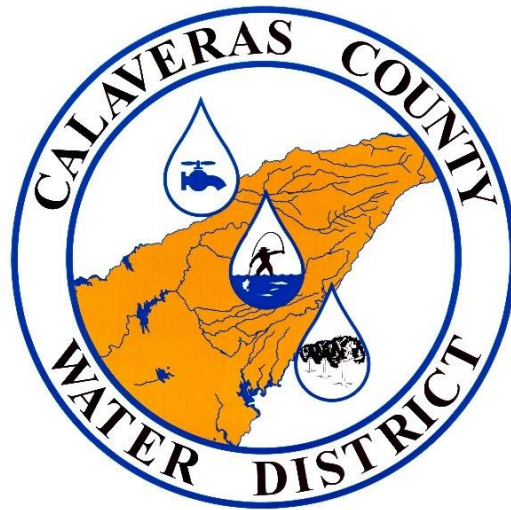


CALAVERAS COUNTY WATER DISTRICT

DESIGN AND CONSTRUCTION STANDARDS MANUAL

REVISED OCTOBER 2021



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Adopted on June 10, 2009 by District Resolution No. 2009-38

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ABBREVIATIONS AND DEFINITIONS

ABBREVIATIONS AND DEFINITIONS

Wherever in these STANDARDS, or in any documents or instruments referenced by these STANDARDS, the following terms, abbreviations, or definitions shall apply and the intent and meaning shall be interpreted as follows:

ABBREVIATIONS

| | |
|----------|--|
| AASHTO | American Association of State Highway and Transportation Officials |
| AC | Asbestos Cement |
| ACI | American Concrete Institute |
| ADD | Average Day Demand |
| ADWF | Average Dry Weather Flow |
| AF | Acre-Feet |
| AFY | Acre-Feet per Year |
| ANSI | American National Standards Institute |
| ASCE | American Society of Civil Engineers |
| ASTM | American Society for Testing and Materials |
| AVV | Air and Vacuum Valve |
| AWWA | American Water Works Association |
| BEP | Best Efficiency Point |
| CALTRANS | California Department of Transportation |
| CAV | Combination Air and Vacuum Valve |
| CBSC | California Building Standards Code/Commission |
| CCDPW | Calaveras County Department of Public Works |
| CCEHA | Calaveras County Environmental Health Agency |
| CCR | California Code of Regulations |
| CCWD | Calaveras County Water District |
| CEQA | California Environmental Quality Act |
| CFC | California Fire Code |
| CHSC | California Health and Safety Code |
| CIP | Capital Improvement Plan |
| CSI | Construction Specifications Institute |
| CTS | Copper Tubing Size |
| DCDA | Double Check Backflow Prevention Detector Assembly |
| DDR | Division of Drinking Water |
| DF | Demand Factor |
| DIP | Ductile Iron Pipe |
| DIR | Department of Industrial Relations, California |

ABBREVIATIONS (continued)

| | |
|-----------|---|
| DIPRA | Ductile Iron Pipe Research Association |
| DR | Dimension Ratio |
| EIR | Environmental Impact Report |
| EIS | Environmental Impact Statement |
| EPA | Environmental Protection Agency, United States |
| ESFU | Equivalent Single-Family Dwelling Unit |
| FF | Fire Flow |
| FOG | Fats, Oils, and Grease |
| FM | Factory Mutual Approvals |
| FPS | Feet Per Second |
| GPD | Gallons Per Day |
| GPM | Gallon Per Minute |
| HDPE | High Density Polyethylene |
| HP | Horsepower |
| IAPMO | International Plumbing and Mechanical Officials |
| IBC | International Building Code |
| ICC | International Code Council |
| IFC | International Fire Code |
| IMC | International Mechanical Code |
| IPC | International Plumbing Code |
| IPS | Iron Pipe Size |
| LPS | Low Pressure System |
| MDD | Maximum Day Demand |
| MDF | Maximum Daily Flow |
| MMF | Maximum Monthly Flow |
| NEPA | National Environmental Policy Act |
| NFPA | National Fire Protection Agency |
| NSF | National Sanitation Foundation International |
| PDF | Public Document Format |
| PE | Polyethylene |
| PHD | Peak Hour Demand |
| PHF | Peak Hourly Flow |
| PLC | Programable Logic Controller |
| PUE | Public Utility Easement |
| PVC | Polyvinyl Chloride |
| PRV | Pressure Relief or Regulating Valve |
| PSI / psi | Pounds per Square Inch, Gauge |
| PWWF | Peak Wet Weather Flow |
| RCP | Reinforced Concrete Pipe |

ABBREVIATIONS (continued)

| | |
|-------|---|
| RPBA | Reduced Pressure Principle Backflow Prevention Assembly |
| RWQCB | Regional Water Quality Control Board, Central Valley |
| SAE | Standard American Units |
| SDR | Standard Dimensional Ratio |
| STEP | Septic Tank Effluent Pump |
| SWRCB | California Water Resources Control Board |
| TDH | Total Dynamic Head |
| UL | Underwriters Laboratories, Inc. |

DEFINITIONS

Applicant – A person, persons, corporation, partnership, developer, agency, or legal entity, or authorized agent of same, requesting the District to provide either new water, recycled water, and/or wastewater service.

Application for Concept/Planning Review – An application for water, recycled water, and/or wastewater concept/planning review. Concept/planning review provides a general review of the project and determines conditions for the water and/or wastewater Facility Agreement.

Application for New Service Quotation – A package containing an Application for New Service Quotation, Design and Construction Standards Manual, and instructions.

Approved or Approval – Unless specifically indicated otherwise, means written approval by the District.

Approved Material List – Approved list of materials and equipment for the construction of District water, wastewater, and recycled water facilities contained in Section 6 of the STANDARDS.

Collection – Pipeline that collects sewer flow from one or more wastewater services.

Concept/Planning Review Approval – District approval of the Application of Concept/Planning.

Contractor – Person, firm, partnership, corporation, or organization, either singular or plural, who constructs any portion of the “Released for Construction” Improvement Plans, and licensed by the State of California Contractor’s Board, and registered with the California Department of Industrial Relations (DIR).

Cost to Serve – Application for New Service Quotation and associated District response.

County – The County of Calaveras, California.

Cross Connection – Any unprotected connection between any part the District water system used or intended for drinking water and any source containing water or a substance that is not or cannot be approved as safe, wholesome, and potable for human consumption.

Design Report – A Design Report prepared by a registered California licensed civil engineer containing a preliminary design and layout of the proposed water, recycled water, and/or wastewater System Improvements.

Development – A development which requires construction of System Improvements related to District water, recycled water, and/or wastewater facilities.

District – The Calaveras County Water District.

District Engineer – Authorized registered civil engineer, licensed in California, who oversee the engineering functions of the District and District engineering department.

DEFINITIONS (continued)

District Policies – The Rules, Regulations, Ordinances adopted in public forum by the elected District Board related to water, recycled water, and wastewater service.

Easement – A publicly recorded document granting the District permanent rights-to- access to private land or other property.

Engineer – The Engineer of Record licensed by the State of California as a civil engineer, employed by the Owner responsible for the planning, design, and construction of the new water, recycled water, and/or wastewater Improvement Plans.

Extension of Facilities – Facilities that are extended or expanded to serve new customers.

Facility Agreement – A service agreement between the District and Owner setting forth conditions related to the extension or expansion of District’s water, recycled water, and/or wastewater systems.

Field Acceptance – Approval by the District Inspector of the physical installation of the System Improvements as shown in the “Released For Construction” Improvement Plans and associated approved construction changes.

Final Acceptance – Ownership transfer of the Improvement System to the District.

Fire District – The fire protection district having jurisdiction in the area of the Improvement System project.

Fire Line – A private pipe system that is connected to the District water system and utilized only for fire protection and serving a single property.

Grant of Easement – An easement recorded at the County Recorder’s Clerk Office concerning a privately owned parcel for the purpose of access to District facilities located on the property for construction, inspection, maintenance, and operation.

House Inspection – Inspection by District of the water, recycled water, and/or sewer service between the water meter, recycled water backflow preventor, or property line sewer cleanout, to a distance of 2-feet from the building foundation.

