.
3. Pressure testing shall be conducted for two hours at 150 pounds per square inch, or at one- and one-half times the operating pressure, whichever is higher, as measured from the system high point. The test gauge shall be liquid filled and capable of testing up to 300 psi.
4. No detectable leakage is allowed.

B. Chlorine Disinfection – Chlorine disinfection shall comply with the American Water Works Association Standard for Disinfecting Water Mains (C651) and as specified below:

1. Disinfection inspections shall begin only after passing the pressure test.
2. Prior to chlorination, pre-flush water mains and services. Pre-flushing is not permitted if using the Tablet Method for chlorination.
3. Chlorine shall be drawn through all mains, hydrant runs, and services. The District Inspector shall verify that a minimum chlorine residual of 50 parts per million (ppm) has been achieved.
4. After a 24-hour holding period, the District Inspector will verify that a minimum chlorine content of 25 ppm remains in the system.
5. Upon approval by the District Inspector, the water system shall be flushed to remove concentrated chlorine. Flushing shall be continued until the remaining water has a chlorine residual below 1 ppm and a turbidity equal to or less than one NTU. Chlorinated water shall be neutralized to 1 ppm chlorine residual or less prior to discharge. Discharge location and neutralization methods shall be coordinated with and approved by the District Inspector.

6. Chlorinated water resulting from flushing newly installed water lines may not be discharged into the sewer system. Permission to discharge chlorinated water into the sewer system may be granted by permit from the County of Sacramento Department of Public Works, Water Quality Division on a case-by-case basis. Contractor/Developer is responsible for obtaining any approvals or permits for discharge of spent water.
7. Prior to discharging into the sewer system, the Contractor shall sign a form authorizing the District to bill for the amount of water discharged into the system. At the end of each flushing exercise, and prior to tying into the District water system, the District Inspector(s) shall prepare a bill for water usage based on the meter reading or estimate of water used. This bill must be paid before the written letter of acceptance will be issued by the District. All volumes of water used for construction shall be metered.
8. Chlorinated water shall not be discharged under any conditions. Disposal of spent water shall not be into environmentally sensitive areas (i.e., under oak trees, vernal pools, manmade or natural streams, drainage systems, etc.). No water may be disposed of under oak trees during any time of the year.

C. Water Quality Testing – Prior to collecting water quality samples, the water system shall be held at District line pressure for a minimum of 24 hours. Water may not be drawn during this time period. After the 24-hour holding period has elapsed, water quality samples shall be collected by the District Inspector for testing. The District will require 48 hours to complete total coliform and total plate count tests. If the initial samples fail, the waterline will be retested until an acceptable water quality is achieved, at the expense of the Contractor. Bacteriological samples will be taken following chlorination and flushing activities. Additional bacteriological samples will be taken after tie-in activities if the pipe has been cut and the inner barrel has been exposed.

D. Tying into the District System – The water system may be tied into the District System upon completing and passing all the testing procedures. Tie-ins shall be conducted as shown in the Standard Details W-9 and W-10 of these Construction Improvement Standards, or as shown on District approved plans for specific case by case connections. After the tie-in has been made, the Contractor shall flush the segment tied-in, to the approval of the District Inspector.

E. Continuity Testing – The District will test continuity of the location wire with District standard locating equipment upon request for testing by the Contractor. Discontinuity in the location wire shall be repaired. It is recommended that the Contractor request continuity testing after subgrade is made, but before asphalt is placed. Final continuity testing will take place after asphalt is placed and all valve boxes are raised. Costs for said inspection shall be borne by the Contractor/Developer. Preliminary inspections may be performed by outside Contractors, but shall not be accepted by District as an official record.

3.14 Repairing Installed Improvements

All DIP water mains shall be repaired by the following procedures:

- A. Damaged or failed pipe sections shall be removed and replaced with new pipe in the presence of the District Inspector. All repaired joints shall be restrained with mega lug type restraint and shall be polyethylene wrapped and taped.
- B. After the repair has been completed, the excavation shall be backfilled and compacted to grade as specified. The repairs shall then be re-tested per these Construction Improvement Standards.
- C. At the direction of the District, the Contractor shall repair damage to the polyethylene encasement as described within ANSI/AWWA C- 105/A21.5, or shall replace all damaged polyethylene film sections.

3.15 Punchlist Process

When the Contractor feels all improvements are substantially complete, a punchlist of final outstanding items may be requested. The punchlist shall be generated by the District and will require a final inspection of all work, including but not necessarily limited to the following:

- A. Installation of service lines, meter boxes, and water meter (or idler) shall be complete and in accordance with these Construction Improvement Standards.
- B. That all valve boxes are raised to finish grade, centered, and cleaned out.
- C. That the District has been given and has approved all valve reference measurements.
- D. That all meter setters and meters are properly positioned, and that all meter boxes are positioned and raised to proper grade.
- E. That fire hydrants are raised to proper grade, in a vertical position, painted in accordance with Section 3.12.D, and that the concrete pad and bollards are placed properly.
- F. That backfill has passed all compaction requirements and the District has written records.
- G. That all system valves are open (except those specifically required to be normally closed), and that the turns required for complete open/close cycle are recorded on the record drawings.
- H. That all waterlines have been chlorinated, disinfected, and tested for bacteriological contamination.
- I. That all line pressure testing and flushing has been completed.

- J. That the jobsite is clean and that all of the Contractor's equipment and materials are removed.
- K. That all service lateral locations have been marked on curb.
- L. That all paving, seal coating, striping, and surface restoration are completed.

Any deficiencies found during the punchlist process shall be corrected to District satisfaction prior to final acceptance.

When all items have been completed and corrected to the full satisfaction of the District, the District shall issue to the Contractor a written letter of acceptance. After the written letter of acceptance is issued the completed water system and main extensions with all appurtenances, apparatuses, fittings, and equipment shall become and forever remain the property of the District. The Contractor shall maintain all new water pipeline systems for a period of one year after the date of the letter of acceptance as outlined in Section 2.4.

Section 4: Materials

4.1 Equal

The words "or equal" shall mean any material deemed by the District to be acceptable for use within the District's water system, as compared to products of specified manufacturers. Contractors proposing to use materials, which are not specifically named, shall submit all necessary documentation to allow review of said material for use as an equal. The submittal shall include a letter with:

- A. Product – A description of the product and the appropriate materials specification section number.
- B. Contact – The name and telephone number of the contact person for the proposed product.
- C. References – A list of other agencies who are using the proposed product (include names and telephone numbers).

Address the letter to Carmichael Water District at 7837 Fair Oaks Blvd., Carmichael CA 95608, ATTN: General Manager. District staff may request a sample of the product for review.

The Contractor shall submit all material for review 35 days prior to contract award. All submittals shall include documentation verifying contract award date. Contractors shall allow 2 to 4 weeks review time by the District.

4.2 Unapproved Materials

Materials not approved for use on the project shall be removed from the site within 24 hours if requested by the District Inspector.

4.3 Appurtenances

- A. Air Release Valves – Air release valves shall be epoxy coated vacuum break type. A listing of approved manufacturers includes: Crispin, Valmatic, or equal.
- B. Backflow Assembly – Shall be from the latest University of Southern California List of Approved Backflow Assemblies.
- C. Blow Off – Manufacturers and products include: Kupferle, Eclipse # 78 (2-inch) or equal.
- D. Cadweld – A listing of materials includes:

#4 jumper cable, CP cable, 18" long with 1" bare end #4 Cadweld copper sleeve #4 Cadweld shot with thermite mastic weld cap-t-cap.

4.4 Ductile Iron Pipe

DIP shall be Pressure Class 350 manufactured in accordance with AWWA standard "Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids" (ANSI/AWWA C151/A21.51) and shall include the following:

- A. All DIP shall be cement mortar lined in accordance with the standard for "Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water" (ANSI/AWWA C104/A21.4). The cement mortar lining shall be as specified in C104/A21.4 Section 4.7.2 and shall not be less than 1/8 (one eighth) inch for 4 through 12-inch diameter pipe; and 3/16 (three-sixteenth) inch for 16 through 24-inch diameter pipe.
- B. Mortar lining shall be provided with an asphaltic seal coat meeting the requirements of AWWA C104.
- C. DIP manufacturers include: Pacific States, Tyler, US Pipe, or equal.

4.5 Fittings

- A. All fittings for buried water mains shall be ductile iron. All other cast iron and steel fittings will not be accepted as equal and will be rejected if installed, with removal and replacement at the Developer's expense.
- B. Unless otherwise specified or shown on the approved plans, all fittings to be used with DIP shall employ either mechanical joints or restrained joints conforming to the standard for "Ductile-Iron Compact Fittings for Water and Other Liquids" (ANSI/AWWA C153/A21.53). Fitting manufacturers include Tyler, US Pipe, or equal.
- C. All ductile iron fittings shall be mortar lined in accordance with the standard for "Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water" (ANSI/AWWA C104/A21.4).
- D. All fittings shall be wrapped in polyethylene encasement in accordance with these Construction Improvement Standards.

4.6 Freeze Protection for Backflow Assemblies

- A. The backflow assembly freeze protection shall be a fabricated insulating bag designed specifically to protect above ground water facilities to a 12-hour minimum temperature of 20°F. The materials of construction shall be as follows:

Laminated fabric conforming to Herculite #10 by Herculite Products (fabric shall be a minimum of 10.6 oz/sq. yd.), or equal. Brass Rolled Rim Grommet and spur washer by Astrup, or equal. Polyester thread with a minimum strength of 14.2 pounds, Coats American's Star Ultra product line, or equal. Fiberglass insulation R-19 rated 6-inch minimum thickness. Two-inch minimum width Velcro, or equal.

4.7 Gaskets – Insulating Type

- A. Insulating Flange Gaskets – Insulating flange gaskets shall be USSO Standard B.16.21 insulation flange kits, Type E Full Face Gasket with two-side insulation as manufactured by Calpico, US Pipe Gaskets, or equal.

4.8 Hydrants

Hydrants shall be wet barrel type Clow 960 or equal. Exterior shall be painted with one coat of primer and painted in accordance with Section 3.12.D.

4.9 Hydrant Bury

Hydrant buries shall be ductile iron mechanical jointed cross flange, cement-mortar lined per AWWA C 104.

4.10 Hydrant Bury Extensions

Hydrant bury extensions shall be cement-mortar lined per AWWA C 104, and placed below the break off check valve.

4.11 Nuts and Bolts

- A. Flange Bolts and Nuts – Flange bolts and nuts to be minimum Grade 4, conforming to ASTM #A307 Grade Bd.
- B. Hydrant Bolts – Hydrant bolts are to be Solid, 5/8" x 3.5", conforming to ASTMA307 Grade A & B Low Carbon Steel.
- C. Tee Bolts – Steel bolts are to be 3/4" high strength, low alloy steel with a heavy nut, conforming to AWWA Standard C-1 11-90.

4.12 Nylon Bushings

Nylon bushings shall be 76-76R, 2 1/2" NST x 2" Pipe.

4.13 Patching Material

A listing of manufacturers and part reference numbers for patching of DIP include: Cop-Coat CarboLine Company (Bitumastic No. 50, Coal Tar), or equal.

4.14 Polyethylene Encasement

Polyethylene film for encasement shall have a minimum thickness of ten (10) mils. The minus tolerance on thickness shall not exceed ten percent of the nominal thickness. The encasement of pipe in polyethylene shall be in either tape or sheet form. Polyethylene film shall be

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

4.15 Polyvinyl Chloride (PVC) Pressure Pipe

Polyvinyl Chloride Pressure Pipe for water system mains 3 inches and larger is not allowed. All water mains shall be ductile iron pipe.

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

- A. PVC shall only be permitted after service meters two inches in diameter or smaller, when approved by the District Inspector.
- B. All PVC Pipe and fittings shall have been manufactured within the 18-month period prior to installation.
- C. Pipe and gaskets shall be kept clean and protected against sunlight and heat damage.
- D. Pipe showing signs of physical damage or excessive ultraviolet exposure will be rejected and shall be immediately removed from the job site.

4.16 Pressure Regulators

Not Used

4.17 Restraints

Restraint systems for DIP shall include: Field Lock Gaskets (3-inches through 24-inches diameter only), HDSS, Mega Lug, TR Flex, or equal. Restraint systems shall be required for all pipe joints if the diameter is less than or equal to 12-inches. For diameters larger than 12-inches, restraint systems shall be installed at all pipe joints within a minimum of three (3) pipe lengths before or after a Tee, 90° elbow, or 45° elbow fitting. Thrust blocks shall be installed at all Tees, 90° elbows, and Dead-ends.

4.18 Riser Aligners

Riser aligners shall be installed for all valves where the valve nut is at a depth exceeding the depths shown in the Standard Details. Riser aligner shall be as shown in the Standard Details.

4.19 Riser Stock

Riser stock shall be 8-inch diameter PVC SDR35 for all main line valves.

4.20 Sampling Stations

Sampling stations shall be purchased through the District and shall be installed by the Contractor.

4.21 Services

Water services shall be constructed of brass or copper piping as shown in the Standard Details. Water services shall not be constructed of lead bearing materials and shall be compliant with AB 1953 as lead free.

- A. Brass Material (shall be constructed lead free)
 - 1. Brass pipe – Brass pipe shall conform to ASTM B-43 standards. A listing of pipes includes: Hallstead Y4" through 2" Red Brass, Cambridge-Lee, Federal WW-3 5 1, or equal.
 - 2. Brass fittings – Brass fittings shall conform to ANSI Standard B 16.15, B 16.24, B2. 1, T-94-1, and be a minimum of Class 125. A listing of manufacturers includes: Lee Brass, Merritt Brass, or equal.
 - 3. Brass fittings for Copper Tubing – A listing for brass fittings for copper tube includes: Jones, Mueller Streamline, or equal.
 - 4. All nuts and bolts for service sizes 2" and greater shall be brass.
- B. Blue Poly Coated Copper Tubing – Copper tubing shall be seamless, annealed copper tube, shall conform to ASTM B88 "Standard Specification for Seamless Copper Water Tube", and shall be Type K. Copper shall be grade UNS-C 122200. For 1" diameter, use Type K Roll Soft Copper. Tubing manufacturers includes: Cambridge-Lee, Mueller Streamline, or equal.
- C. Corporation Stops
 - 1. Corporation stops shall be male iron pipe thread by female iron pipe thread (MIP x FIP) and full throat ball valve design. A Corporation stop shall be installed at the water main for all service laterals two inches and smaller. Manufacturers of corporation stops include: Jones, Mueller, or Insulated Corps Mueller.
- D. Curb Stops
 - 1. Curb stop manufacturers include: Jones, Mueller, or equal with locking device.
 - E. Dielectric Tape – Manufacturers for dielectric tape include Polyken #932 Hi-Tack joint wrap tape or approved equivalent flexible dielectric tape.
 - F. Service Saddles – Jones, Mueller, Ford 4-inch through 24-inch saddles with 1-inch or 2-inch tap.

4.22 Service Boxes and Lids

Service boxes shall be as listed in the Service Meters Installation section and shown on the Standard Details. All box lids are to be permanently marked with the appropriate label (i.e., Water, ARV, Blow-Off, CPT, etc.).

4.23 Meter Setter

Meter setter shall not be used.

4.24 Water Meter

Water meters shall be purchased from the District.

4.25 Location Wire

Location wire shall be 10-gauge minimum UF rated solid copper with plastic insulation.

Location Wire Connectors - Location wire connectors shall be split-bolt type connectors. A listing of products includes: Perma-Seal Wire Connectors or equal.

4.26 Location Wire Mastic Tape Seal

Location wire mastic tape shall be 3M Mastic Tape #2229 or equal.

4.27 Valves

- A. **Butterfly Valves** – Butterfly valves are to be used on diameters ranging from 10" to 72" and shall meet the requirements of AWWA C504. Valves shall be cast iron body with cast or ductile iron disk. Disk shall have Ni-Chrome or Type 316 stainless steel edge. Shaft shall be stainless steel, connected to the disk with a stainless steel pin or torque plug, and shall be scribed on both ends to indicate valve position. Valve seat shall be Buna-N.

Butterfly valves shall be Pratt Ground Hog (Holiday free epoxy, interior lining and standard black asphalt varnish exterior), Mueller Lineseal III (Holiday free epoxy, interior lining and standard black asphalt varnish exterior), or equal. Certification shall be provided by the valve manufacturer stating that the epoxy lining is Holiday free.

- B. **Gate Valves** – Gate valves shall meet the requirements of AWWA C509 for sizes 3" to 8". Gate valve shall be resilient seat, fusion bonded epoxy lined and coated, and be equipped with a 2-inch operating nut. Valves shall be no rising stem type valve. Gate valves shall be as manufactured by American Flow Control, Mueller, Clow, or equal

- C. Service Gate Valves – Gate valves for 2" services shall be NIBCOT - 113 Bronze, or equal.
- D. All valve coatings shall be repaired if damaged prior to or during installation.
- E. Buried valves shall be installed with the operating nut in a vertical alignment to allow ease of operation once buried. Failure to install the valve-operating nut in a plumb alignment will require re-installation of the valve until it is plumb.
- F. Above ground valves at pump stations may be rising stem valves.
- G. Operating wheels shall be provided where shown in the Standard Drawings and where valves one above grade at mechanical facilities such as pump stations, wells, fire service, and back-flow devices. Handwheels shall be equipped with a tamper proof locking device acceptable to the District.

4.28 Valve Boxes

All valve boxes in street and other traffic areas shall be designed to H-20 loading conditions. Valve boxes shall be precast concrete boxes, with G5 cast iron lids, and shall be as manufactured by Christy, Brooks, or equal. Valve boxes shall be equipped with riser pipes securely installed directly over the center of the valve-operating nut. Valve riser and box shall be installed true and plumb over the valve to allow unrestricted valve operation from the surface.

Valve box and riser shall be cleaned of any rocks, gravel, dirt or other materials possibly obstructing the valve operation. Tracer wire shall be accessible and clear of operating nut.

4.29 Water Pipe Marking Tape

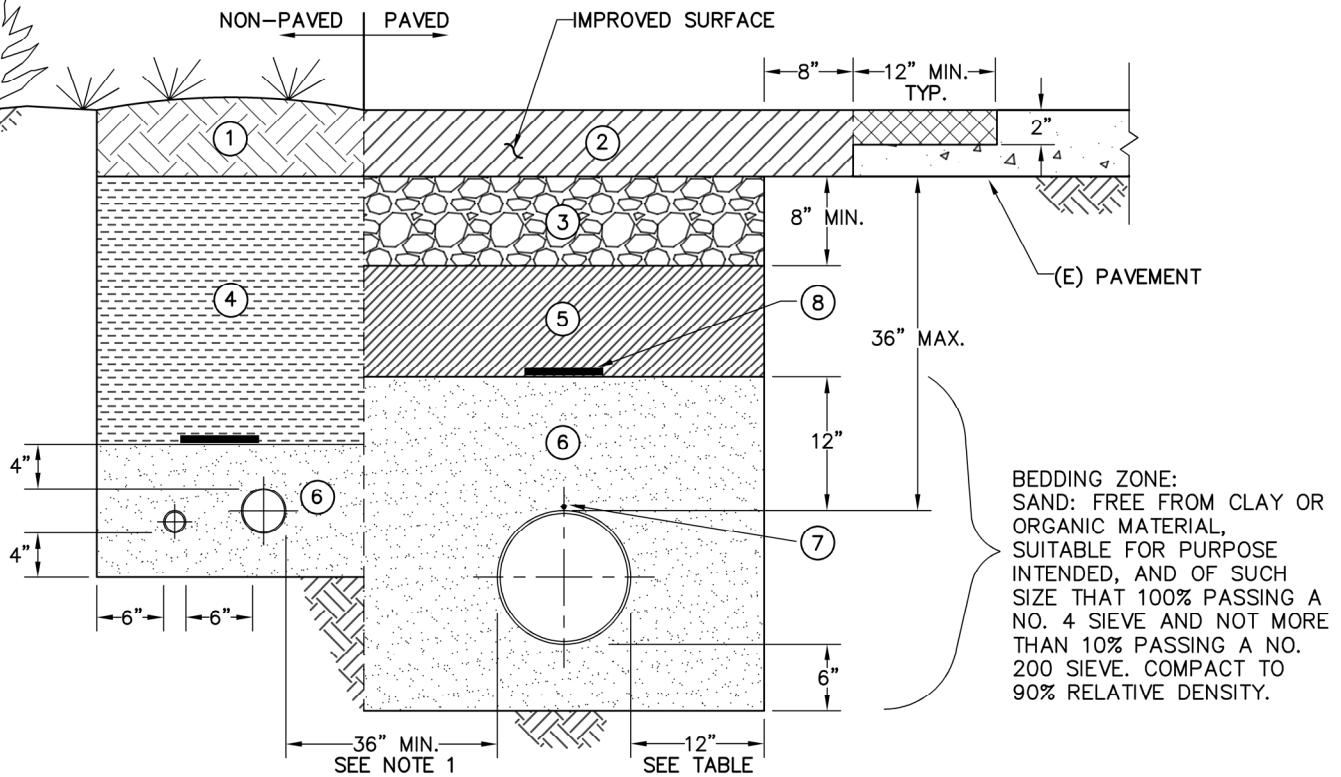
Water pipe marking tape shall be as shown in the Standard Drawings, and marked "W/M Below". Manufacturers and materials include: Calpico Inc. (Tracer Tape-Non-Detectable 12" width), Reef Industries Inc., Terra Tape Extra Stretch 450 Material, or equal.

WATER SYSTEM GENERAL NOTES

NOTES:

1. CONTRACTOR SHALL NOT OPERATE EXISTING DISTRICT VALVES. ONLY DISTRICT STAFF SHALL CONDUCT PLANNED WATER SYSTEM SHUTDOWNS.
2. CONTRACTOR SHALL PROVIDE A MINIMUM OF 48 HOURS ADVANCE NOTICE OF A PLANNED WATER SHUTDOWN AND IS RESPONSIBLE TO REQUEST THE VALVE BE REOPENED FOLLOWING THE WORK. PLANNED SHUTDOWNS ARE TO SCHEDULED AT THE DISTRICT'S CONVENIENCE.
3. PROVIDE THRUST RESTRAINT AT ALL BENDS, TEES, AND ENDS FOR BURIED PRESSURE PIPE, AS NOTED ON PLANS.
4. DEVELOPER SHALL LOCATE AND STAKE ALL PROPERTY CORNERS WHERE WATER SERVICES ARE TO BE INSTALLED.
5. DEVELOPER SHALL PROVIDE ALL TESTING AND PAY FOR ALL DISTRICT INSPECTION COSTS.
6. EXISTING WATER LINES AND FACILITIES LOCATIONS PROVIDED BY THE DISTRICT ARE APPROXIMATE. DEVELOPER/CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE EXACT FIELD LOCATIONS AND MAINTAINING THE FOLLOWING SEPARATIONS BETWEEN UTILITIES.
 - a. MINIMUM VERTICAL CLEARANCE BETWEEN A SEWER SERVICE AND A WATER SERVICE SHALL BE 12 INCHES AND THE WATER SERVICE SHALL BE ABOVE THE SEWER SERVICE.
 - b. MINIMUM VERTICAL CLEARANCE BETWEEN ALL NON-SEWER UTILITY CROSSINGS SHALL BE 12 INCHES.
 - c. MINIMUM HORIZONTAL CLEARANCE BETWEEN SANITARY AND STORM SEWER PIPELINES AND DISTRICT WATER LINES SHALL BE 10 FEET.
 - d. MINIMUM HORIZONTAL CLEARANCE SHALL BE 36 INCHES BETWEEN ALL NON-SEWER UTILITIES AND WATER.
 - e. MINIMUM COVER OVER WATER MAINS SHALL BE 36 INCHES UNLESS OTHERWISE DIRECTED BY THE DISTRICT AND/OR SHOWN ON PLANS.
7. WATER PIPELINES SHALL BE INSTALLED ON UNIFORM GRADES TO MINIMIZE HIGH SPOTS AND LOW SPOTS IN THE PIPE. THE DISTRICT MAY REQUIRE ADDITIONAL BURIAL DEPTH TO REDUCE THE USE OF AIR RELEASE VALVES AND BLOW-OFF ASSEMBLIES.
8. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC CONTROL. TRAFFIC CONTROL AND PAVEMENT CUTTING AND RESTORATION ARE UNDER THE JURISDICTION OF SACRAMENTO COUNTY.
9. THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICES ALERT A MINIMUM OF 48 HOURS PRIOR TO START OF ANY EXCAVATION.
10. THE CONTRACTOR SHALL NOTIFY THE SACRAMENTO METRO FIRE DEPARTMENT A MINIMUM OF 48 HOURS PRIOR TO ANY WATER SYSTEM SHUTDOWN THAT WILL SHUT OFF AN EXISTING FIRE HYDRANT.
11. NO SHUT DOWNS ARE TO BE SCHEDULED ON MONDAYS, WEEKENDS, OR HOLIDAYS.
12. BACTERIOLOGICAL TESTS SHALL ONLY BE PERFORMED ON MONDAYS, TUESDAYS, WEDNESDAYS, AND THURSDAYS (BEFORE 12:00 PM).

CARMICHAEL WATER DISTRICT		GENERAL NOTES	
7837 FAIR OAKS BOULEVARD CARMICHAEL, CALIFORNIA, 95608 – 6400		SCALE: NONE	APPROVED BY: MM
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MATERIALS:

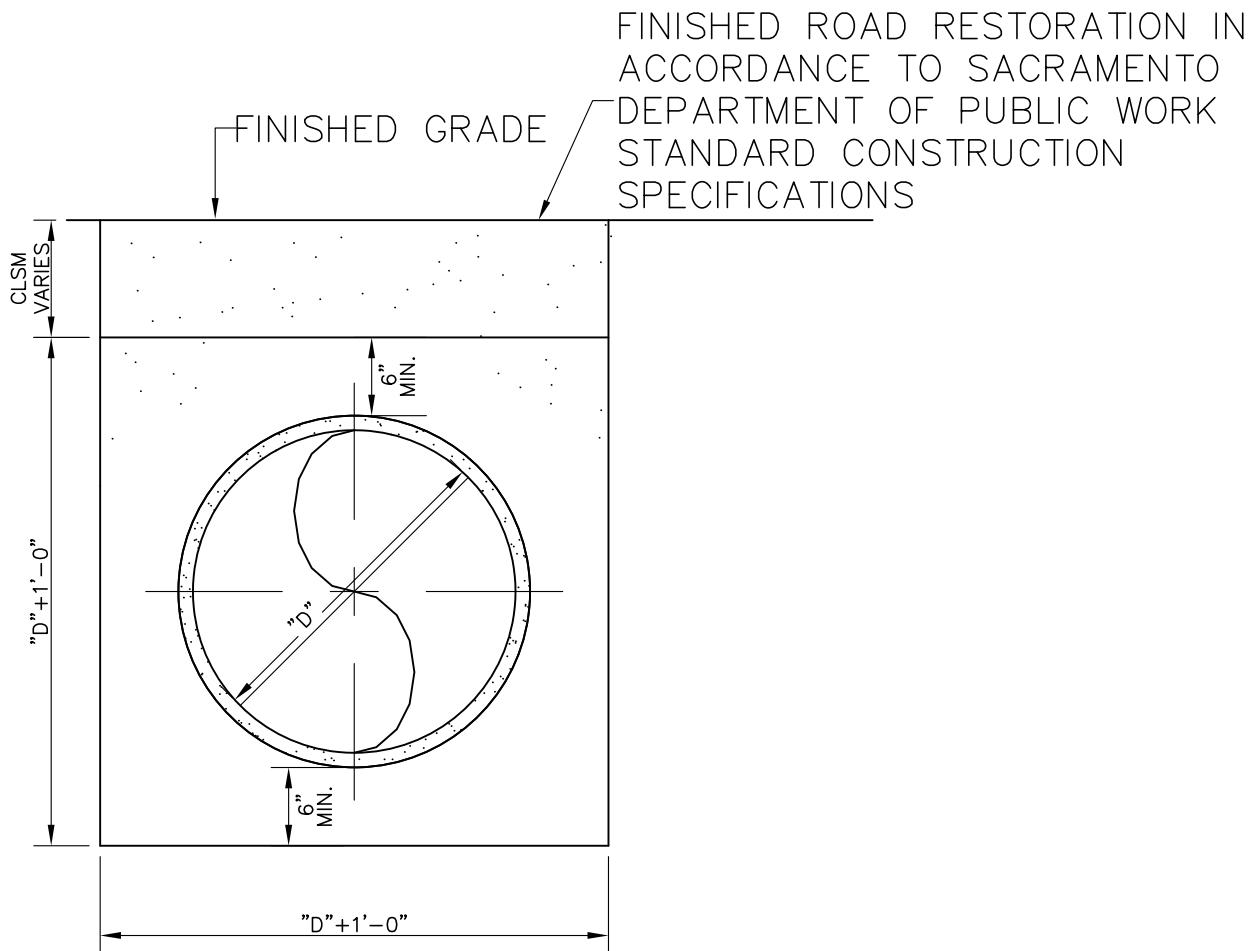
- (1) 6" MINIMUM TOPSOIL, RESTORE LANDSCAPE TO ORIGINAL CONDITION
- (2) 4" TO 6" THICK ASPHALT CONCRETE TO MATCH EXISTING
- (3) 8" MINIMUM 3/4" AGGREGATE BASE AT 95% COMPACTION
- (4) FINAL BACKFILL SHALL BE 1.5" MINUS AT 90% MIN. COMPACTION
- (5) INTERMEDIATE NATIVE BACKFILL AT 95% COMPACTION SEE SACRAMENTO COUNTY SPECIFICATIONS (MUST MEET OR EXCEED)
- (6) SAND BEDDING - 4" MIN. DEPTH BELOW PIPE FOR DIA. \leq 4" AND 6" MIN. DEPTH BELOW PIPE FOR DIA. $>$ 4" - 4" MIN. FILL ABOVE PIPE FOR DIA. \leq 4" AND 12" MIN. FILL ABOVE PIPE FOR DIA. $>$ 4"
- (7) #10 AWG, SINGLE STRAND SOFT DRAWN COPPER WIRE W/ $\frac{1}{16}$ " PVC INSULATION; TAPE TO TOP OF PIPE AT 10' INTERVALS
- (8) PLASTIC WARNING TAPE LOCATED ON TOP OF BEDDING ZONE

18" MIN. TRENCH - SIDEWALL CLEARANCES

PIPE DIAMETER (IN.)	MIN. SIDEWALL (IN.)
1.5 - 8	6
12, 16, 18	12
24	18
\geq 30	PER PLANS

NOTES:

1. MINIMUM 36" BETWEEN MAINLINES OR LATERALS W/ DIA. \geq 4", AND MINIMUM 6" BETWEEN LATERALS W/ DIA. $<$ 4" AND/OR MAINLINES W/ DIA. \geq 4".
2. COMPLY FULLY WITH 29 CFR PART 1926 OSHA SUBPART P EXCAVATIONS AND TRENCHES REQUIREMENTS.
3. CONTRACTOR TO SECURE TRENCH FOR SAFE ACCESS PER OSHA REQUIREMENTS FOR INSPECTIONS AND TESTING.
4. BACKFILL MATERIALS, AGGREGATE BASE, PAVEMENT MATERIALS AND CONCRETE FOR CURBS, GUTTERS AND SIDEWALKS SHALL COMPLY WITH THE COUNTY OF SACRAMENTO DEPARTMENT OF PUBLIC WORKS STANDARD CONSTRUCTION SPECIFICATIONS AND STANDARD COUNTY DRAWINGS.
5. BACKFILL SHALL BE MECHANICALLY CONSOLIDATED AND SHOVEL SLICED UNDER THE HAUNCHES OF THE PIPE.
6. IN ROCKY OR UNYIELDING SOIL, THE TRENCH SHALL BE EXCAVATED A MINIMUM OF 12" BELOW THE PIPE AND THE TRENCH WIDTH SHALL BE INCREASED BY 12".
7. ONE 12" STRIP OF BACKFILL TAPE SHALL BE USED FOR ALL PIPES 12" AND SMALLER. FOR PIPES LARGER THAN 12", INSTALL ONE ADDITIONAL STRIP PER 12" ADDITIONAL DIAMETER OR FRACTION THEREOF.
8. ALL SOIL COMPACTION PERCENTAGES ARE TO BE BASED ON ASTM D1557.



NOTES:

CLSM ONLY USED FOR PIPE INSTALLATION WHERE COVER IS LESS THAN 24" TO FINISHED GRADE

6" OF COMPACTED SAND FULLY SURROUNDING PIPE.