House Plumbing – Plumbing fixtures, devices, and piping within a building or structure, including all pipes and appurtenances on the downstream side of the water meter or sewer cleanout.

Improvements – The Improvement System.

Improvement Plans – Calculations, drawings, specifications, cost estimates, schedules, conveyances and assurances for construction of new water, recycled water, and/or wastewater facilities by the Owner.

Improvement System – Water, recycled water, and/or wastewater facilities as identified by the Improvement Plans.

DEFINITIONS (continued)

Inspector – An employee or agent of the District engaged to observe and record field compliance with the Improvement Plans.

Master Plan – A District Master Plan for water, recycled water, or wastewater facilities in a service area.

Offsite – District water, recycled water, and/or wastewater system outside the Improvement Plans boundaries.

Onsite – Water, recycled water, and/or wastewater facilities constructed by a Owner within the boundaries of the Improvement Plans.

Owner – An individual or organized group, partnership, corporation, developer, etc., proposing to subdivide or improve land which will require water, recycled water, and/or wastewater service from the District's.

Owner's Engineer – The Engineer.

Parcel Map – A land division map prepared in accordance with County requirements.

Plans – The System Improvement Plans.

Pressure Zone – An area located between two elevations within the District's water system that is supplied by a reservoir(s) and/or pressure reducing station(s) having specific maximum and minimum hydraulic grades.

Project – The Owner's project.

Project Acceptance – Final District inspection, acceptance of Record Drawings, payment of any outstanding monies, submission of maintenance bond, and applicable warranties.

Record Drawings – Drawings and associated records of the Improvement Plans "As Constructed".

Recycled Water – Sewage which, as a result of treatment, is suitable for beneficial uses in accordance with current California Code Regulations Title 22, Chapter 4.

Released for Construction – Approval by the District Engineer of the Improvement Plans.

Required – A requirement of the District.

Service Area – Area within the County that has established customer water, recycled water, and/or wastewater service.

Service Lateral or Lateral – Sewer service pipe from the collection sewer in a public utility easement ending at a cleanout located at the edge of the property served.

Sewage/Septage – Domestic wastewater.

Sewer – A domestic wastewater gravity pipeline.

DEFINITIONS (continued)

Sewer Force Main – A domestic wastewater pipeline operating under pressure induced by mechanical pumping.

Subdivision Map – A land division map prepared in accordance with the County requirements.

STANDARDS – The Calaveras County Water District Design and Construction Standards Manual.

Standard Drawings – Standard drawings and details for construction of District water, wastewater, and recycled water facilities located in Section 7 of the STANDARDS.

Standard Technical Specifications – Standard technical specification for the construction of District water, wastewater, and recycled water facilities located in Section 5 of the STANDARDS.

Transmission Main – Water pipelines identified in the District’s Master Plan as backbone pipelines dedicated to deliver water to the distribution system.

Trunk Sewer – A pipeline that collects wastewater from several collection sewers.

User – Any person, customer, or entity being served from District.

User Service Line – Pipe, tubing, and fittings connecting a water main to an individual water meter located at the edge of the property served.

Water Main – The water distribution pipeline usually consisting of pipelines that supply water to user meters, pressure regulators, or fire protection hydrants.

Water Purveyor – Calaveras County Water District.

Water Connection – The pipe between the user meter to the customer service and responsibility of the customer.

Water Service Connection – See User Service Line.

***** END OF ABBREVIATIONS AND DEFINITIONS *****

**SECTION 1
GENERAL REQUIREMENTS**

SECTION 1 – GENERAL REQUIREMENTS

1.1 INTRODUCTION

1.1.1 SCOPE

The purpose of the Water and Wastewater Design and Construction Manual (STANDARDS) is to provide procedures and minimum guidelines for the planning, design, and construction of District water and wastewater facilities. The following Sections comprise the STANDARDS:

Section 1 – General Requirements

Procedures, requirements, regulations, criteria, agreement terms, and fee schedule for new water and/or wastewater service.

Section 2 – Water Standards

Planning, design construction requirements, criteria, and standards for District water distribution systems.

Section 3 – Wastewater Standards

Planning, design, construction requirements, criteria, and standards for District wastewater collection systems.

Section 4 – Recycled Water Standards

Under development and currently not available.

Section 5 – Standard Technical Specifications

District standard technical specifications for water, recycled water, and wastewater System Improvements.

Section 6 – Approved Materials List

List of District pre-approved manufacturers, suppliers, equipment, and materials suitable for water, recycled water, and wastewater System Improvements.

Section 7 – Standard Drawings

District standard construction drawings and details for construction of water and wastewater improvements.

These STANDARDS apply to all District water, recycled water, and wastewater Improvement Systems being extended, modified, upgraded, and rehabilitated, new or

existing. In some situations, the District may require criteria that exceed these STANDARDS based on project-specific conditions.

Wherever there are differences between these STANDARDS and other local, regional, County, State, or Federal regulations, the most stringent or highest requirement shall govern. All environmental mitigation and permit requirements of various governing bodies are to be incorporated into project design and construction.

Unless otherwise noted, all measurements in these STANDARDS are in Standard American English (SAE) units.

1.1.2 CALAVERAS COUNTY WATER DISTRICT JURISDICTION

The District is responsible for the approval of Improvement Plans and installation inspection of all water and wastewater Improvement Systems constructed within the District's service area. The District's service area is generally the boundaries of the County of Calaveras, except for those areas being served by other Special Districts and City of Angels Camp. As a result, the District services several non-continuous service areas/locations. The locations of the District water and wastewater service are shown on Section – 7 Drawing G01.

District responsibility for water and/or wastewater service ends at the edge of the customer's property line. Termination of District responsibility, including maintenance, is identified by the location of the user's water meter and/or sewer lateral cleanout located at the property edge. However, during installation/construction the District shall inspect the user's water service line and/or sewer lateral located on the customer's property up to a distance 2-feet from the building foundation.

Wells for individual users within the District's service area are not the jurisdiction of the District. Calaveras County monitors and approves private well construction.

1.1.3 INTERPRETATION

It is recognized that it is not possible to anticipate all situations that may arise or prescribe standards applicable to every situation. Therefore, any items or situations not included in these STANDARDS shall be resolved in accordance with the best professional engineering practices. The District Engineer must approve, in writing, any exception to these STANDARDS. Such exceptions shall be project specific and be incorporated in the project documents and drawings. However, the District Engineer does not have the authority to wave State and Federal regulations and requirements.

1.1.4 APPLICABLE CODES AND POLICIES

All design and construction shall comply with the latest adopted ordinances, regulations and government agencies having appropriate justification. These include, but are not limited to:

- A. *California Code and Regulations (CCR) Title 24* including the following adopted ICC and NFPA codes:
 - 1. International Fire Code as amended by *Title 24, Part 9, California Fire Code*
 - 2. International Plumbing Code as amended by *Title 24, Part 5, California Plumbing Code*
 - 3. NFPA 70, National Electrical Code as amended by *Title 24, Part 3, California Electrical Code*
- B. County and State road encroachment regulations.
- C. Calaveras County Water District Rules, Regulations and Ordinances.
- D. State Water Resources and Regional Water Quality Control Boards Rules and Regulations.
- E. CCR Title 17, Division 1, Chapter 5, Subchapter 1 and CCR Title 22, Division 4 related to drinking water.

1.1.5 FIRE SERVICE WITHIN DISTRICT'S SERVICE AREA

The District will provide water for fire hydrants and other facilities used exclusively for firefighting at such pressure and at such rates of flow as may be available from time to time as a result of the operation of the District's storage, transmission, and distribution facilities. The quantity and rate of fire flows are under the jurisdiction of various Fire Protection Districts in the County.

1.2 ENGINEERING PROCEDURES

1.2.1 GENERAL

The purpose of these STANDARDS is to provide District customers with both a system that dependably and safely delivers high quality drinking water and a system that collects customer domestic wastewater for treatment and disposal.

1.2.2 OWNER'S ENGINEER'S RESPONSIBILITY

These STANDARDS establish minimum guidelines for the planning, design, and construction of the District's water and wastewater Improvement Systems. They are not intended to be a substitute for engineering knowledge, judgment, and experience. The contained procedures shall be reviewed by the Owner's Engineer and shall be

applied as necessary to the development. Proposed deviations to these STANDARDS shall be submitted, in writing to the District.

All plans, specifications, reports, or documents shall be prepared by a California registered civil engineer, or under direction thereof, and shall be signed and stamped to indicate his/her responsibility and will be the property of the District upon acceptance of the project.

Improvement Plans “Released for Construction” do not in any way relieve the Owner's Engineer of the responsibility for the design and complying with all requirements of the District. Improvement Plans shall be revised or supplemented if it determined by the District's Engineer that any of the following occurs:

- A. Requirements have not been met; and
- B. There is a significant change in the site conditions; and
- C. Construction does proceed within the time allowed in the Facility Agreement.

1.2.3 REFERENCE SPECIFICATIONS

References to institutional standards ANSI, ASTM, AWWA, NEC, NFPA, and NSF shall refer to the latest edition or revision of such standards, unless otherwise specified.

1.2.4 APPROVAL FOR WATER, AND/OR WASTEWATER SERVICE

Figure 1.1 is a flow chart showing the approval process to extend or expand the existing District system for new customer service, whether it is for a single lot service or for a subdivision.

For developments going through the County Planning Department, an Application for Concept/Planning should be submitted prior to the start of the project associated environmental review and documentation. Concept/Planning Review and approval is generally required prior to the preparation of environmental documents.

1.2.5 APPLICATION FOR NEW SERVICE QUOTATION

Service for water and/or wastewater starts with the Application for New Service Quotation. The Application is available at the District office and District website.

When received the District, if complete, the application will be reviewed and availability of service from existing District facilities determined. If service is available a Cost of Service Quotation will be prepared by the District. If there are no facilities, or if the existing facilities do not have the capacity, the District will notify the Applicant that an Application for Concept/Planning Review is required. The

Application for Concept/Planning Review is available at the District office and District website.

Application for New Service Quotation fees and Application for Concept/Planning Review fees are described in Section 1.3.

1.2.6 APPLICATION FOR CONCEPT/PLANNING REVIEW

The District requires the submittal of an Application for Concept/Planning Review when the District's existing water and/or wastewater systems must be expanded to provide new customer service. The purpose of the Concept/Planning Review is to evaluate the overall project concept and to determine the feasibility of service. A description of the project, review fees and environmental documentation deposit are to be included with the Application. If the project is not feasible, the environmental documentation deposit will be returned.

A project Design Report will be required, unless the project is not complex or will not be a significantly impact. The purpose of the Design Report is to generate an understanding between the Owner and the District on what water and/or wastewater Improvement System the Owner must construct prior to receiving service. The Design Report will be then incorporated into the Facility Agreement by reference.

The Design Report shall conform to these STANDARDS. The Design Report is to be prepared by and stamped by a California registered engineer. Concept/Planning Approval will not be given until the District Engineer has approved the Design Report.

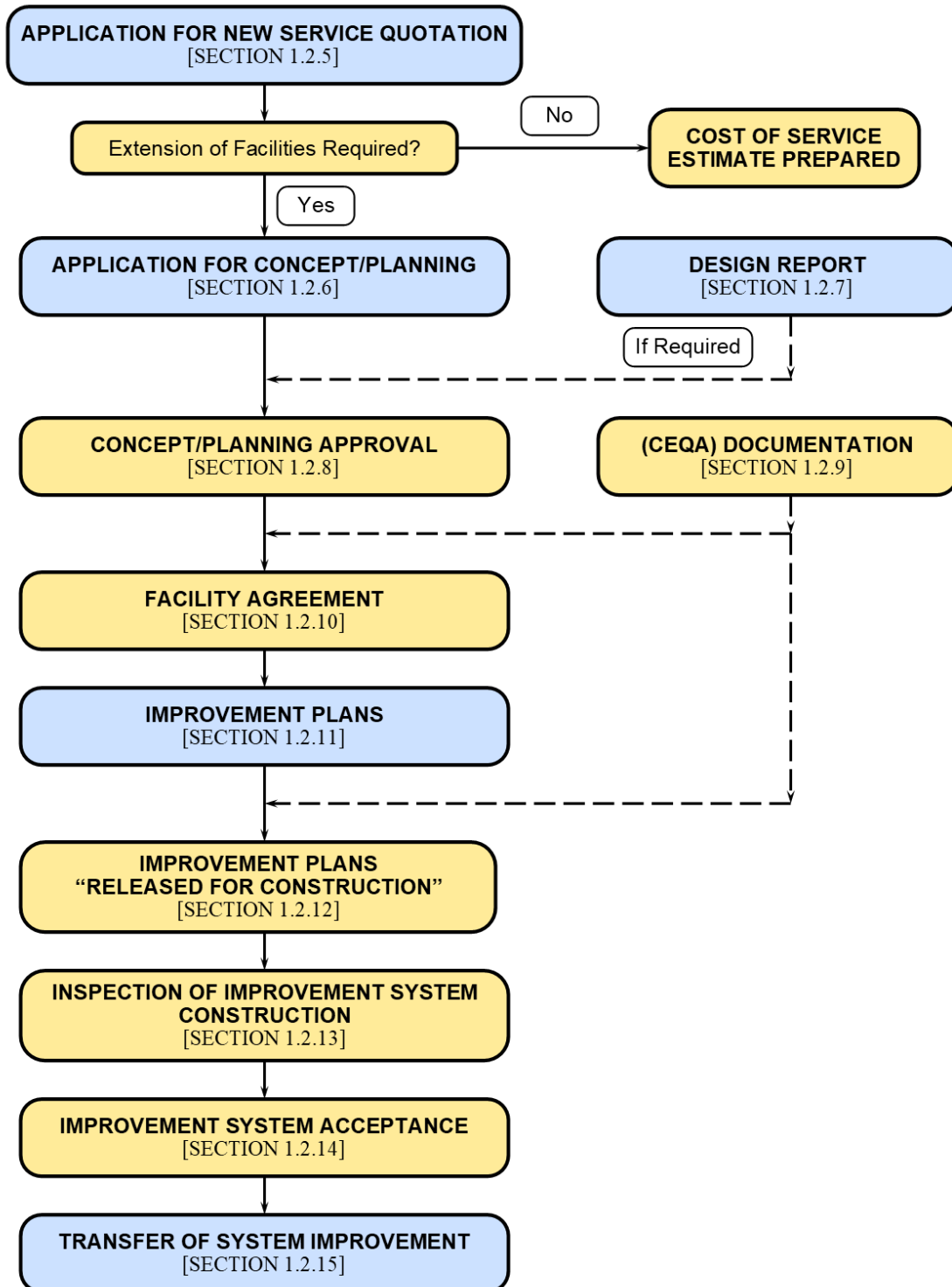


FIGURE 1.1
APPLICATION FOR NEW SERVICE FLOW CHART

1.2.7 DESIGN REPORT

Prior to preparing the Design Report, a meeting with the Owner's Engineer and the District Engineering Department is required to review the project and report content.

The complexity of the report will depend upon the size of the project, the number of phases, and the extent of the improvements that are required. The report shall include the following information.

A. Cover Page

1. Project Name
2. Identify if a Water and/or Wastewater Improvement System(s);
3. Project schedule
4. Assessor's Parcel Number(s); and
5. Owner's Engineer's Stamp; signed and dated.

B. Project Description

1. A location map identifying the District service area and showing existing District infrastructure; and
2. Project map showing phasing (if applicable), proposed subdivision layout and adjacent developments.

C. Water

1. Map showing proposed location and size of all water facilities, including pressure reducing stations and pump stations (if applicable).
2. Proposed connections to existing District system.
3. Description of water demands based upon number of ESFU and these STANDARDS. Landscaping requires a separate connection and is to be listed as a separate demand.
4. Description of any District Master Plan facilities that will be required, such as water storage tanks.
5. Preliminary design criteria for pumping and pressure reducing facilities (if applicable). Individual lots requiring booster pumps are to be identified. Include a demand table with average day, peak hour, and maximum day demands detailed by junction node.
6. Hydraulic model, with map, showing the nodes and pipe numbering scheme.