CARMICHAEL WATER DISTRICT

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**CONTROLLED LOW-STRENGTH MATERIAL
FOR SPECIAL CONDITIONS**

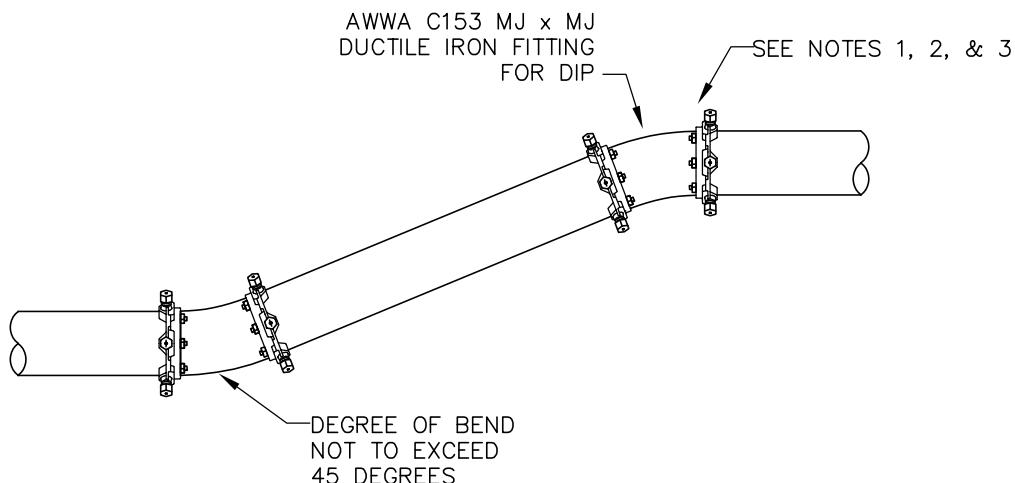
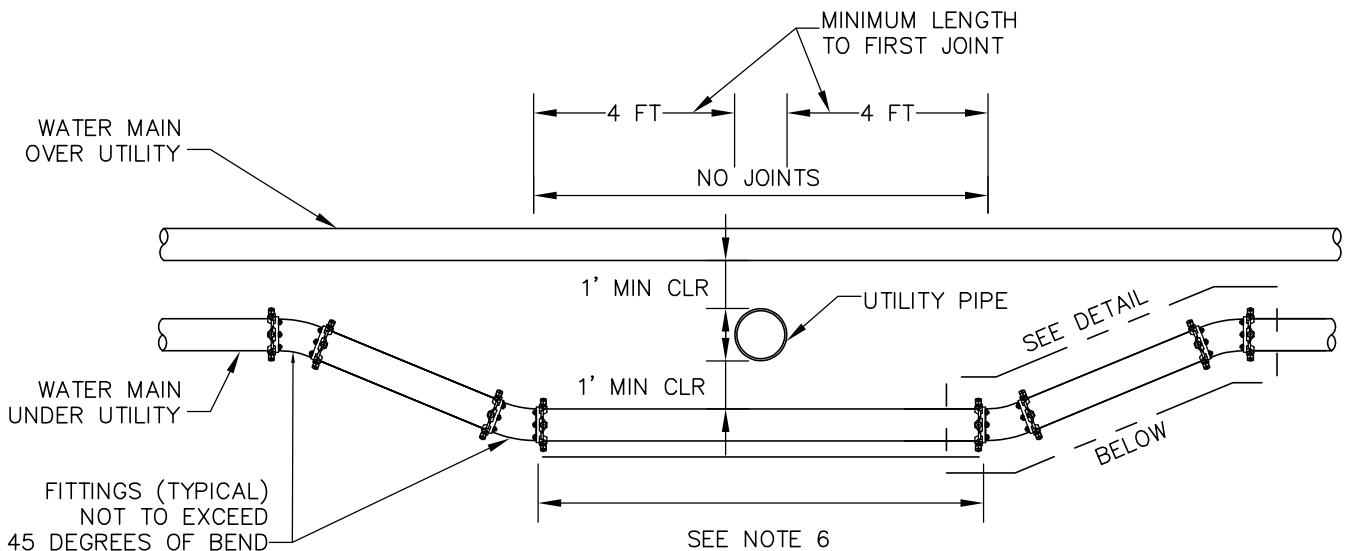
SCALE: NONE

APPROVED BY: MM

DATE: APRIL 2021

DRAWN BY: JC

W-3



NOTE:

1. RESTRAIN ALL JOINTS PER CARMICHAEL WATER DISTRICT CONSTRUCTION IMPROVEMENT STANDARDS.
2. IF BEND IS TO EXCEED 45 DEGREES, THE BEND AND THE RESTRAINED LENGTH MUST BE REVIEWED BY THE DISTRICT.
3. WRAP ALL DIP AND FITTINGS WITH 10 MIL. POLYETHYLENE ENCASEMENT IN ACCORDANCE WITH AWWA C105.
4. RESTRAINING DEVICE FOR PUSH ON JOINTS, USE U.S. PIPE FIELD LOK GASKETS OR EQUAL: FOR MECHANICAL JOINT JOINTS USE WEDGE ACTION RESTRAINT DEVICE EBAA MEGALUG 2000 SERIES, OR EQUAL.
5. THIS DETAIL IS FOR PIPES 12" DIA. AND SMALLER ONLY.
6. CENTER A FULL LENGTH DIP SPOOL BELOW UTILITY. IF TOTAL LENGTH IS GREATER THAN 18 FEET ALL JOINTS BETWEEN FITTINGS SHOWN MUST BE FULLY RESTRAINED.
7. FLANGED FITTINGS ARE ALLOWED ONLY WITH DISTRICT APPROVAL.
8. ALL ELBOWS AND BENDS REQUIRE IN ACCORDANCE TO DETAIL W-6, OR AS OTHERWISE NOTED BY THE DISTRICT

CARMICHAEL WATER DISTRICT

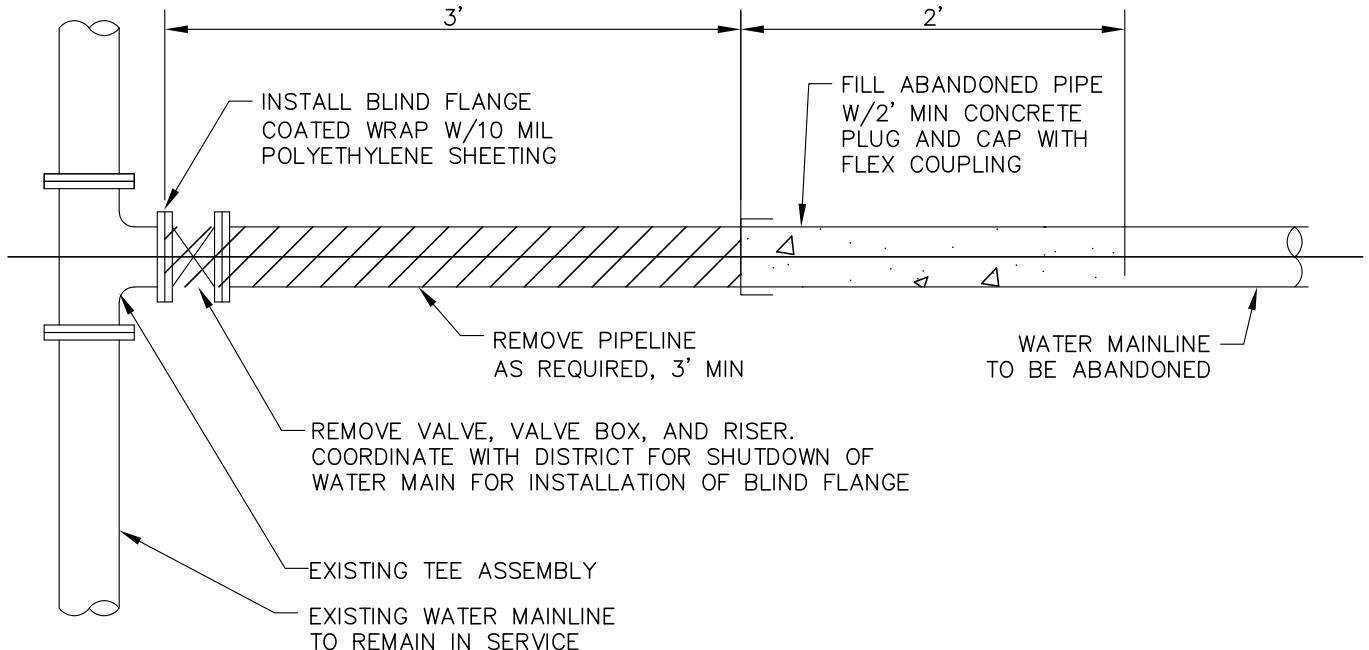
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CARMICHAEL, CALIFORNIA, 95608 - 6400

UTILITY CROSSING

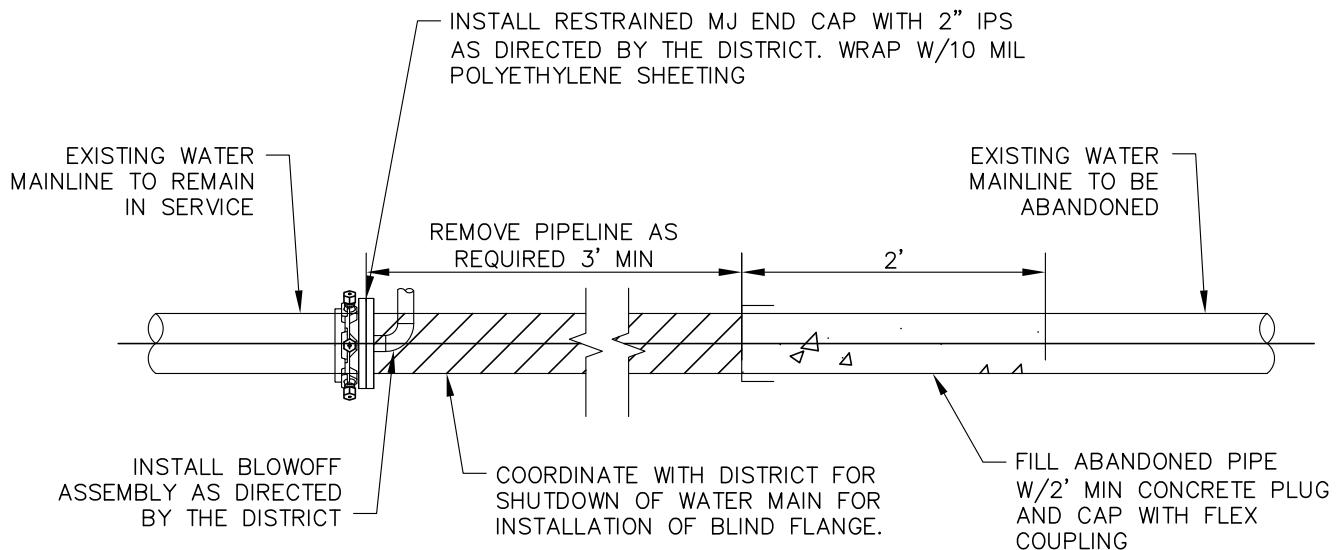
SCALE: NONE	APPROVED BY: GN
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DATE: APRIL 2024	DRAWN BY: SR
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W-4



WATER MAIN ABANDONMENT AT EXISTING VALVE



WATER MAIN ABANDONMENT

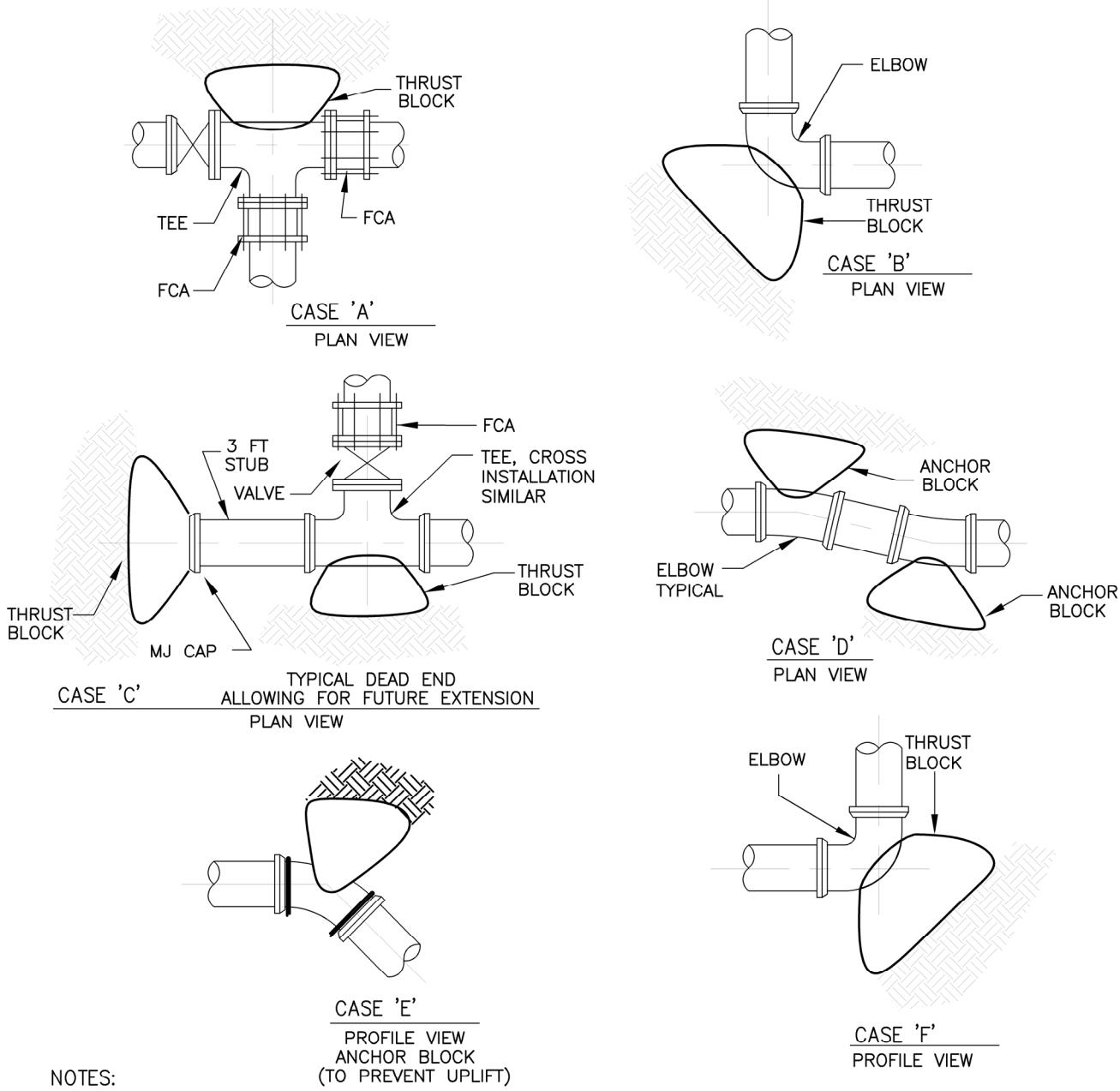
CARMICHAEL WATER DISTRICT

7837 FAIR OAKS BOULEVARD
CARMICHAEL, CALIFORNIA, 95608 - 6400

TYPICAL WATER MAIN ABANDONMENT

SCALE: NONE	APPROVED BY: MM
DATE: APRIL 2021	DRAWN BY: JC

W-5



NOTES:

1. THRUST BLOCKS SHALL BE INSTALLED AT ALL TEES, 90° ELBOWS, AND DEAD-ENDS.
2. EACH TYPE OF THRUST OR ANCHOR BLOCK SHALL BE DESIGNED FOR EACH SPECIFIC APPLICATION AND SHALL BE SUBMITTED WITH CALCULATIONS BY AN ENGINEER LICENSED BY THE STATE OF CALIFORNIA.
3. THRUST BLOCKS SHALL BE CONSTRUCTED SO THAT MAJOR BEARING SURFACE IS IN DIRECT LINE WITH THE MAJOR FORCE CREATED BY THE PIPE OR FITTINGS.
4. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2500 PSI AT 28 DAYS.
5. A DOUBLE LAYER OF 6 MIL POLYETHYLENE FILM SHALL BE PLACED BETWEEN CONCRETE AND METAL FITTING.
6. CONCRETE SHALL BE KEPT BEHIND THE BELL OF THE FITTING.
7. SEE CARMICHAEL WATER DISTRICT CONSTRUCTION IMPROVEMENT STANDARDS RESTRAINT SYSTEM REQUIREMENTS FOR PIPE JOINTS.
8. OTHER THRUST BLOCK AND ANCHOR DETAILS WILL BE WORKED ON A CASE BY CASE BASIS WITH THE DISTRICT.

CARMICHAEL WATER DISTRICT

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THRUST BLOCK AND ANCHOR DETAILS

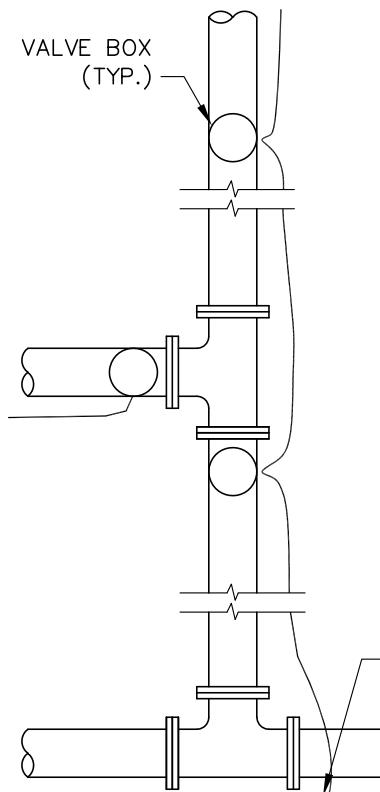
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APPROVED BY: GN

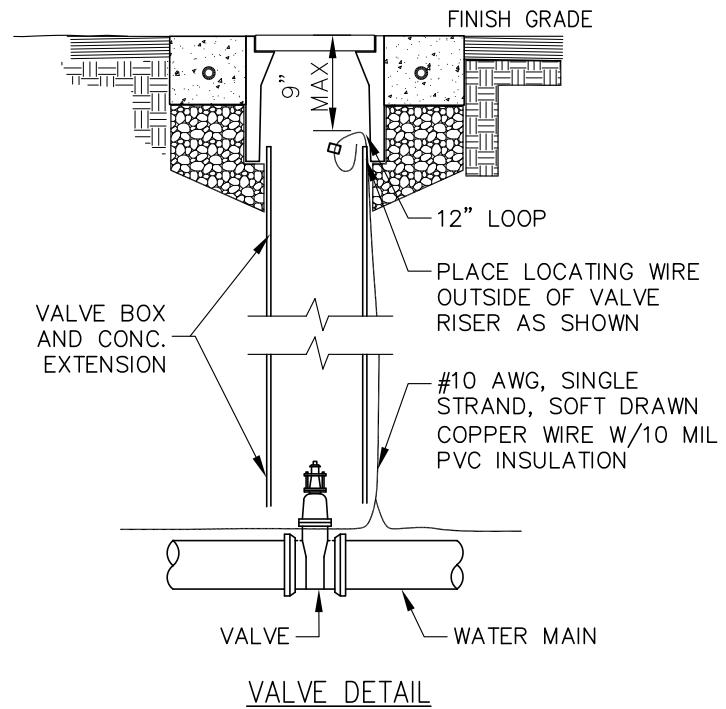
DATE: APRIL 2024

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W-6



TYPICAL LAYOUT



VALVE DETAIL

NOTE:

1. WIRE SHALL BE CONTINUOUS BETWEEN VALVE BOXES, EXCEPT AS NOTED.
2. LOCATING WIRE SHALL BE LAID ON TOP OF THE WATER MAIN, AND SHALL BE TAPED TO IT OR THE POLYETHYLENE ENCASEMENT (IF THE PIPE IS DUCTILE IRON) AT 10' INTERVALS AND TAPED AT ALL FITTINGS. TAPE SHALL BE 10 MIL POLYETHYLENE.
3. CONTRACTOR SHALL CONDUCT A CONTINUITY TEST ON ALL LOCATING WIRE SPLICES.