D. Sewer

1. A map showing all proposed sewer facilities, including the size sewer mains,
 2. The location of sewage lift stations, pumped lots, and off-site contributions (if applicable).
 3. Average dry weather flow and peak wet weather flow based upon the number ESFU and these STANDARDS.
 4. Location of proposed connections to existing District system.
 5. Description of any Master Plan facilities that will be required, such as wastewater treatment facility expansion.
 6. Preliminary design criteria for sewage lift station facilities, including capacity and head.
 7. Identify all individual lots requiring house pump installations (if applicable).
 8. Table showing proposed sewer hydraulics such as capacities, flows, slopes, velocities, depth of flow, etc.
 9. Sewer model, with map, showing the manhole and sewers numbering scheme.
- E. Temporary Facilities
1. Temporary facilities (if applicable) and a schedule for the permanent facilities to be installed.
- F. Appendix
1. Copy of the tentative map (if applicable).
 2. Pertinent calculations and hydraulic modeling analysis.

Two (2) copies of the Design Report shall be submitted to the District Engineering Department. The Owner's Engineer will receive confirmation correspondence indicating the Design Report has been received.

Upon receipt, an initial screening of the Design Report will be performed. If the Design Report does not meet minimum standards, it will be returned to the Owner's Engineer for resubmittal. Initial District review will be completed within approximately four (4) weeks with subsequent reviews adding to the total review time. Any questions regarding the review should be directed to the District Engineering Department.

Review comments, by the District, will be sent to the Owner's Engineer and copied to the Owner. Resubmittal of the Design Report, if required, shall consist of two copies of the revised Design Report and a copy of the review letter as an appendix. Upon approval, the District Engineer will sign the Design Report and a copy returned to the Owner's Engineer. The Design Report will become the basis of design in the Facility Agreement.

If the Improvement Plans received after the Facility Agreement are significantly different than the Design Report, the project approval process will not continue until the Design Report has been revised and approved.

1.2.8 CONCEPT/PLANNING APPROVAL

Concept/Planning Application is valid for twelve (12) months from the date of District approval. Within the twelve (12) month period, a Facility Agreement must be executed.

1.2.9 ENVIRONMENTAL DOCUMENTATION

Projects that require construction of new facilities will be subject to environmental review, documentation, and mitigation under the statutes of California Environmental Quality Act (CEQA), and if applicable, National Environmental Policy Act (NEPA). Calaveras County will normally be the lead agency if the facilities are part of a development under review of the County.

The District will be the lead agency for projects that are carried out by individual property owners and where the primary work is the construction water and/or wastewater improvements.

Environmental documents prepared and adopted by the County, must be submitted to the District the Facility Agreement. If the document is a negative declaration, then the initial study must also be included. Costs to review the County CEQA documentation will be subject to fees as described in Section 1.3.

When the District is the lead agency, the Engineering Department will determine the appropriate type of environmental document. The Owner will be provided with a cost estimate and schedule for preparing the environmental document.

A public comment period and/or Board approval may be required, depending on the type of environmental document required. Typically, line extensions will be exempt from CEQA and only a notice filed with the County and State Clearinghouse required.

1.2.10 FACILITY AGREEMENT

The District will provide a standard service Facility Agreement (Agreement) that is to be executed by the Owner. The District Board has authorized the General Manager to execute the Agreement on behalf of the CCWD. Conditions, other than those contained in the Facility Agreement, may need Board approval. Generally, the Agreement states that the Owner shall provide for the design, engineering, construction, and installation of a complete water and/or wastewater system at the expense of the Owner; and thereafter, the system will be operated, maintained, and dedicated to CCWD.

The Agreement will provide for, but not be limited to, provisions for the Owner to prepare and submit to CCWD, for review, all engineering calculations, plans, specifications, cost estimates, property descriptions, pay all fees, deliver all bonds, construct and pay for all facilities and do all other work as required.

Improvement Plans are to be constructed in compliance with these Standards, together with any and all amendments thereto and all other requirements of each and every governmental authority having any jurisdiction with development.

The Agreement provides that at the time of completion, the system shall be granted, in its entirety, free and clear of any and all encumbrances, to CCWD. Upon acceptance of the Improvements, the District will charge expansion fees, monthly fees to the users and may impose or raise fees in order to operate, maintain and the system.

The service Facility Agreement provides a two-year term for Improvement Plans submittal. If Plans are not submitted within the two-year period then a new Agreement will be required.

1.2.11 IMPROVEMENT PLANS SUBMITTAL AND REVIEW

A. General

The Engineering Department has established criteria, which shall be followed in the preparation of Improvement Plans (Plans). Upon receipt of the Plans the Department will perform a cursory review of the Plan's content and if the Plans do not meet these STANDARDS, they will be returned to the Owner's Engineer. The Owner's Engineer, who is preparing the Plans, is responsible for preparing neat, accurate and comprehensive plans in keeping with the standards of the profession. All engineers involved in preparing Plans should have in their possession a complete set of these STANDARDS.

The following administrative items are required to be completed prior to or included with the Plans submittal:

1. Executed Facility Agreement
2. Estimate of System Improvements construction cost and total cost
3. Payment of Plan review fees

It should be understood that the responsibility for accuracy and completeness of the Plans rests with the Owner's Engineer. By signing the Plans, the District Engineer attests to the fact that the Plans have been reviewed and conform to these STANDARDS.

B. Plans Submittal

Section 7 – Drawing G02 describes the general requirements for the preparation of the Plans. Two (2) sets of ANSI D-size plans (22-inch x 34-inch) are to be submitted, along with associated specifications for review. For subdivisions, all of the development related improvements drawings and specifications are to be included.

C. Plans Review

Approximately four (4) weeks will be required for the first review. One set of Plans, with comments, along with a review letter will be returned to the Engineer. Subsequent reviews are intended to ensure that the original comments have been addressed.

D. Easements

Pipelines shall be installed within a paved road right-of-way, unless there are physical limitations or extreme economic penalties. When easements are required, there shall be careful consideration of access and how the pipeline is to be maintained and/or replaced. Easements shall define and establish the rights of District construct, reconstruct, operate, and maintain facilities in the location designated by the Engineer.

All easements are to be shown on the Plans. Grant of Easements for all installations in off-site private property shall provide to the District. No construction work will be permitted to proceed in off-site private property until the District receives and accepts all right-of-way easements.

1. Easement Width – The minimum width of easements shall be 15-feet for pipelines less than 12-inches in diameter and 20-feet for pipelines 12-inches in diameter, or width three times the depth of the line, whichever is greater.

The pipeline shall be offset from the edge of the easement line by 5-feet whenever possible, leaving a minimum of 10-foot clearances from the opposite easement line. Additional easement width may be required in special conditions.

2. Descriptions and Exhibits – Descriptions or exhibits for easements to be acquired shall be prepared by a California licensed land surveyor, or civil engineer licensed in California before January 1, 1982. The parcel number shall appear on the description or exhibit. The correct name of the grantor (individual(s), partnership or corporation) shall appear on the description or exhibit. Two copies of each description or exhibit shall be submitted with Plans prior to being “Released for Construction”.
3. Grant of Easement – After the Engineer has submitted the descriptions and drawings for review, CCWD will prepare the Grant of Easements forms for the respective easement. The

original Grant of Easement form together with its description or exhibit shall be returned to the Engineer to secure the proper signature(s) and notarization(s). The properly executed Grant of Easement shall be submitted to CCWD for acceptance and recording.