CARMICHAEL WATER DISTRICT

LOCATING WIRE TYPICAL LAYOUT

7837 FAIR OAKS BOULEVARD
CARMICHAEL, CALIFORNIA, 95608 – 6400

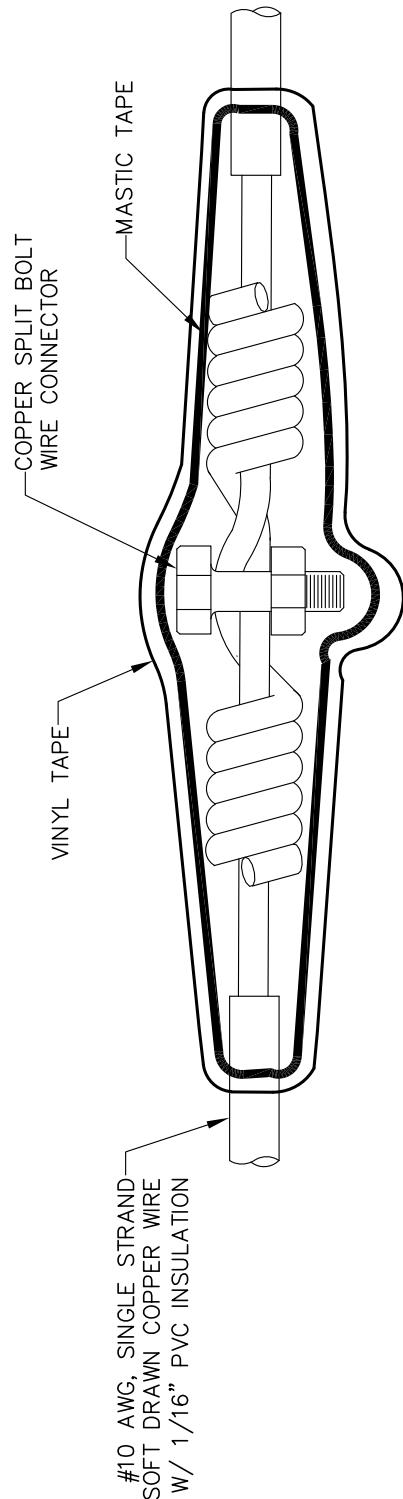
SCALE: NONE

APPROVED BY: SN

DATE: SEPT 2009

DRAWN BY: RN

W-7



NOTES:

1. TWIST THE WIRE A MINIMUM OF (5) TIMES ON EACH END.
2. INSTALL SPLIT BOLT CONNECTOR.
3. COVER THE ENTIRE SPLICE WITH MASTIC TAPE WRAP
4. WRAP MASTIC WITH VINYL TAPE.

* SOLDERING MAY BE INCLUDED IN ADDITION TO THE ABOVE.

CARMICHAEL WATER DISTRICT

LOCATING WIRE SPLICE

7837 FAIR OAKS BOULEVARD
CARMICHAEL, CALIFORNIA, 95608 - 6400

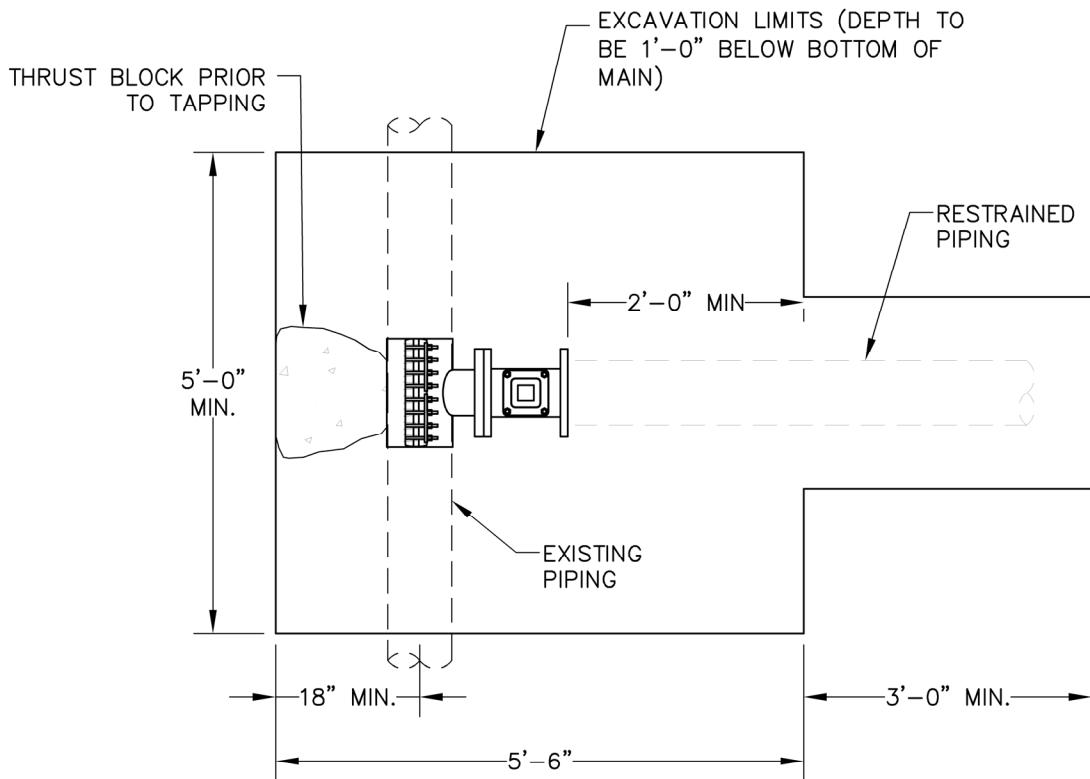
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DATE: SEPT 2009

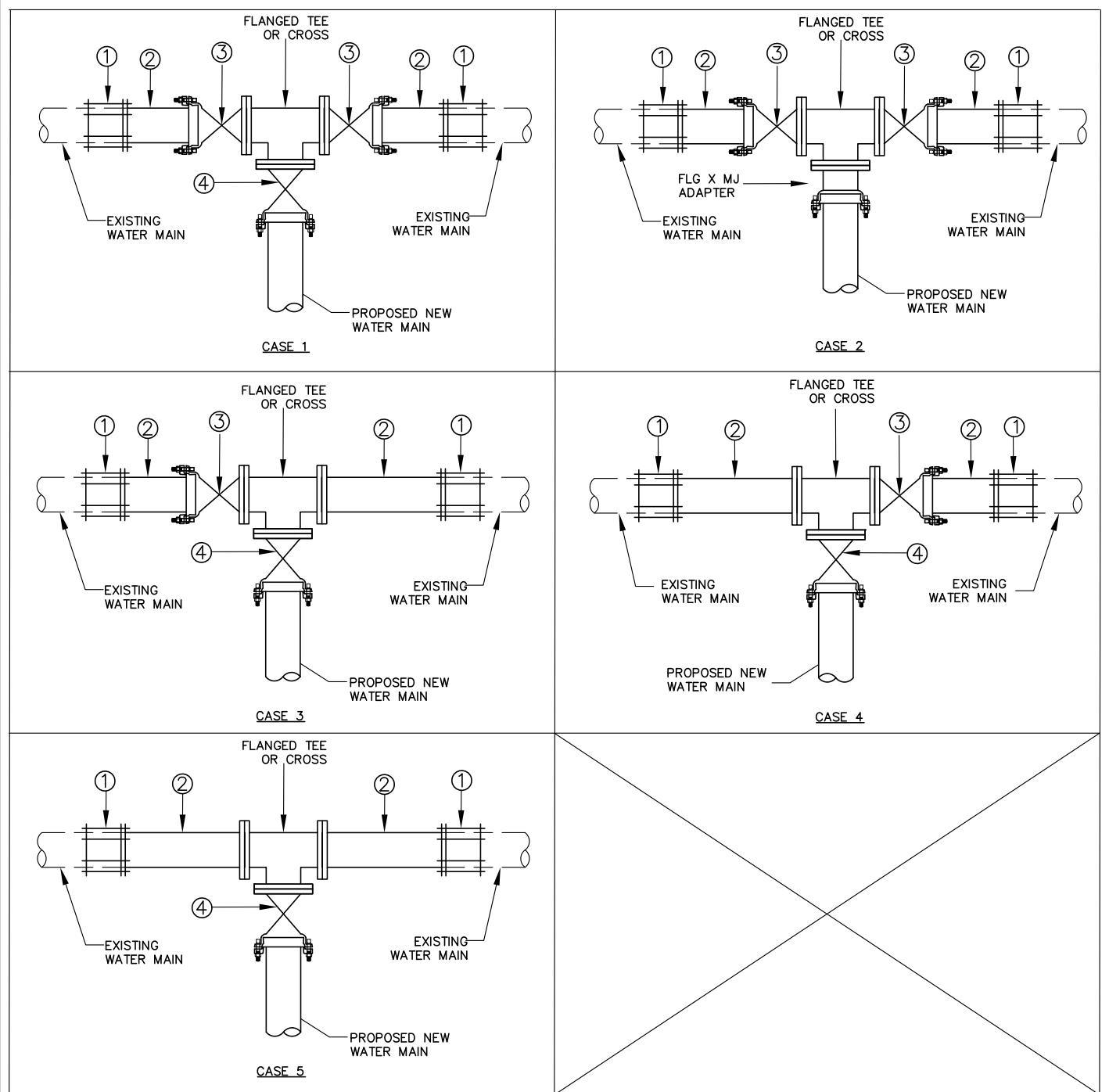
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W-8



NOTE:

1. TAPPING SADDLE FOR USE WITH MAXIMUM TAP SIZE BEING ONE PIPE DIAMETER LESS THAN EXISTING PIPE DIAMETER.
2. SADDLE, COUPLINGS GATE VALVES, AND ALL NEW OR EXPOSED PIPING SHALL BE WRAPPED WITH 10 MIL. MIN POLYETHYLENE ENCASEMENT.
3. DO NOT ALLOW ANY WATER TO ENTER EXISTING PIPE. ADHERE CHLORINE TABLETS TO TEE OR CROSS, THE NUMBER OF TABLETS SHALL BE AS DIRECTED BY THE DISTRICT. SPRAY EXISTING PIPE, ALL FITTINGS AND VALVES WITH A SOLUTION OF SUPER CHLORINATED WATER JUST PRIOR TO INSTALLATION.
4. PROVIDE RESTRAINED PIPE JOINTS AS REQUIRED TO PREVENT MOVEMENT.
5. NO TAP TO BE MADE WITHIN 30 INCHES OF A JOINT OR FITTING ON CIP OF DIP.
6. TAP ON AC AND PVC PIPE SHALL BE MADE 3' MINIMUM FROM ANY COUPLING OR FITTING.
7. CONTRACTOR TO INSTALL THRUST BLOCK BEHIND AND UNDER TAPPING SLEEVE.
8. TAPPING SLEEVES SHALL BE ALL 316L STAINLESS STEEL BY SMITH BLAIR MODEL 663-316LSS OR APPROVED EQUAL; AND TAPPING VALVES SHALL BE MUELLER FLGxMJ OR APPROVED EQUAL.
9. EXCEPTION FOR THE THRUST BLOCK GIVEN TO LATERALS 2" OR LESS AND MAINS 4" OR GREATER.



NOTE:

1. TEE, COUPLINGS GATE VALVES, AND ALL NEW OR EXPOSED PIPING SHALL BE WRAPPED WITH 10 MIL. MIN POLYETHYLENE ENCASEMENT.
2. DO NOT ALLOW ANY WATER TO ENTER EXISTING PIPE. ADHERE CHLORINE TABLETS TO TEE OR CROSS, THE NUMBER OF TABLETS SHALL BE AS DIRECTED BY THE DISTRICT. SPRAY EXISTING PIPE, ALL FITTINGS AND VALVES WITH A SOLUTION OF SUPER CHLORINATED WATER JUST PRIOR TO INSTALLATION.
3. PROVIDE THRUST BLOCKS AND RESTRAINED PIPE JOINTS AS REQUIRED TO PREVENT MOVEMENT.

LEGEND:

- ① FLEX COUPLING (AC OR OD STEEL) OR DUCTILE IRON MJ SLEEVE (DIP OR C900)
- ② CLASS 52 DIP PUP OR FLG X PE SPOOL, 24" MIN. LENGTH
- ③ FLG X MJ VALVE (FLG X FLG VALVE ACCEPTABLE WITH DISTRICT APPROVAL)
- ④ FLG X MJ VALVE

CARMICHAEL WATER DISTRICT

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**TIE-IN CONNECTIONS TO EXISTING FACILITIES
WITH TEE CONNECTION**

SCALE: NONE

APPROVED BY: MM

DATE: APRIL 2021

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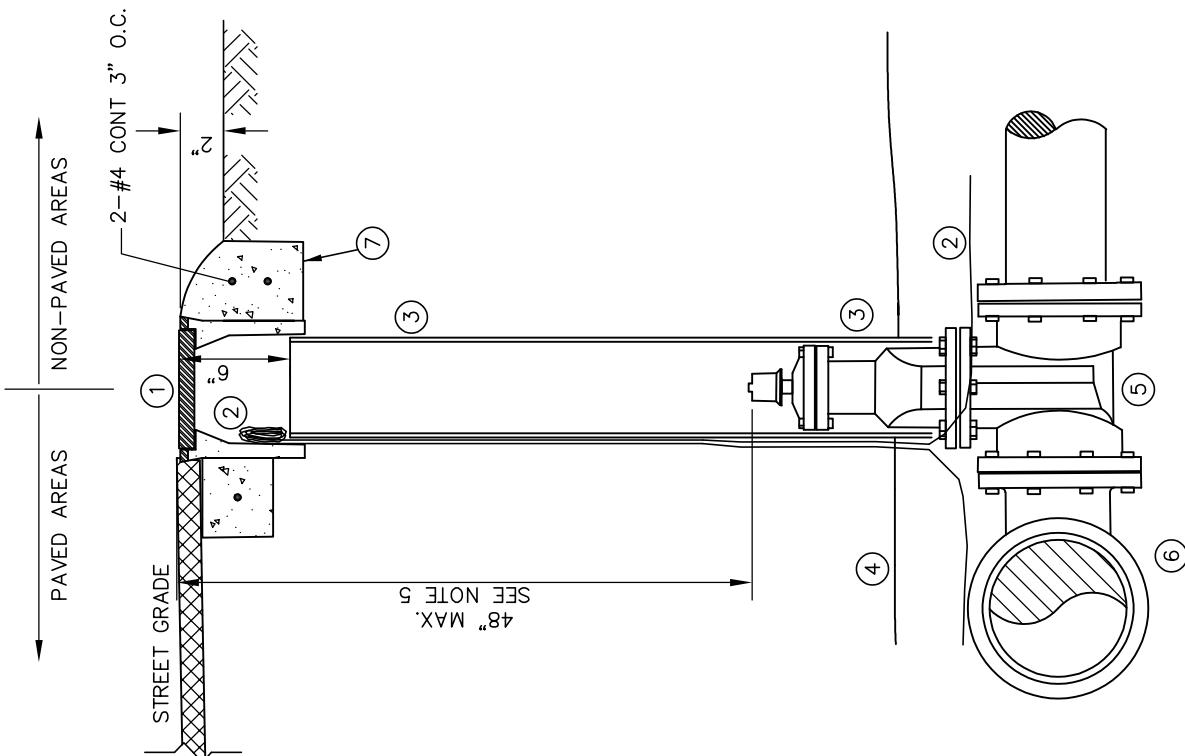
CARMICHAEL WATER DISTRICT

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TYPICAL GATE VALVE & BOX INSTALLATION