3. Final Map – Easements may be shown on Final Maps and shall include a dedication describing the easement as an all-weather, unobstructed surface for the purposes of constructing, reconstruction, laying and maintaining and operating the improvements and appurtenances. A copy of the proposed Final Map or other evidence shall be submitted prior to the plans being “Released for Construction” to substantiate the easements and dedications.
5. Easements for Future Extensions – Easements shall be dedicated or granted to CCWD in all cases where future extensions of lines will be required on property being served. Such easements will be included on the parcel or subdivision map and shown in the Plans when there is any doubt as to the ability to properly serve the ultimate service area.
6. Fee Title – Fee title for treatment plant sites, pumping and lift station sites, major transmission mains, storage tank sites and sites for similar major facilities shall be granted to the District and recorded in CCWD’s name. The District shall accept all sites and descriptions prior to the Plans being “Released for Construction” and recording must be completed prior to CCWD acceptance of the Improvements.
7. Easement Conditions – Easements shall have unobstructed access and have all-weather surface for heavy equipment. Easements with slopes greater than seven percent (7%) shall be paved. Provisions shall be made to have a turn-around if the easement results in a dead-end situation. Easement monuments and/utility paddles will be required to physically delineate the easement boundaries.

Where easement slopes are such that access will be limited and pavement is not able to be installed, special considerations for slope protection will be required. At a minimum, check dams shall be installed across the top of the trench at 20-foot intervals.

E. Released for Construction

The Improvement Plans will be “Released for Construction” upon the following:

1. All revisions have been made and all signatures have been obtained.

2. All fees owed have been paid.
3. Payment construction inspection fee deposit.
4. Receipt of Payment and Performance Bonds, if applicable.
5. Proof of an insurance policy naming the District as an additional insured party during construction.

Once the above have been completed, the Engineering Department will notify the Owner's Engineer that the Plans can be picked up. The Owner's Engineer will then provide the Engineering Department with four (4) signed sets of Plans.

No construction shall occur before the Plans are signed and before the proper notification given.

Plans "Released for Construction" imply that the District has reviewed the drawings, specifications, calculations, etc. and the field area in which the work is proposed and that the drawings, calculations, etc. and field conditions seem to meet the requirements of CCWD and construction may begin.

Significant office or field change from Plans "Released for Construction", which will affect the project, nullifies any prior approval of the Plans and will require that revisions and/or new Plans be submitted and reviewed prior to construction.

If field conditions are encountered during construction that necessitate significant deviation from the Plans "Released for Construction", construction shall be halted until Plans are revised by the Engineer, re-submitted to CCWD and again "Released for Construction". Minor utility relocations are not considered significant. Stoppage of work would only affect the area or significant change. Work in unaffected areas may continue.

Plans "Released for Construction" for any portion of the work may be withdrawn at any time it is determined that any portion of the Plans, calculations, etc. and/or construction work fails to meet CCWD requirements.

"Released for Construction" Plans shall become void six (6) months from the date of release, unless construction of the project, as detailed on the Plans, has begun.

1. Permits and Licenses – Where permits and/or licenses, other than those issued by CCWD are required, the Engineer shall prepare and provide to CCWD a copy of all permit or license requirements prior to the Plans being "Released for Construction".

1.2.12 CONSTRUCTION AND INSPECTION

Section 5 – Standard Technical Specification Section 01000 describes the requirements for construction of the water and sewer System Improvements. A pre-construction meeting is to be scheduled with the District inspector prior to the start of construction.

A set of the signed, “Release for Construction” Plans and a copy of these STANDARDS are to be onsite during construction. Any Improvement System work performed without being inspected by the District will be automatically rejected and re-installed will be required in the presence of a District inspector, at the Owner’s expense.

The Owner will pay all costs directly related to the District construction inspection. Copies of inspection reports, which shall include the number of hours on the job for that project, will be provided to the Owner.

1.2.13 PROJECT ACCEPTANCE

A. General

Project acceptance will occur after final inspection, submittal and acceptance of Record Drawings and final project costs, payment of any outstanding monies, and submission of maintenance “warranty” bonds.

B. Record Drawings

Upon completion of the work and final inspection, one sets of accurate project Record Drawings in electronic formats described below be submitted for review and acceptance by the District Engineer. Recorded Drawings submitted shall include:

1. In Autodesk AutoCAD® format including the binding of X-Refs, viewports, raster files, external data links, etc. Each drawing shall have a paperspace set-up for plotting of the drawing as full-scale ANSI D-size drawings.
2. An electronic version, in Adobe PDF® for reproduction as 100-percent scale ANSI D-size drawings.
3. An updated GPS survey shall be performed to verify the location of improvements, if requested by the District.

AutoCAD files shall contain of all Improvement Plan drawings, including any and all cross-reference drawings, survey information, integrated graphics, and pen weights and color, and plot styles, if applicable.

AutoCAD® files shall be compatible with AutoCAD® version 2013 or newer. Contact the Engineering Department for additional AutoCAD® file requirements.

GIS information shall be in ESRI ArcView® format, current version in use by the District in NAD 83/NAVD 88 datum.

Record Drawings shall reflect the actual Improvement System constructed and shall give the accurate location of all new/or relocated facilities. The project will not be “finalized” until the Record Drawings and associated documents are approved.

To the extent feasible, CCWD will cooperate in compiling necessary field data to aid in the preparation of the Record Drawings. The following certificate shall be signed and shall appear on the appropriate sheet of the Plans:

| Water/Wastewater Record Drawing Certificate | | |
|---|----------|------|
| <p>“This set of plans, having been reviewed by me, reflect all approved revisions to the water/wastewater Improvement Plan known to me, and all field deviations to the improvements by the construction contractor, as reported to me as of <u>(insert date)</u>.” It does not represent field verification of planned Improvement System by me.</p> | | |
| <p>_____</p> | | |
| Registered Civil Engineer Name, | RCE No., | Date |

It should be emphasized that the responsibility for accurate Record Drawings must involve active participation by the Owner's Engineer and contractor during the project. All changes, whether done through formal change order or revision process or whether done as a field adjustment, should be reflected on the Record Drawings.

The Inspection Fee Deposit, and if applicable payment and performance bonds, shall be held by CCWD until after the receipt and District acceptance of the Record Drawings.

C. Project Costs

The Owner or Owner's Engineer shall submit an itemized list of costs that were incurred related to the water and/or sewer System Improvement constructed for the project. The costs shall include a prorated share of engineering, administration, and legal costs that can be attributed to the water and/or sewer system and the total construction cost for the water and/or sewer system, including all change orders.

This information will be used by the District to determine total "asset value" for maintaining a replacement reserve fund for system depreciation and to determine the correct value of the maintenance bond.

1.2.14 TWO YEAR WARRANTY BOND

As a condition precedent to the acceptance of the complete Improvement System, the Owner shall furnish either a corporate surety maintenance bond of an acceptable surety company, authorized to do business in the State of California, or an irrevocable letter of credit issued by a banking firm acceptable to the District. Alternative methods of bonding may be utilized upon the approval of the CCWD. The bond shall protect CCWD against the results of faulty materials, poor workmanship, or defective equipment. The bond shall be for a period of two (2) years after acceptance of the project.

1.2.15 CONVEYANCE OF FACILITIES TO DISTRICT

Upon acceptance completion of the Improvement System, as designated in the Agreement, the Owner shall file a Notice of Completion with the County Recorder; and shall grant, transfer, and assign the entire Improvement System to the District free and clear of any and all encumbrance, liability, or obligations.

In consideration of the performance by the Owner and said transfer, CCWD agrees to accept said Improvement System and facilities so transferred to it and to thereafter operate and maintain said Improvement System and to provide system services to the owners of real property in the subdivision served by the Improvement System in accordance with its then current rate schedule and thereafter as said schedule is amended from time to time.

It is understood, however, that the cost of operation and maintenance may exceed the charges made to the current customers of the Improvement System. In such case, it may be necessary to impose a fee for vacant lots or parcels within the development, pursuant to applicable provisions of law, until such time when the number of customers can support the operation and maintenance cost of the Improvement System.

1.3 FEES, DEPOSITS, AND BONDS

1.3.1 GENERAL

The Owner will pay all costs directly related to CCWD's review of applications, environmental documents, plans, permits, inspections, preparation of the Facility Agreement, all costs directly related to the construction inspection, bonds, administration, and the preparation of Record Drawings.

Table 1.1 shows when the fees and deposits are due at the various stages of review and acceptance. Fees are non-refundable and are a one-time charge. Deposits are generally refundable after all charges have been paid. Fees and deposits are to be paid in cash or check, in accordance with the schedule. Where deposits are indicated, the District will invoice the Owner on a monthly basis for services rendered.

Invoicing will be at the current District rates in effect at the time the services are provided. The monthly invoice shall be paid within thirty (30) days after receipt of invoice from CCWD. If the billing is not paid within thirty (30) days, interest will accumulate from the date of initial billing until paid in full and the Owner may be deemed in default of the Agreement.

If the deposits are not sufficient to cover the amounts owing, then CCWD may discontinue the review process and withhold acceptance of the project.

TABLE 1.1
DISTRICT FEE/DEPOSIT/BOND SCHEDULE

| FEES | |
|--|-----------------------------|
| New Service Quotation (<i>water or wastewater</i>) | |
| Residential with existing service | \$15 per lot ^{1.} |
| Commercial with existing service | \$45 per lot ^{1.} |
| Residential or Commercial without service | \$192 per lot ^{1.} |
| Concept/Planning Review and Facility Agreement | |
| Line extensions for Parcel(s) | \$200 per lot |
| Subdivision Maps | \$1,000 per lot |
| DEPOSITS | |
| Review of Environment Documents (CEQA) (<i>with final review cost to billed Applicant</i>) | \$500 |
| Improvement Plans Review and Inspection (<i>based upon estimated Improvement System cost</i>) | |
| \$0 to \$200,000 | \$2,000 |
| Greater than \$200,000 | \$5,000 |
| BONDS | Value of Bond |
| Performance Bond (<i>Value of Improvement System</i>), if applicable | 125% |
| Payment Bond (<i>Value of Improvement System</i>), if applicable | 125% |
| Maintenance Bond (<i>Value of Improvement System</i>): | |
| Value up to \$100,000 | 40% |
| Between \$100,000 to \$1,000,000 | 30% |
| Greater than \$1,000,000 | 20% |
| ^{1.} District rates indexed to the January 2021 ENR/CCI value = 11627.94; Fees adjusted annually. | |

1.3.2 SEWER TV INSPECTION

TV Inspection by video shall be made of one hundred percent (100%) complete sewer Improvement System prior to its acceptance. The Owner shall provide the TV Inspection service per the requirements of Section 5 – Standard Technical Specification Section 02661. TV Inspection will not be performed by the District.

The Owner shall notify the District seven (7) working days in advance of the scheduled TV inspection and provide a copy of the TV inspection logs along with video recording per Section 02661. Significant deficiencies and defects may require the re-video of a portion or the whole of the system following completion of corrective action.

1.3.3 BONDS

Should the Agreement require, or when the Owner desires to record the Final Parcel or Subdivision Map prior to the completion and acceptance of the Improvement System, a performance and payment bonds shall be posted to ensure completion of and payment for the Improvement System in accordance with the “Release for Construction” Improvement Plans. A Performance Bond and a Payment Bond, each issued by a surety company authorized to do business in the State of California and acceptable to CCWD, shall be provided by the Owner.

Each bond shall be in the amount of 125 % of the final estimate of the construction costs for the complete Improvement System or that portion of the system yet to be completed. The Bonds will remain in full force and effect until such time as the Improvement System is/are accepted by CCWD. The District will permit the conversion of a Performance Bond to a two-year Warranty Bond.

Certificates of deposit, cash, and letters of credit may be substituted.

1.3.4 TWO-YEAR WARRANTY BOND

As a condition precedent to the acceptance of the completed Improvement System, the Owner shall furnish either a corporate surety Maintenance Bond of an acceptable surety company, authorized to do business in the State of California, or an Irrevocable Letter of Credit issued by a banking firm acceptable to CCWD. Alternative methods of bonding may be utilized upon the approval of CCWD. The Maintenance Bond shall protect CCWD against the results of faulty materials, poor workmanship, or defective equipment.

The Warranty Bond shall be for a period of two (2) years after acceptance of the project and comply with the terms and conditions of the Facility Agreement. The amount of the bond is to be equal to the amounts listed on the Fee/Deposit Schedule, Table 1.1 and is to be based on the value of the Improvement System shown on the transfer document.

During the two-year warranty period, the Owner shall fully repair or replace any defective installation or other deficiency at no cost to District. The District will notify the Owner of deficiencies; and the Owner is to schedule the warranty work to be performed within three (3) business days of notice by District, unless otherwise approved by the District.

All warranty work is to be inspected by the District. Upon completion of the warranty work, the Owner is to provide a written notification to the District of: (1) the specific warranty work completed; and (2) the date the warranty work was completed.

During the two-year warranty period, should corrections/repairs not be CCWD completed to the satisfaction of the District or within the time allotted for corrections, District will notify the bond company, or bank, to make arrangements for the completion of the work.

If the District requires warranty work on the Improvement System, the Warranty Bond is to be extended for the entire Improvement System for an additional two (2) years. This extended warranty will begin on the date that the warranty work is completed.

1.3.5 WARRANTY SEWER TV INSPECTION

During the two-year warranty period, the Owner will perform a warranty sewer TV Inspection of the sewer pipeline system identical to the 100% complete sewer pipeline TV inspection described in Section 1.3.2.

The TV Inspection shall be scheduled approximately eighteen (18) months from the date of District acceptance of the sewer Improvement System. The Owner shall be responsible for all costs of the warranty period TV Inspection.

1.3.6 SPECIAL CHARGES

If there are unforeseen items or circumstances requiring “special approval,” the Engineering Department may require a deposit of funds or an agreement for funds to provide for operation and maintenance of facilities.

1.3.7 MAIN LINE EXTENSION AND REIMBURSEMENT AGREEMENTS

If an Owner desires to enter into a reimbursement agreement with the District, such arrangements shall be negotiated separately.

***** END OF SECTION 1 – GENERAL REQUIREMENTS *****

**SECTION 2
WATER STANDARDS**

SECTION 2 – WATER STANDARDS

2.1 PLANNING

2.1.1 GENERAL

The purpose of this Section is to provide information on estimating demands and planning system facilities.

The District's water systems are designed and built using transmission mains to supply distribution systems. The distribution system then delivers water to the individual customer in sufficient volumes and without excessive headloss. The planning, design and layout criteria in the following sections apply mainly to distribution systems for developments. Facilities identified in District Master Plan(s) are to be designed under the directions of the Engineering Department.

It is the intent of these criteria to provide a water system that will dependably and safely convey the required amount of high-quality water at adequate pressures and with minimum maintenance and operational costs.

2.1.2 WATER DEMANDS

This Section outlines planning data to determine the overall water supply needs, average day demand (ADD), maximum day demand (MDD), peak hour demand (PHD), fire flow (FF), pipeline velocities, system pressures, and pump station capacities. The District Engineer may request alternative unit demands if there are specific uses that can be documented to show an increase or decrease than those shown below.

Demands are calculated in terms of an Equivalent Single Family Unit (ESFU). An ESFU is the proportional amount of usage of a single family residential unit. Water usage consists of two parts:

- A. The raw water supply requirements; and
- B. The various peak demands. The distribution system shall be sized for either the PHD, or the MDD plus FF, whichever is greater.

Flow rates shall be determined according to land use of the area to be served and the location of the development within the service area. These usages are described in the following sections.

A. Raw Water Supply

The annual average raw water supply, for planning purposes for an ESFU is 0.75 acre-feet per year. This demand is used to project the annual raw water supply needs and is to be included in the design report. This demand includes unaccounted-for water and conveyance losses.

B. System Demand

The ADD for an ESFU is based on a population of 2.4¹ people per unit with an average demand of:

1. 500 GPD (gallons per day per unit above 3,000 ft. elevation)
2. 750 GPD (gallons per day per unit below 3,000 ft elevation)

The ADD, excluding irrigation demands is calculated by using the Demand Factors (DF) that are listed in Table 2.1 and Table 2.2. Estimated irrigation demand is to be added to these values for the total demand.