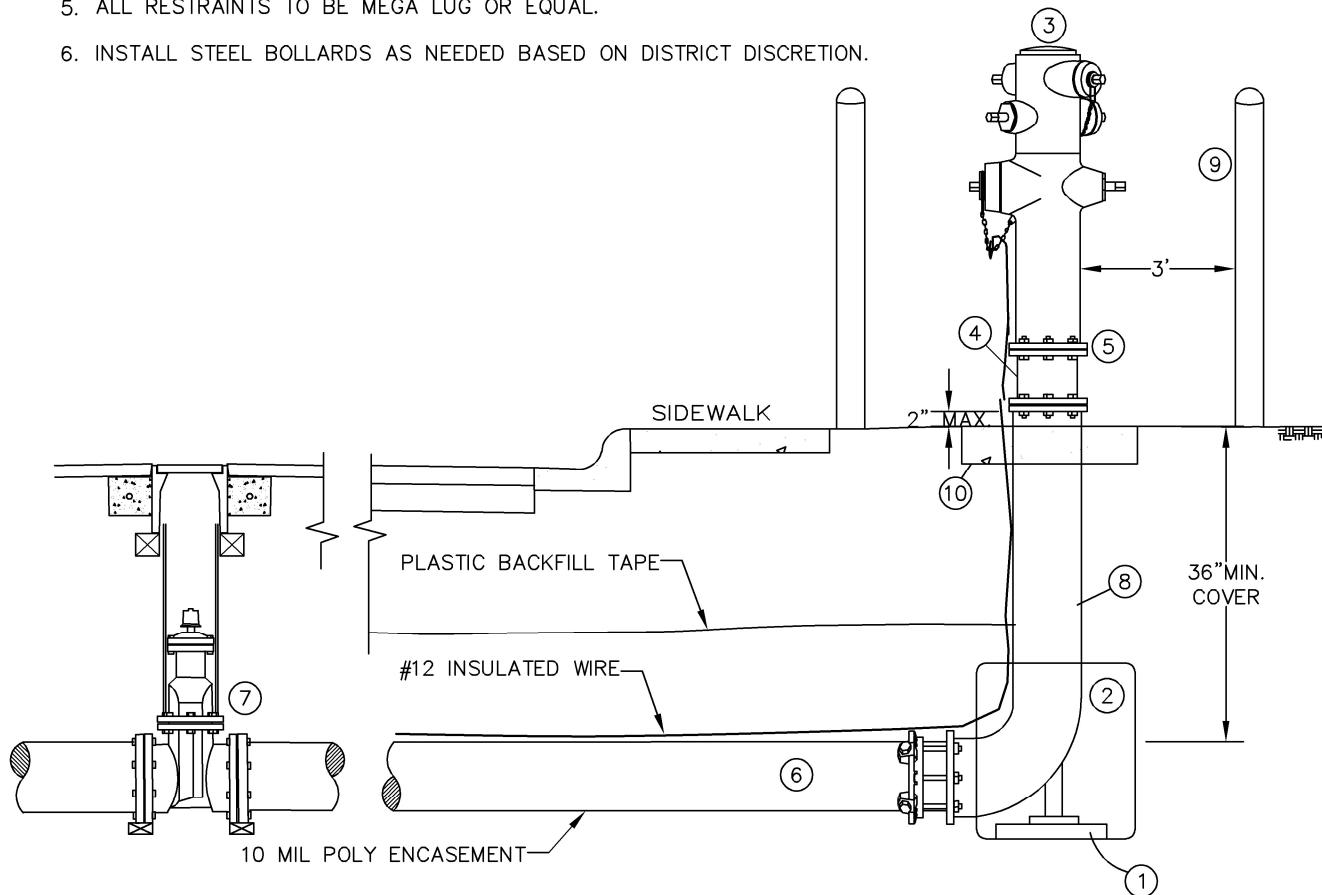
SCALE: NONE	APPROVED BY: GN
DATE: SEPT 2025	DRAWN BY: SR

W-11



NOTES:

1. FITTINGS SHALL BE DUCTILE IRON
2. VALVES AND FITTINGS SHALL BE WRAPPED IN 10 MIL. OR THICKER POLYETHYLENE.
3. VALVE SHALL BE A MINIMUM OF 12' FROM HYDRANT OR AT DISTRICT'S DISCRETION. USE APPROVED RESTRAINING JOINTS FROM VALVE TO HYDRANT BURY.
4. A MINIMUM 3 FOOT CLEAR AREA SHALL BE MAINTAINED AROUND THE FIRE HYDRANT.
5. ALL RESTRAINTS TO BE MEGA LUG OR EQUAL.
6. INSTALL STEEL BOLLARDS AS NEEDED BASED ON DISTRICT DISCRETION.



MATERIALS:

(1) BLOCKING	(6) 6" DUCTILE IRON PIPE WITH MEGALUG OR EQUAL
(2) CONCRETE SUPPORT AGAINST UNDISTURBED SOIL	(7) 6" GATE VALVE PER (W-11)
(3) CLOW 960 OR EQUAL - YELLOW	(8) FLANGE x MJ BURY
(4) BREAK OFF CHECK VALVE (HYDRANT GUARD OR EQUAL)	(9) SCH. 40 STEEL BOLLARDS PER (W-14)
(5) BREAKAWAY BOLTS (BREAK POINT) PER CHECK VALVE MANUFACTURER	(10) 3' SQUARE x 4" THICK CONCRETE HOLD BURY OR AT THE DISTRICT'S DISCRETION

CARMICHAEL WATER DISTRICT

7837 FAIR OAKS BOULEVARD
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FIRE HYDRANT ASSEMBLY

WET BARREL

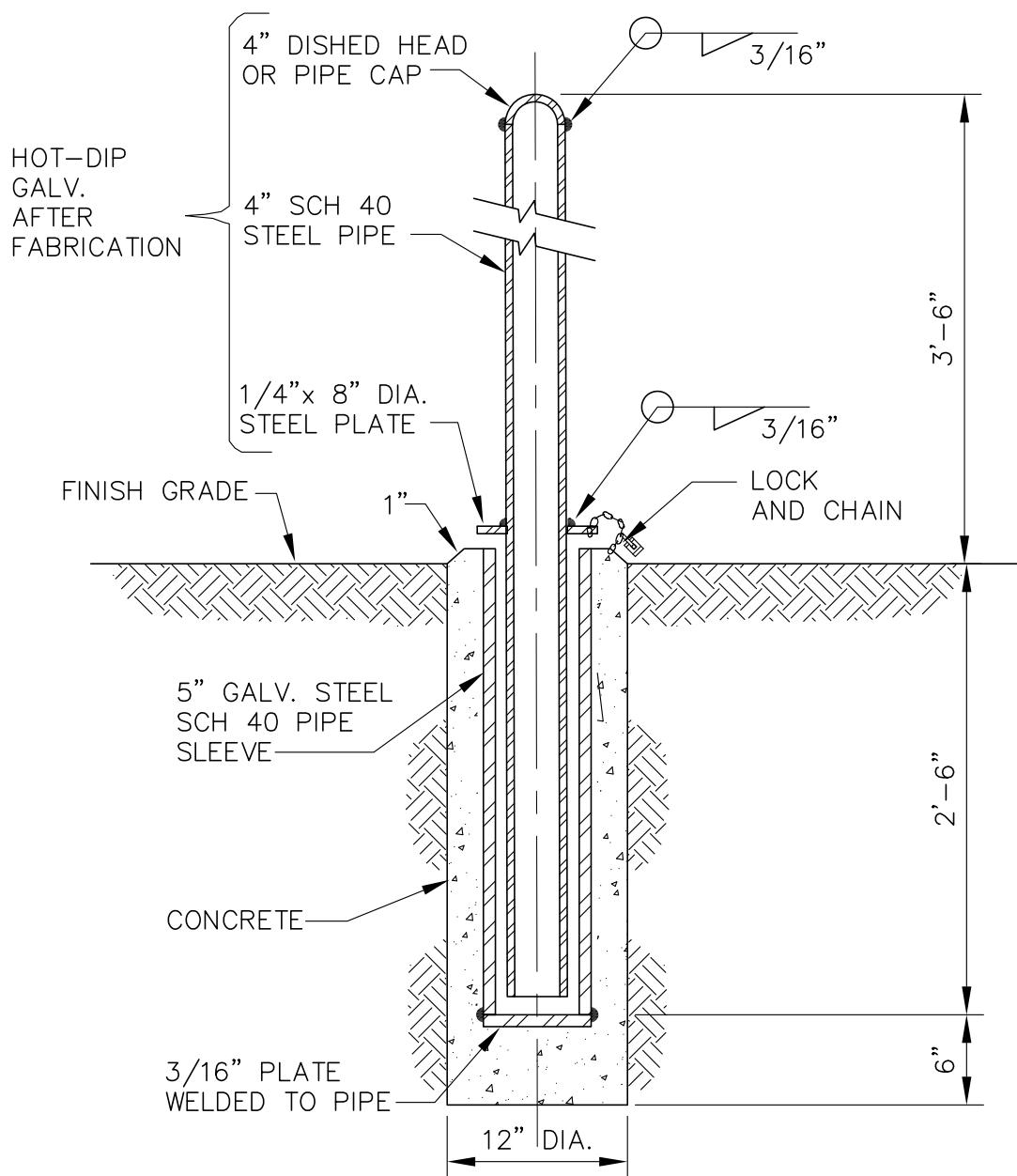
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APPROVED BY: GN

DATE: APRIL 2025

DRAWN BY: SR

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CARMICHAEL WATER DISTRICT

4" DIAMETER STEEL BOLLARD

REMOVABLE

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CARMICHAEL, CALIFORNIA, 95608 - 6400

SCALE: NONE

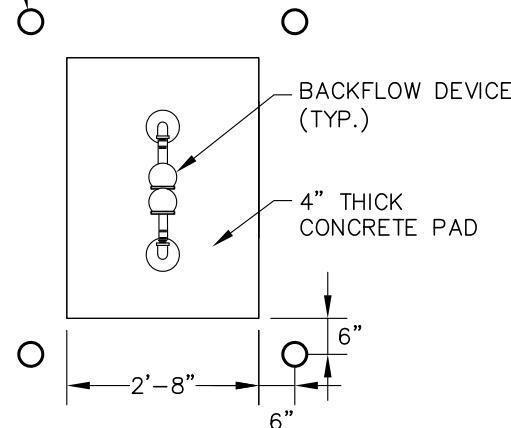
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DATE: APRIL 2021

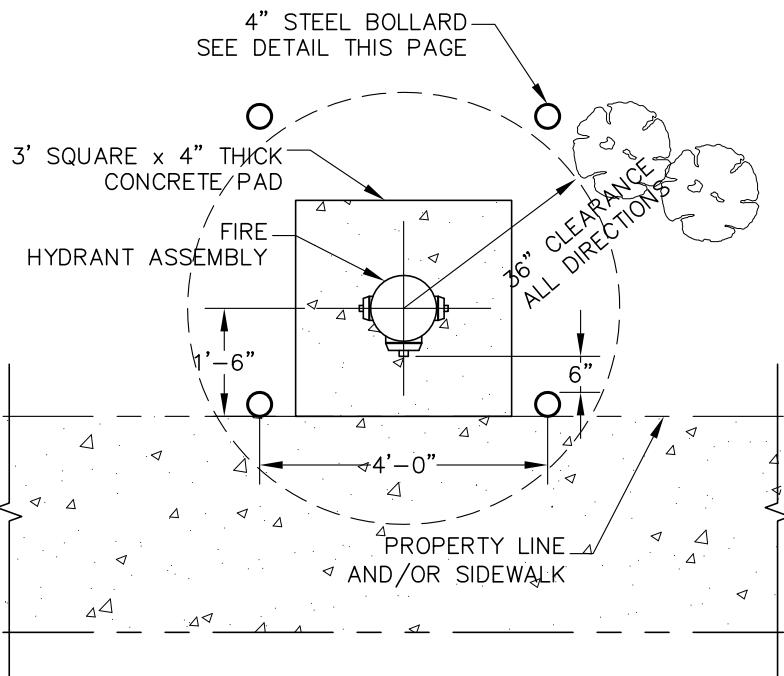
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W-13

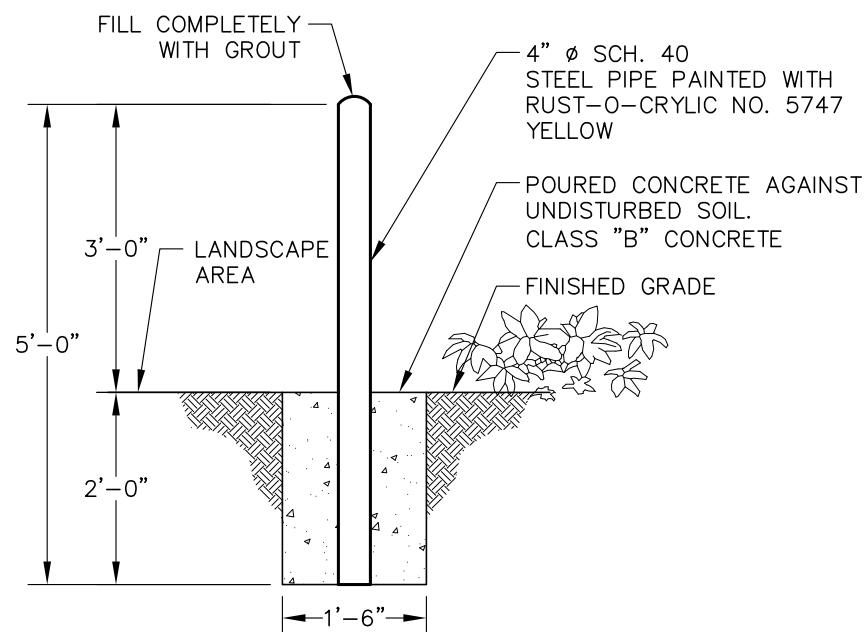
4" STEEL BOLLARD
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TYPICAL BOLLARD INSTALLATION
AT BACKFLOW PREVENTION DEVICE



TYPICAL BOLLARD INSTALLATION
AT FIRE HYDRANT



4" STEEL BOLLARD TYPICAL

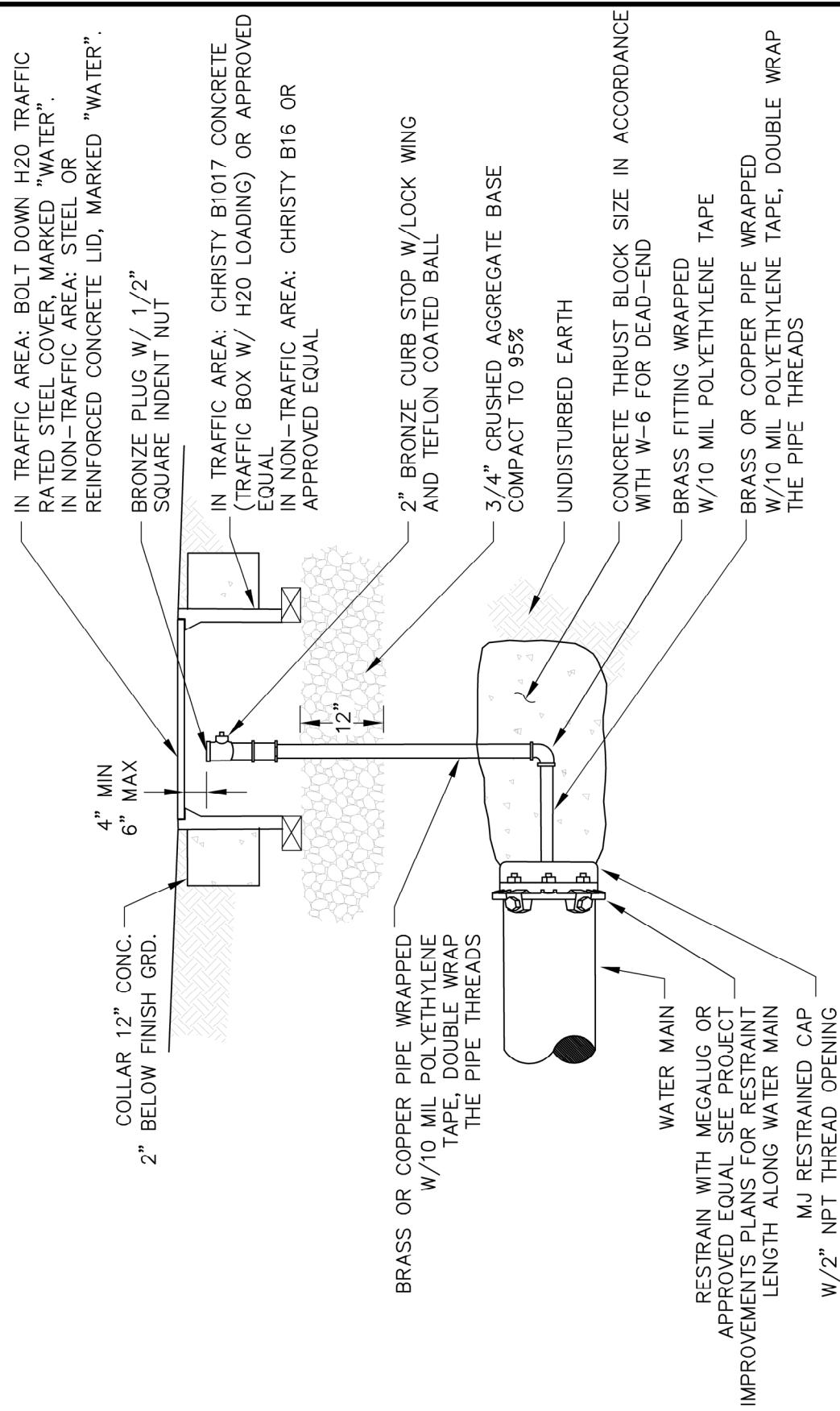
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7837 FAIR OAKS BOULEVARD
CARMICHAEL, CALIFORNIA, 95608 - 6400