The Demand Factor is the proportionate to ESFU. Average (ADD), Maximum Day (MDD), and Peak Hour Demand (PHD) are calculated as follows:

1. $ADD = DF \times (\# \text{ of services}) \times (500 \text{ or } 750 \text{ GPD})$
2. $MDD = 2.0 \times ADD$
3. $PHD = 3.0 \times ADD$

The local Fire District governs the Fire Flow (FF) requirement. It is the engineer's responsibility to demonstrate through fire flow tests and calculations that the required fire flow can be met while the District's water system is under a MDD condition for the specified duration. The calculations shall verify that fire flow can be delivered to the site. Fire flow is either provided by storage volume or by pumping stations. The storage facilities providing fire flows shall be assumed to be half full.

¹. Dwelling occupancy based upon Adopted 2019 Calaveras County General Plan, 2. Land Use Element, page LU5.

TABLE 2-1
SYSTEM DEMAND FACTOR

| USER CLASSIFICATION | DEMAND FACTOR | UNITS |
|--|------------------|--------------|
| <u>RESIDENTIAL</u> | | |
| Single family residence | 1.0 | Per unit |
| Mobile homes at mobile home park, townhomes, condo | 0.7 | Per unit |
| Apartments | 0.55 | Per unit |
| Accessory dwelling (one per property, max. 900 sf) | 0.55 | Per unit |
| <u>COMMERCIAL AND INDUSTRIAL</u> | | |
| Automobile repair shop | 1.0 | Each |
| Barber shops | 0.3 | Per station |
| Bars, cardrooms, casinos, taverns, cocktail lounge | 0.05 | Per seat |
| Beauty shops | 0.3 | Per station |
| Car wash, self serve | per manufacturer | |
| Cleaners (plant with office) | 1.0 | Per machine |
| Commercial building with sink only | 0.11 | Per sink |
| Dentists | 0.36 | Per station |
| Fire station | 0.1 | Per employee |
| Hospitals | 0.8 | Per bed |
| Hotel | 0.25 | Per room |
| Hotel units with kitchenette | 0.8 | Per unit |
| Laundries (at apartments, mobile park, self-service laundromats) | 0.6 | Per machine |
| Long-term care facilities | 0.5 | Per bed |
| Meeting halls and churches | 0.01 | Per seat |
| Mini-Mart / service station | | |
| - With food prep facilities, with restrooms | 4.0 | |
| - Without food prep facilities, with restrooms | 1.5 | |
| - Without food prep and restrooms | 0.8 | |
| Motel | 0.25 | Per room |

TABLE 2-1
SYSTEM DEMAND FACTOR
(CONTINUED)

| USER CLASSIFICATION | DEMAND FACTOR | UNITS |
|--|---------------|--------------|
| Motel units with kitchenette | 0.8 | Per unit |
| Office facility (for accountants, attorneys, engineers, insurance, real estate, etc.) with/ common restroom where restroom is limited to employees | 0.1 | Per employee |
| - Toilet | 0.44 | Per toilet |
| - Urinal | 0.22 | Per urinal |
| Office facility w/ common restroom where restroom access is primarily by employees by open to he public | | |
| - Toilet | 0.78 | Per toilet |
| - Urinal | 0.33 | Per urinal |
| Physician office or clinic | 1.0 | Per office |
| Restaurants | | |
| - Full Service | 0.07 | Per seat |
| - Fast Food (disposable service ware) | 0.05 | Per seat |
| Restroom buildings | 1.0 | Per toilet |
| Retail stores (including Clothing, building supply, hardware, appliance, furniture, warehouse, drug store, pet shop, other retail stores) | 0.1 | Per employee |
| RV Park w/ individual hookup | 0.3 | Per space |
| Schools | | |
| - Without cafeteria, gymnasium or showers | 0.03 | Per student |
| - With cafeteria, but no gymnasium or showers | 0.06 | Per student |
| - With cafeteria, gymnasium and showers | 0.10 | Per student |
| Theaters, indoor (based on maximum seat capacity) | 0.02 | Per seat |
| Veterinary clinic | 0.27 | Per employee |
| Warehouse facility where total employee hours per week does not exceed forty (40) hours | 0.25 | Per restroom |
| Minimum Demand Factor for all commercial classifications that normally requires less than 1.0 usage | 0.25 | |

Notes:

1. The factor for User Classifications not specifically listed in the above table will be determined by District personnel from the most similar classification listed or from usage records of similar establishments.
2. See text of applicable sewer Ordinances for additional requirements

TABLE 2-2
UNDEVELOPED AREAS

| LAND USE/ZONING | DENSITY ^{1.} (units/acre) | OCCUPANCY ^{1.} (ESFU/acre) | DF |
|--|---------------------------------------|--|-----|
| Residential Low Density ^{1.} | 1 – 6 | 3.5 | 1.0 |
| Residential Medium Density ^{1.} | 6 – 12 | 9.0 | 1.0 |
| Residential High Density ^{1.} | 12 – 20 | 16 | 1.0 |
| Commercial | - | 2.5 | 1.0 |
| Industrial | - | 2.5 | 1.0 |

^{1.} Land use, density and occupancy based upon Adopted 2019 Calaveras County General Plan, 2. Land Use Element, page LU5.

C. Non-Residential Water Demand

When specific information is not available for the type of non-residential development, the water demand shall be determined land use, area, and Table 2.3 below.

TABLE 2.3
NON-RESIDENTIAL WATER DEMAND

| DEVELOPMENT | AVERAGE ANNUAL DEMAND, (AF/gross acre) | AVERAGE DAY DEMAND, (GPD/gross acre) |
|-----------------------|---|---|
| Commercial/Industrial | 2.4 | 2,150 |
| Parks | 2.5 | 2,200 |
| Schools | 1.0 | 900 |

2.1.3 HAZEN-WILLIAMS COEFFICIENTS

The Hazen-Williams coefficient for new water pipelines shall be 130. Existing pipelines shall be use 110 as the coefficient.

2.1.4 PIPELINE VELOCITIES

Water mains shall be designed so that the maximum velocity does not exceed 5.0 feet per second (FPS) under peak hour demand conditions without approval of the District. A maximum velocity of 12 FPS shall apply to fire flow conditions. The minimum velocity shall be 2.0 FPS.

2.1.5 SYSTEM PRESSURES

Water mains shall be sized and designed taking into consideration both static and dynamic conditions. The criteria that shall be followed is outlined Table 2.4 below:

TABLE 2.4
WATER SYSTEM DESIGN PRESSURES

| CONDITION | DESIGN CRITERIA |
|--|---|
| Static Pressure (<i>No system demand</i>) | 120-psi maximum, at the lowest meter to be served, based on full reservoir or maximum PRV setting in pressure zone. |
| Dynamic Operating Pressure | 40 psi minimum under PHD based on half full reservoir or lowest PRV setting in pressure zone (<i>CCR Title 22, Division 4, Chapter 16, Article 8, §64602</i>). Pressures below the minimum will be designated as Low Pressure Zones and will require approval from the District, and 20 psi minimum, under Fire Flow plus MMD, based on half full reservoir or lowest PRV setting in pressure zone. |

A. High Pressure Zones

A pressure regulator preceded by a strainer will be required on the downstream side of the meter where pressures exceed 80 psi (static), or as required by the District.

Where static pressures exceed 120 psi, a mainline pressure reducing stations will be required, creating a new pressure zone.

B. Low Pressure Zones

Lots where the minimum pressures forty (40) psi are not met will require an individual booster system. Property owners are reimbursed from the District¹ a one-time fixed amount for the installation of the booster system. For new subdivisions, the Owner will be required to pay the reimbursement amount for all low-pressure lots at the time of project acceptance.

¹. Rules and Regulations Governing the Furnishing of Water and/or Sewer Service, Article IV, Section 39, Low Pressure Policy.

2.2 FACILITY DESIGN CRITERIA

2.2.1 PURPOSE

The purpose of this Section is to establish design criteria for water distribution facilities and service connections from the main water line to the property line.