**4" DIAMETER STEEL BOLLARD
(AS NEEDED BASED ON DISTRICT DISCRETION)**

SCALE: NONE	APPROVED BY: MM
DATE: APRIL 2021	DRAWN BY: JC

W-14

NOTE:

1. BACKFILL WITH 3/4" CRUSHED AGGREGATE BASE COMPACT TO 95%.

CARMICHAEL WATER DISTRICT

7837 FAIR OAKS BOULEVARD
CARMICHAEL, CALIFORNIA, 95608 - 6400

2" BLOW-OFF ASSEMBLY

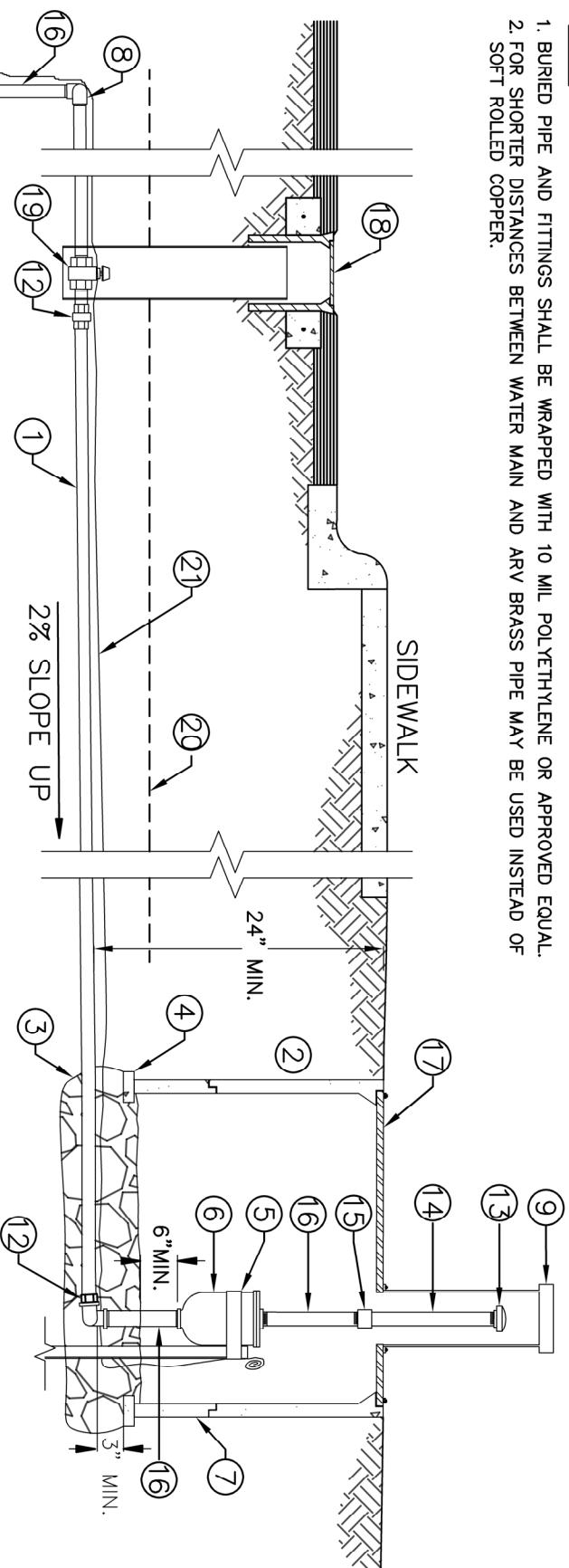
SCALE: NONE
DATE: MARCH 2024

APPROVED BY: GN
DRAWN BY: SR

W-15

NOTES:

1. BURIED PIPE AND FITTINGS SHALL BE WRAPPED WITH 10 MIL POLYETHYLENE OR APPROVED EQUAL.
2. FOR SHORTER DISTANCES BETWEEN WATER MAIN AND ARV BRASS PIPE MAY BE USED INSTEAD OF SOFT ROLLED COPPER.



MATERIALS:

1. BLUE COATED TYPE "K" SOFT ROLLED COPPER
2. CHRISTY B36 CONC BOX (OR EQ) W/ H20 LDG & STL CHKD PL NON SKID BOLT DOWN COVER MARKED "WATER"
3. 3/4" CRUSHED ROCK DRAIN TO 10" MIN. DEPTH
4. 2"x6"x12" CONCRETE BLOCK UNDER PERIMETER OF BOX
5. STEEL CHANNEL (UNISTRUT OR EQ) W/ 1" MIN. WIDE SS STRAP
6. CRISPIN COMBINATION AIR/VACUUM VALVE OR APPROVED EQUAL
7. CHRISTY EXTENSION SPOOL (IF NECESSARY) OR EQUAL
8. SWING JOINT (2 - 90° FITTINGS)
9. PLACER WATERWORKS AV18-M (OR EQ) AIR VENT ENCL. BOLTED DOWN
10. BRONZE DOUBLE STRAP SERVICE SADDLE WITH ZINC COATED NUTS AND WASHERS FOR CATHODIC PROTECTION
11. CORPORATION STOP (SEE NOTE 7) SIZED PER ARV OUTLET
12. COMPRESSION JOINT
13. NPT MUSHROOM VENT CAP W/ SS SCREEN. BOTTOM VENTING (SIZED PER ARV OUTLET)
14. NPT SCH 80 PVC PIPE (SIZED PER ARV OUTLET)
15. NPT PVC COUPLING PLACED 1/2" BELOW BOX LID
16. BRASS NIPPLE (SIZE PER ARV OUTLET)
17. PLACER WATERWORKS ARV COVER PW/218 - B36 (OR EQUAL) BOLTED DOWN
18. VALVE BOX W/ 6" X 6" CONC COLLAR WITH #4 REBAR AND 8" SDR RISER PIPE
19. NPT GATE VALVE (1" OR 2" TO MATCH ARV INLET SIZE)
20. 12" WIDE WARNING TAPE
21. #10 AWG LOCATING WIRE

CARMICHAEL WATER DISTRICT

7837 FAIR OAKS BOULEVARD
CARMICHAEL, CALIFORNIA, 95608 - 6400

1" & 2" AIR RELEASE VALVE ASSEMBLY

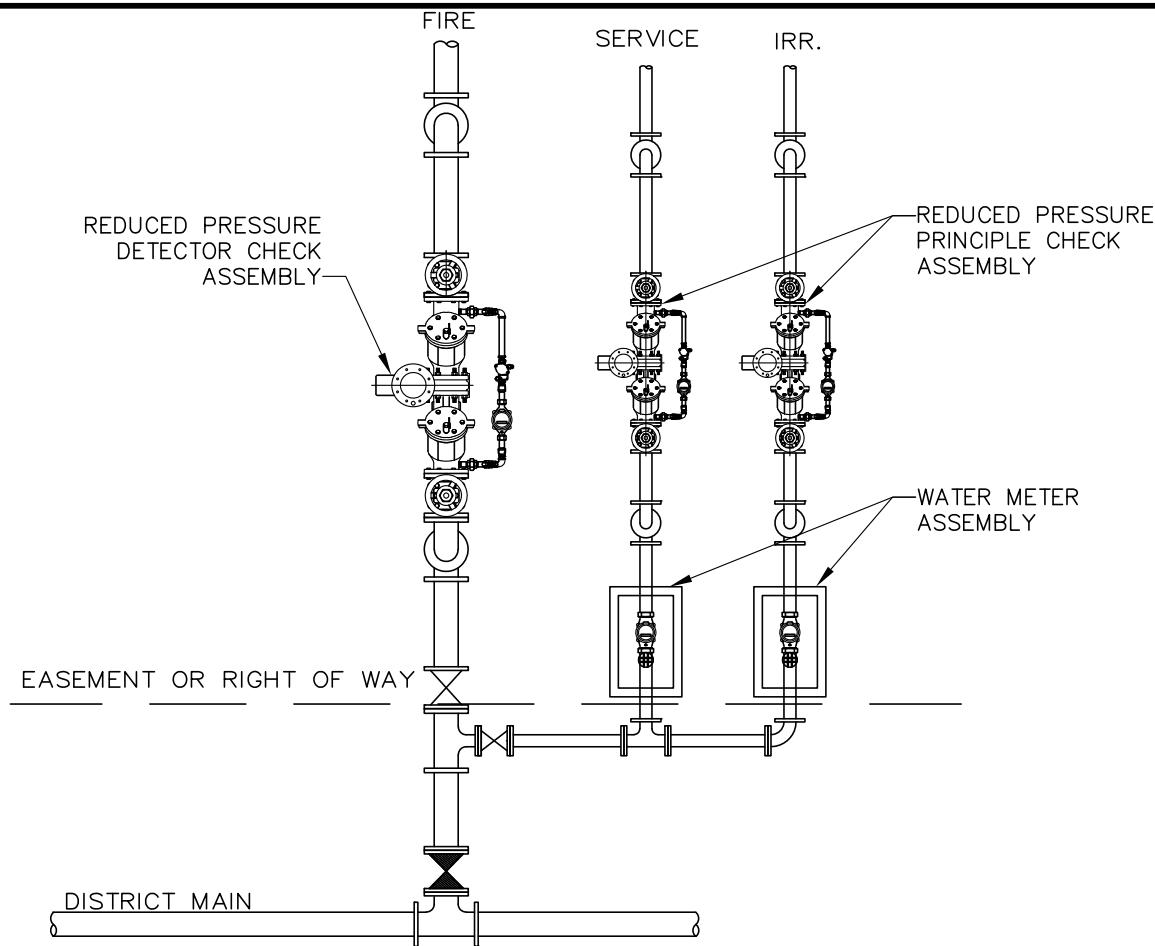
SCALE: NONE

APPROVED BY: GN

DATE: JULY 2025

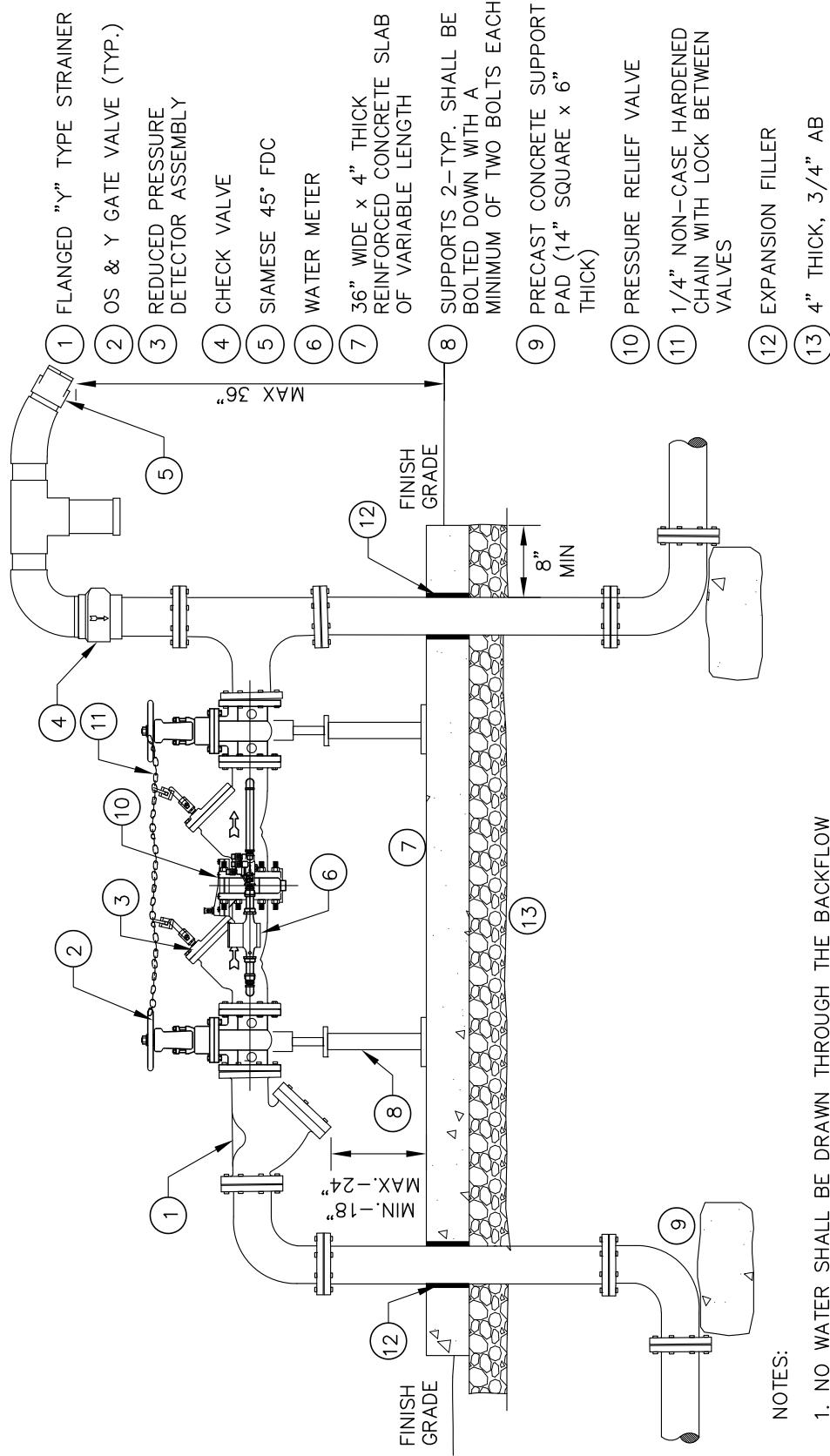
DRAWN BY: SR

W-16



NOTES:

1. BACKFLOW ASSEMBLY SHALL BE TESTED AND ACCEPTED, PRIOR TO PERMITTING SERVICE. METERS WILL BE INSTALLED BY DISTRICT CREWS. WATER MAY NOT BE DRAWN PRIOR TO TESTING OF THE BACKFLOW DEVICE BY THE DISTRICT.
2. PROVIDE A MINIMUM 3 FOOT SEPARATION BETWEEN BACKFLOW DEVICES IN PARALLEL.
3. RESTRAIN ENTIRE MANIFOLD WITH APPROVED RESTRAINT SYSTEMS.
4. TAPS SHALL BE MADE SUCH THAT NO DEAD END LINES RESULT.
5. ALL LINES 3" AND LARGER SHALL BE DIP.
6. PROVIDE A CONCRETE PAD WITHIN THE LIMITS OF THE BACKFLOW MANIFOLD WITH POSITIVE DRAINAGE AND A 2% MAX. SLOPE PER DRAWING W-19 AND W-20 AND INSTALL PIPE BOLLARDS PER DRAWING W-14.
7. IN A BACKFLOW MANIFOLD CONFIGURATION THAT INCLUDES DOMESTIC AND IRRIGATION SERVICES, THE IRRIGATION SERVICE TAP SHALL BE DOWNSTREAM OF THE DOMESTIC SERVICE TAP.
8. ALL NON RESIDENTIAL SERVICES AND RESIDENTIAL SERVICES WITH FIRE SPRINKLERS REQUIRE REDUCED PRESSURE BACKFLOW PROTECTION DEVICES.
9. PROVIDE A 3' MINIMUM CLEARANCE FROM TOE OR TOP OF ANY SLOPE. NO SLOPES GREATER THAN 2:1 ADJACENT TO BACKFLOW MANIFOLD. IF THE ABOVE CRITERIA CAN NOT BE MET, A RETAINING WALL IS REQUIRED. THE RETAINING WALL SHALL BE CONSTRUCTED OF CONCRETE OR MASONRY ONLY.
10. PROVIDE CURB STOPS AS REQUIRED PER THESE STANDARDS.
11. METER LID SHALL BE STENCILED WITH THE NUMBER ADDRESS IT SERVICES. USE WHITE ENAMEL PAINT AND 2" TALL STENCILING.
12. A METER BYPASS WITH A LOCKING CURB STOP OR LOCKING VALVE SHALL BE REQUIRED FOR MULTI-FAMILY DOMESTIC SERVICES OR WHERE REQUIRED.



NOTES:

1. NO WATER SHALL BE DRAWN THROUGH THE BACKFLOW DEVICE UNTIL IT HAS BEEN TESTED AND APPROVED BY THE DISTRICT.
2. THE BACKFLOW DEVICE SHALL BE INSULATED WITH A DISTRICT APPROVED FREEZE PROTECTION BAG.
3. FITTINGS SHALL BE FLANGE BY FLANGE OR RESTRAINED.
4. PIPE AND FITTINGS SHALL BE DUCTILE IRON.
5. BURIED PIPE AND FITTINGS SHALL BE WRAPPED AND SEALED WITH 10 MIL POLYETHYLENE AND VINYL TAPE.
6. A MINIMUM OF FOUR (4) 4" BOLLARDS PER DRAWING W-14 SHALL BE LOCATED AT EACH BACKFLOW ASSEMBLY.

CARMICHAEL WATER DISTRICT

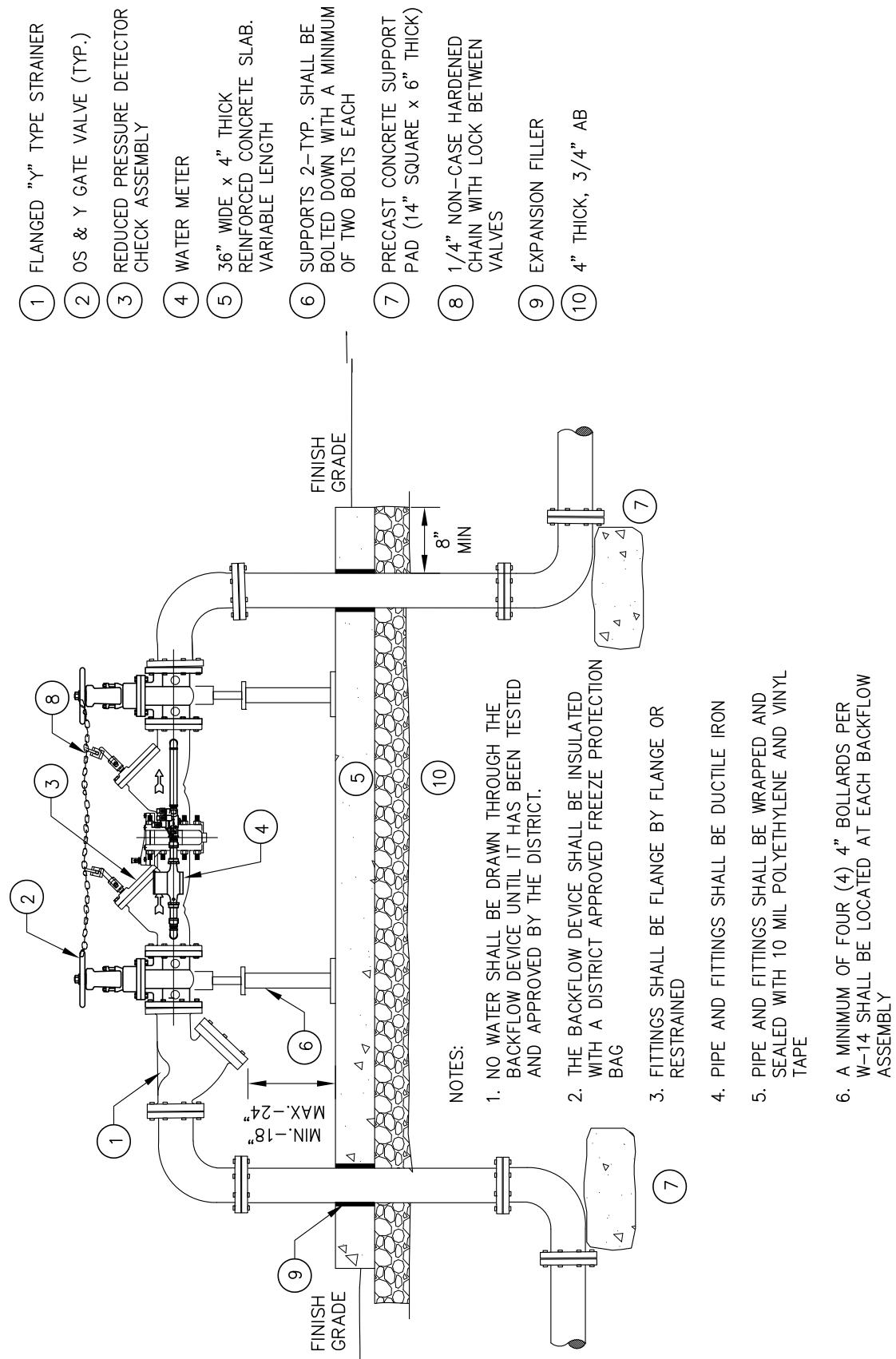
7837 FAIR OAKS BOULEVARD
CARMICHAEL, CALIFORNIA, 95608 - 6400

FIRE PROTECTION ASSEMBLY

(REDUCED PRESSURE DETECTOR CHECK)

SCALE: NONE	APPROVED BY: MM
DATE: APRIL 2021	DRAWN BY: JC

W-18



CARMICHAEL WATER DISTRICT

ON-SITE FIRE PROTECTION

7837 FAIR OAKS BOULEVARD
CARMICHAEL, CALIFORNIA, 95608 - 6400

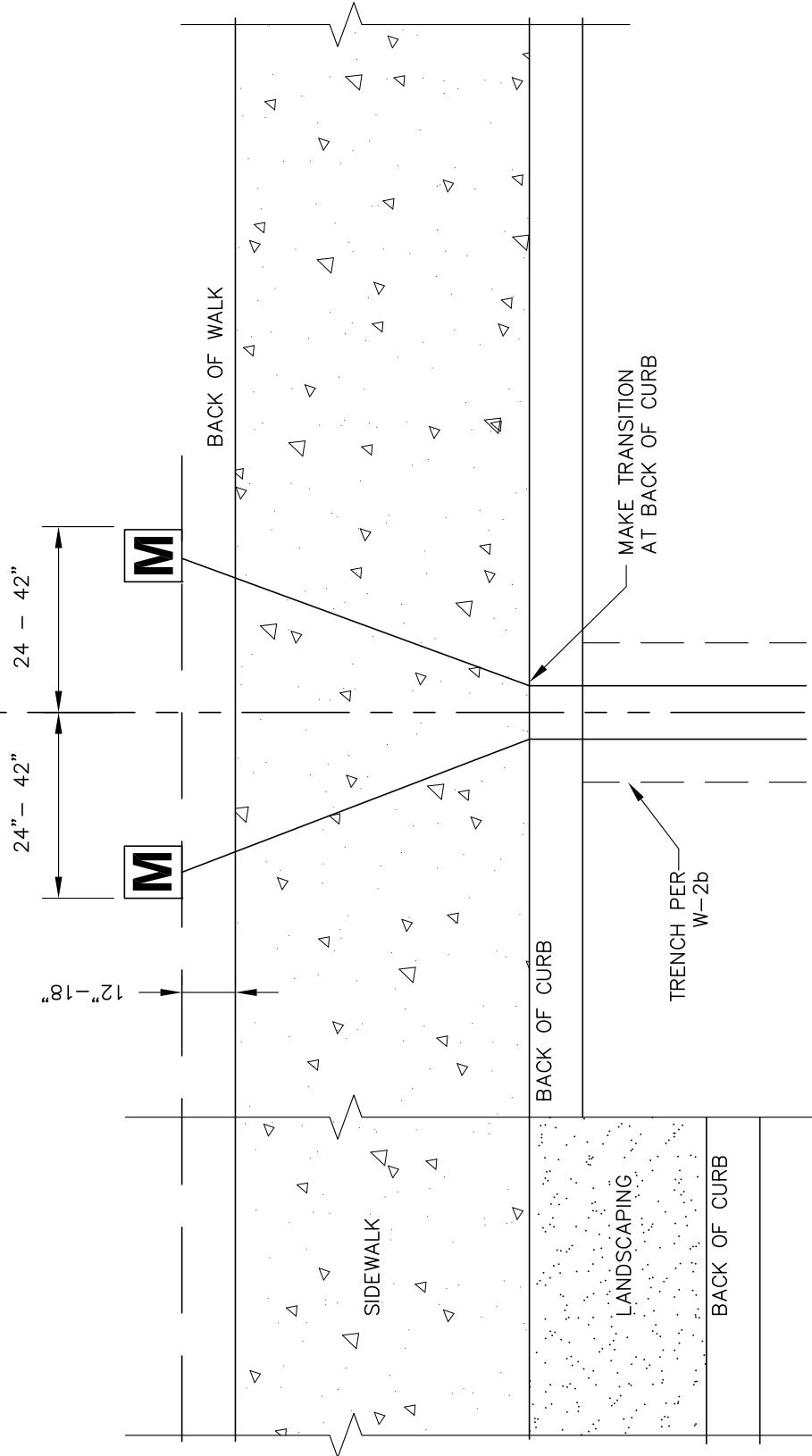
SCALE: NONE	APPROVED BY: MM
DATE: APRIL 2021	DRAWN BY: JC

W-19

NOTES:

1. 24" MINIMUM SEPARATION DISTANCE BETWEEN SERVICE SADDLES AND OTHER SERVICE SADDLES, MAINLINE COUPLING, JOINT, OR FITTING.

PL



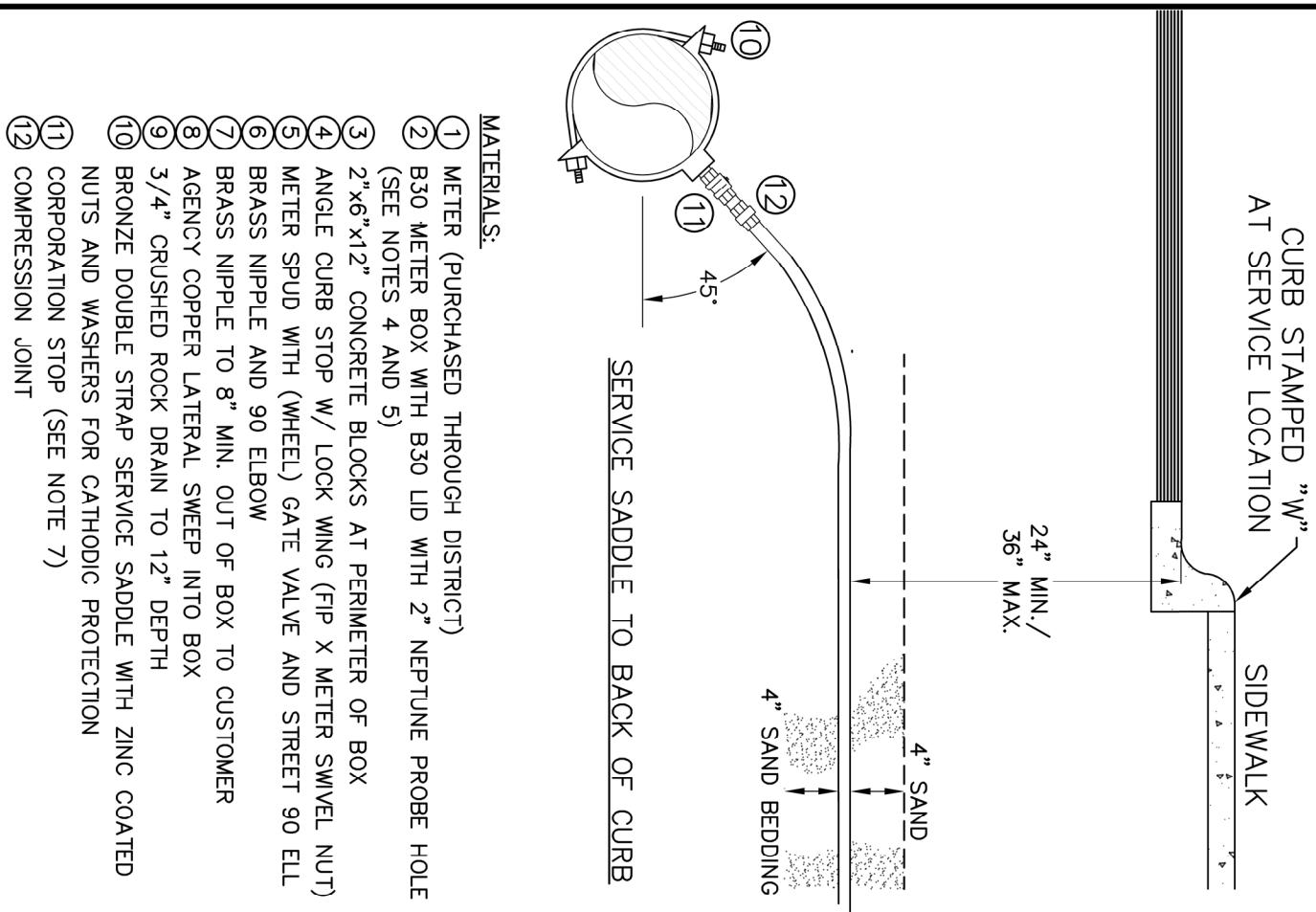
CARMICHAEL WATER DISTRICT

7837 FAIR OAKS BOULEVARD
CARMICHAEL, CALIFORNIA, 95608 - 6400

WATER SERVICE BOX LOCATION

SCALE: NONE	APPROVED BY: MM
DATE: APRIL 2021	DRAWN BY: JC

W-20

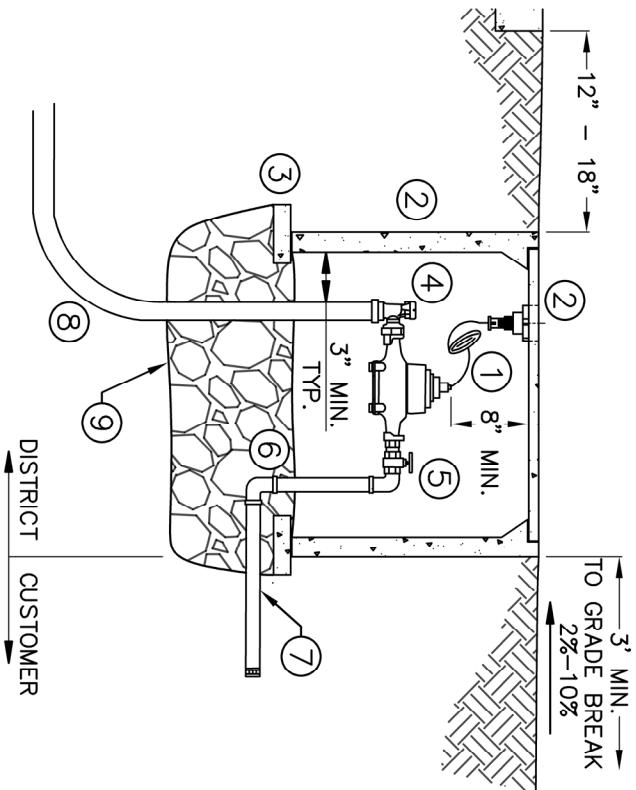


MATERIALS:

- ① METER (PURCHASED THROUGH DISTRICT)
- ② B30 METER BOX WITH B30 LID WITH 2" NEPTUNE PROBE HOLE (SEE NOTES 4 AND 5)
- ③ 2"x6"x12" CONCRETE BLOCKS AT PERIMETER OF BOX
- ④ ANGLE CURB STOP W/ LOCK WING (FIP X METER SWIVEL NUT)
- ⑤ METER SPUD WITH (WHEEL) GATE VALVE AND STREET 90 ELL
- ⑥ BRASS NIPPLE AND 90 ELBOW
- ⑦ BRASS NIPPLE TO 8" MIN. OUT OF BOX TO CUSTOMER
- ⑧ AGENCY COPPER LATERAL SWEEP INTO BOX
- ⑨ 3/4" CRUSHED ROCK DRAIN TO 12" DEPTH
- ⑩ BRONZE DOUBLE STRAP SERVICE SADDLE WITH ZINC COATED NUTS AND WASHERS FOR CATHODIC PROTECTION
- ⑪ CORPORATION STOP (SEE NOTE 7)
- ⑫ COMPRESSION JOINT

NOTES:

1. WATER METERS AND TOUCH READ DEVICES SHALL BE PURCHASED THROUGH THE DISTRICT. PURCHASE INCLUDES INSTALLATION.
2. ALL BURIED PIPE AND FITTINGS SHALL BE WRAPPED WITH 10 MIL POLYETHYLENE OR APPROVED EQUAL.
3. SERVICE LINES TO BE BLUE COATED TYPE "K" SOFT ROLLED COPPER.
4. FOR BOX LOCATED IN ROADWAY, DRIVEWAY OR SIDEWALK THE BOX AND LID MUST BE POLYMER CONCRETE TIER 22 (HUBBELL OR EQ.). FOR BOX LOCATED IN LANDSCAPE THE BOX AND LID SHALL BE POLY CONC TIER 8 (HUBBELL OR EQ.).
5. NEPTUNE ERT HOLE SHALL BE RECESSED.
6. PACK JOINTS MAY NOT BE USED.
7. FOR TAPS MADE ON DUCTILE IRON PIPE ALL CORPORATION STOPS AND GATE VALVES SHALL BE DIELECTRIC.
8. FOR TAPS MADE ON OD STEEL PIPE USE FULL CIRCLE REPAIR CLAMP.
9. TAPS, SERVICE SADDLES, AND FITTINGS SHALL BE SEPARATED BY A MINIMUM OF 24 INCHES.
10. AT TAP TAPE AND POLYETHYLENE WRAP ALL EXPOSED FITTINGS.



CARMICHAEL WATER DISTRICT

7837 FAIR OAKS BOULEVARD
CARMICHAEL, CALIFORNIA, 95608 - 6400

STANDARD 1" SERVICE CONNECTION

SCALE: NONE

APPROVED BY: GN

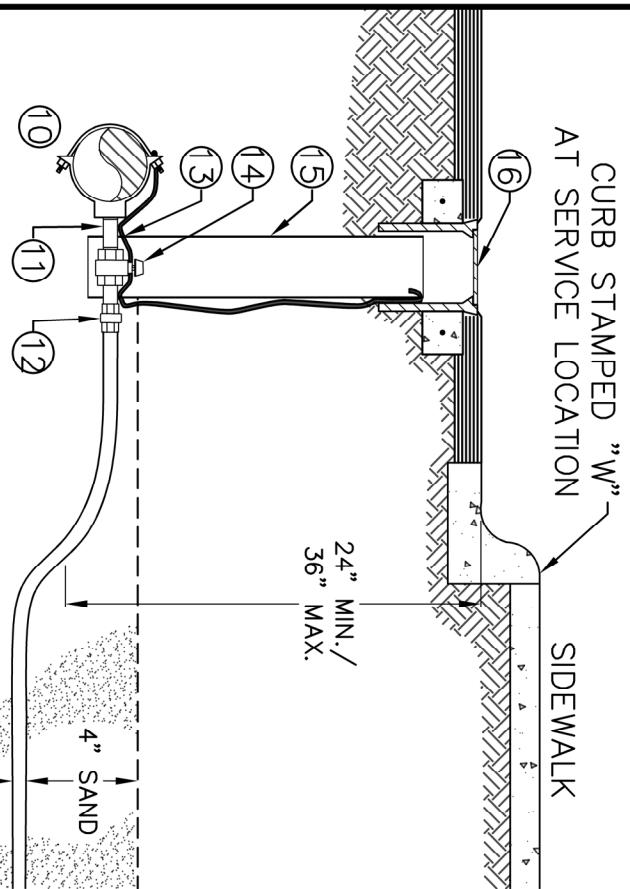
DATE: JULY 2025

DRAWN BY: SR

W-21

CURB STAMPED "W"
AT SERVICE LOCATION

SIDEWALK



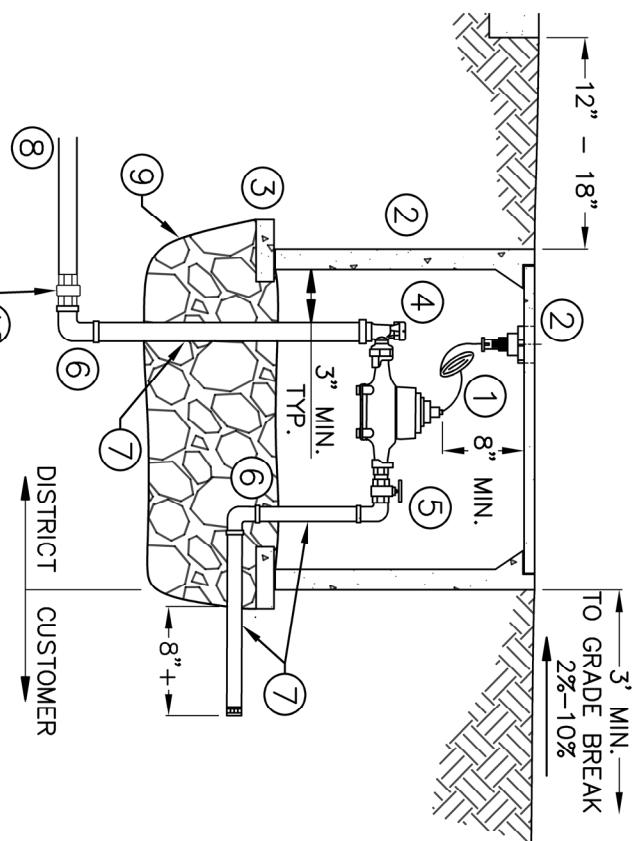
SERVICE SADDLE TO BACK OF CURB

MATERIALS:

- (1) METER (PURCHASED THROUGH DISTRICT)
- (2) B36 METER BOX WITH B36 LID WITH 2" NEPTUNE PROBE HOLE (SEE NOTES 4 AND 5)
- (3) 2"x6"x2" CONCRETE BLOCKS AT PERIMETER OF BOX
- (4) ANGLE CURB STOP W/ LOCK WING (FIP X METER SWIVEL NUT)
- (5) METER SPUD WITH (WHEEL) GATE VALVE AND STREET 90 ELL
- (6) BRASS 90 ELBOW
- (7) BRASS NIPPLE
- (8) AGENCY COPPER LATURAL
- (9) 3/4" CRUSHED ROCK DRAIN TO 12" DEPTH
- (10) BRONZE DOUBLE STRAP SERVICE SADDLE WITH ZINC COATED NUTS AND WASHERS FOR CATHODIC PROTECTION
- (11) 2"x6" NPT BRASS NIPPLE
- (12) MIPxCOMP COUPLING
- #10 AWG LOCATING WIRE
- 2" NPT GATE VALVE W/ 2" SQ. OPERATING NUT (SEE NOTE 7)
- 8" SDR RISER PIPE
- G5 VALVE BOX WITH 6"x6" CONC COLLAR W/ #4 REBAR

NOTES:

1. WATER METERS AND TOUCH READ DEVICES SHALL BE PURCHASED THROUGH THE DISTRICT. PURCHASE INCLUDES INSTALLATION.
2. ALL BURIED PIPE AND FITTINGS SHALL BE WRAPPED WITH 10 MIL POLYETHYLENE OR APPROVED EQUAL.
3. SERVICE LINES TO BE BLUE COATED TYPE "K" SOFT ROLLED COPPER.
4. FOR BOX LOCATED IN ROADWAY, DRIVEWAY OR SIDEWALK THE BOX AND LID MUST BE POLYMER CONCRETE TIER 22 (HUBBELL OR EQ.). FOR BOX LOCATED IN LANDSCAPE THE BOX AND LID SHALL BE POLY CONC TIER 8 (HUBBELL OR EQ.).
5. NEPTUNE ERT HOLE SHALL BE RECESSED.
6. PACK JOINTS MAY NOT BE USED.
7. FOR TAPS MADE ON DUCTILE IRON PIPE ALL CORPORATION STOPS AND GATE VALVES SHALL BE DIELECTRIC.
8. FOR TAPS MADE ON OD STEEL PIPE USE FULL CIRCLE REPAIR CLAMP.
9. TAPS, SERVICE SADDLES, AND FITTINGS SHALL BE SEPARATED BY A MINIMUM OF 24 INCHES.
10. AT TAP TAPE AND POLYETHYLENE WRAP ALL EXPOSED FITTINGS.



STANDARD 2" SERVICE CONNECTION

CARMICHAEL WATER DISTRICT

7837 FAIR OAKS BOULEVARD
CARMICHAEL, CALIFORNIA, 95608 - 6400

SCALE:

NONE

APPROVED BY:

GN

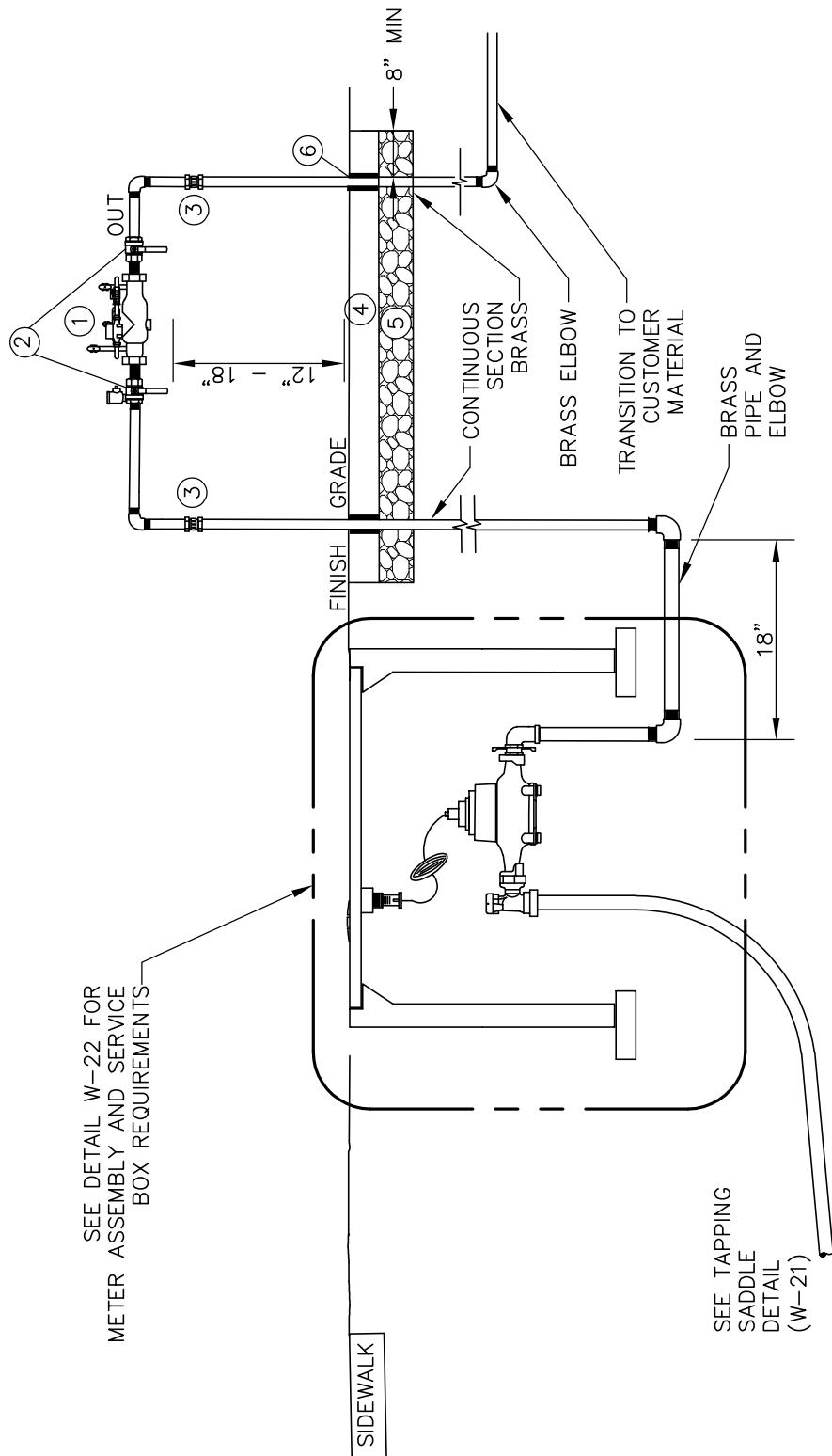
DATE:

JULY 2025

DRAWN BY:

SR

W-22

MATERIALS:

- (1) REDUCED PRESSURE PRINCIPLE TYPE BACKFLOW DEVICE
- (2) BALL VALVES
- (3) INSTALL (2) UNIONS
- (4) 36" WIDE x 4" THICK CONCRETE PAD OF VARIABLE LENGTH (12" NATIVE SOIL FOR LANDSCAPE AREA)
- (5) 3/4" AB, 4" THICK (3/4" AB, 12" THICK FOR LANDSCAPE AREA)
- (6) EXPANSION FILLER

NOTES:

1. NO WATER SHALL BE DRAWN THROUGH THE BACKFLOW DEVICE UNTIL IT HAS BEEN TESTED AND APPROVED BY THE DISTRICT.
2. ALL FITTINGS SHALL BE LEAD FREE, ALL PIPE SHALL BE BRASS OR RIGID COPPER.
3. WATER METERS SHALL BE PURCHASED THROUGH THE DISTRICT PURCHASE INCLUDES INSTALLATION.
4. THE BACKFLOW DEVICE SHALL BE INSULATED WITH A DISTRICT APPROVED FREEZE PROTECTION BAG OR CAGE.
5. BURIED PIPE AND FITTINGS SHALL BE WRAPPED WITH 10 MIL POLYETHYLENE OR APPROVED EQUAL.

CARMICHAEL WATER DISTRICT**1" & 2" SERVICE LINE****WITH RP STYLE BACKFLOW**7837 FAIR OAKS BOULEVARD
CARMICHAEL, CALIFORNIA, 95608 - 6400

SCALE: NONE

APPROVED BY: GN

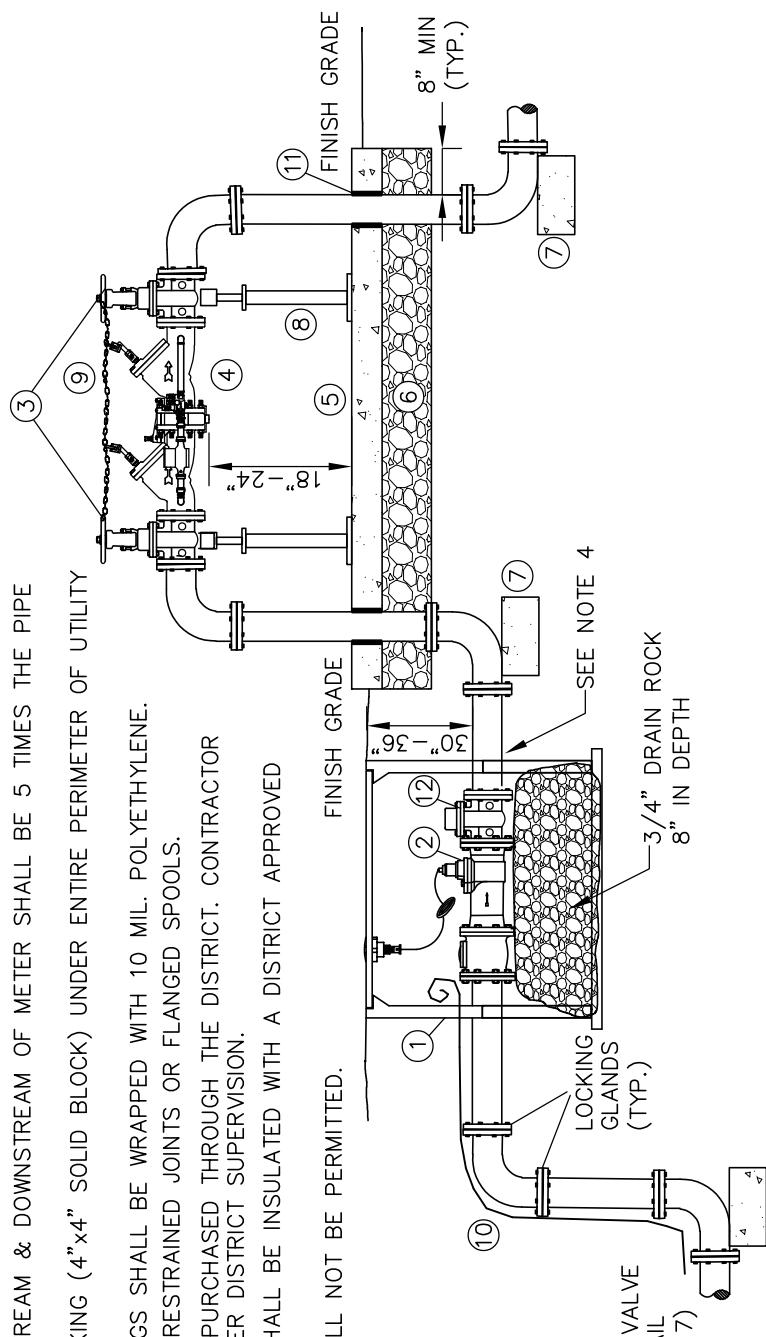
DATE: JUNE 2025

DRAWN BY: SR

W-23

NOTES:

1. NO WATER IS TO BE DRAWN THROUGH THE REDUCED PRESSURE PRINCIPLE BACKFLOW DEVICE UNTIL IT HAS BEEN TESTED AND APPROVED BY THE DISTRICT.
2. PIPE SHALL BE DUCTILE IRON.
3. GATE VALVES SHALL BE RESILIENT SEAT.
4. LENGTH OF SPOOLS UPSTREAM & DOWNSTREAM OF METER SHALL BE 5 TIMES THE PIPE DIAMETER.
5. INSTALL CONCRETE BLOCKING (4"x4" SOLID BLOCK) UNDER ENTIRE PERIMETER OF UTILITY BOX.
6. BURIED PIPE AND FITTINGS SHALL BE WRAPPED WITH 10 MIL. POLYETHYLENE.
7. USE DISTRICT APPROVED RESTRAINED JOINTS OR FLANGED SPOOLS.
8. WATER METER SHALL BE PURCHASED THROUGH THE DISTRICT. CONTRACTOR WILL INSTALL METER UNDER DISTRICT SUPERVISION.
9. THE BACKFLOW DEVICE SHALL BE INSULATED WITH A DISTRICT APPROVED FREEZE PROTECTION BAG.
10. CONCRETE METER LIDS WILL NOT BE PERMITTED.

MATERIALS:

- ① H2O RATED UTILITY BOX AND H2O STEEL LID. UTILITY BOX SHALL BE SIZED TO MAINTAIN 4" CLEARANCE FROM METER ASSEMBLY ON ALL SIDES
- ② METER SHALL BE PURCHASED THROUGH THE DISTRICT
- ③ RESILIENT SEAT GATE VALVES
- ④ REDUCED PRESSURE PRINCIPLE ASSEMBLY TYPE BACKFLOW DEVICE
- ⑤ 32" WIDE x 4" THICK REINFORCED CONCRETE SLAB OF VARIABLE LENGTH
- ⑥ 3/4" AB 6" THICK
- ⑦ 14" SQUARE x 6" THICK CONCRETE SUPPORT PAD
- ⑧ SUPPORT STANDS BOLTED INTO CONCRETE (TWO BOLTS MINIMUM)
- ⑨ 1/4" NON-CASE HARDENED CHAIN WITH BREAKAWAY LOCK
- ⑩ #10 AWG COPPER LOCATING WIRE (SEE W-7)
- ⑪ EXPANSION FILLER

CARMICHAEL WATER DISTRICT7837 FAIR OAKS BOULEVARD
CARMICHAEL, CALIFORNIA, 95608 - 6400**SERVICE LINE****3" AND LARGER**

SCALE: NONE

APPROVED BY: MM

DATE: APRIL 2021

DRAWN BY: JC

W-24