2.2.2 CALIFORNIA CODE OF REGULATIONS

Design and construction of Improvement Plans for water service shall comply with relevant regulations located in *CCR Title 17* and *CCR Title 22* related to drinking water. These regulations include:

- A. ANSI/NSF 60/61 certification of chemicals and products used for water distribution (*CCR Title 22, Division 4, Chapter 16, Article 7*).
- B. Adoption by reference of AWWA standards.

Pipe, coating systems, valves, fittings, gaskets, disinfection chemical for construction shall bear appropriate labels or otherwise indicate NSF certification at the jobsite for inspection by the District.

2.2.2 PIPE DESIGN

A. Minimum Pipe Size

Pipelines shall be sized to deliver the required flows at minimum pressures specified in Section 2.1. No water main shall be less than 6-inch diameter except under special conditions a four (4) inch diameter pipe may be installed in a cul-de-sac provided the following is met:

1. No fire hydrants will be connected to the pipeline
2. Total length of pipe is 150 feet, or less
3. No more than four (4), 5/8-inch services, or equivalent, are to be installed; and
4. There will be no future extension of the pipeline.
5. A blow-off is installed per Section 2.2.5.

Under no condition shall a water main be less than 4-inch diameter (*CCR Title 22, Division 4, Chapter 16, Article 4, §645773*).

B. Pipe Type

Water mains 12- inches and smaller in diameter shall either be AWWA C900 PVC or AWWA C150/C151 ductile iron, and UL® and FM® listed (*CCR Title*

22, *Division 4, Chapter 16, Article 4, §64570*). Pipe type for water mains larger than 12-inches in diameter shall be determined by the District Engineer.

Upon approval of the District Engineer, alternative pipe materials may be used for special conditions provided they are listed in *CCR Title 22, Division 4, Chapter 16, Article 4 Table 64570-A*. Where different classes of pipe are required for the same system, the separation shall be at a valve.

C. Pressure Class

Pressure classes for PVC pipe and DIP are shown in Table 2.5. The pressure class shall be greater than the static or anticipated long-term sustained pressure in the pipeline.

TABLE 2.5
PIPE PRESSURE CLASSES

| PVC PIPE, (AWWA C900) | DIP, (AWWA C150/151) |
|--|----------------------|
| Class 235 (DR 18) Class 305 (DR 14) | Class 350 |

D. External Loads

External loads are defined as earth loads and live loads. Common design practice shall determine the class of pipe required to resist the deflection caused by external loads when the pipe is empty.

Pipe placed in roads or easements shall be designed, at a minimum, for backfill and H-20 loading per AASHTO standard specifications (truck loading with impact). A higher loading may be specified by the Engineering Department, County, or Caltrans depending upon installation location.

E. Service Lines

Service lines 2-inches in diameter and less shall be polyethylene tubing conforming with AWWA C901, SDR 9, CTS tube dimensions. Contact the District Engineering Department regarding service lines greater than 2-inches in diameter.

F. High Pressure Design

The District has pipelines operating under high pressure up to 250 psi. When connecting to high pressure pipelines, pipe materials, flanges, and appurtenances, are to be specified for the appropriate pressures and are to be called out on the Improvement Plans.

G. Layout

Water mains should be laid out only in segmented grids and loops and are to be located within paved road right-of-way's, unless prior approval has been given by the District Engineer.

1. Dead-End Water Main – Dead-end water mains can only be installed if:
 - a. Looping is impractical due to topography, geology, pressure zone boundaries, unavailability of easements or locations of users; or
 - b. The main is to be extended in the near future and the planned extension will eliminate the dead-end condition.
2. Water Mains in Streets – The pipeline centerline, wherever possible, shall be located in public streets parallel to and offset a minimum of 5-feet from the edge of pavement or a minimum of 3-feet from lip of gutter. The separation requirements between wastewater and non-potable pipelines are described on Section 7 – Drawing G03.

Water mains located in streets shall generally follow the street alignment and remain on the same side of the street. Meandering alignments of waterlines shall be avoided. The 5-foot offset should be maintained as close as practical utilizing fittings if the minimum pipe radius cannot be achieved. Water mains shall cross under non-potable pipelines.

When an area outside the tract or development project area can be logically served by extension of the water main in future streets or easements, the pipeline shall extend to the project boundary or to the end of a paved street in a manner facilitating future extensions.

3. Water Mains in Easements – Section 1.2 describes the requirements for easements. Unless there are either physical limitations or extreme economic penalties, water pipelines shall be installed within a paved road right-of-way. When easements are required, there shall be careful consideration of how the pipeline is to be maintained and/or replaced. Where there are side slopes (perpendicular to the pipe), the plans shall clearly indicate graded access within the easement.

In general, the pipeline within an easement shall be accessible by conventional maintenance vehicles traveling over all weather relatively level surfaces or driveways unless otherwise approved.

4. Horizontal and Vertical Curves – Where curves are less than the minimum radius or allowable deflections, fittings will be required. In curved streets, the waterline shall generally follow the street

curvature and not cross the street centerline. Crossing the centerline is acceptable if no other utilities are located in the street. Vertical curves and peaks shall be minimized to avoid air valve and blow-off installations. A deeper waterline shall be installed, when practical, to eliminate peaks.

- a. PVC Plastic Pipe – Maximum permitted deflection (combined vertical and horizontal angles) is five degrees (5°) per coupling using mechanical or push-on joints.
- b. Ductile Iron Pipe – For ductile iron pipe using mechanical or push-on joints the maximum allowable deflection is eighty percent (80%) of DIPRA recommendations.
- c. Structural Clearances – Water mains shall have a minimum horizontal clearance of ten feet from the bottom outside edge of structures or footings.

H. Depth of Water Mains

The minimum depth of cover to the top of the pipe from finished grade shall be 36-inches in paved and unpaved areas.

In achieving the above depths, it must be recognized that numerous grade changes to achieve the minimum depths of cover are not desirable. The pipeline shall be designed with constant grades rather than designed to a uniform depth. Flat grades are to be avoided.

Increases in depth may be required where future road improvements could potentially remove some of the existing cover or where there are other conflicting utilities.

2.2.4 ISOLATION VALVES

The distribution system shall be designed with a sufficient number of valves so that flows can be isolated during emergencies or planned outages. Valve locations shall conform those listed below and listed in *CCR Title 22, Division 4, Chapter 16, Article 4, §64577*, whichever is more strictive:

- A. On all branches of crosses and tees.
- B. On the end of an anticipated future line extension with a blind flange.
- C. At all street intersections.
- D. A minimum of every 1,000 feet.
- E. At intervals limiting a maximum thirty (30) service connections between isolation valves.

- F. Line valves between street intersections, shall be located on the prolongation of a property line or right-of-way.

Isolation valves four (4) inch and greater in size shall be an AWWA C509 resilient wedge gate valve, or AWWA C515 reduced wall resilient wedge gate valve with the same nominal size as the pipeline.

The Engineering Department will determine valve type and requirements when operating water pressures exceeds 250 psi or valve size is greater than 12-inch diameter.

2.2.4 AIR VALVES

Air valves are to be installed within the system to eliminate air pockets, prevent vacuum during draining of pipelines, and vent air during the filling of pipelines.

A. Air and Vacuum Valve

Allows large quantities of air to be expelled during line filling and allow air to re-enter the pipeline during draining of the pipeline whether planned or due to a rupture. Air and vacuum valves (AVV) shall be installed on the downhill side of isolation valves on a long ascending pipeline to admit air into the pipe to prevent a vacuum during draining of the pipeline and to vent air during filling.

B. Combination Air Valve

Provides the features of the air and vacuum valve and allows the discharge of small quantities of accumulated air pipe while the pipe is in operation under pressure. Combination air valves (CAV) shall be located at all significant high points along a pipeline, and as required by the Engineering Department. This valve type is generally specified for water distribution systems.

C. Location

Air valves above ground are to be located near side lot property lines rather than in the middle of the front yard. Location and protection of air valves shall meet requirements of *CCR Title 22, Division 4, Chapter 16, Article 4, §64576* and AWWA C512.

D. Sizing

Normally AVV and CAV valves shall be 1-inch to 2-inch in size. Each pipeline shall be to be evaluated to verify sizing. Should a larger valve be required, use the manufacturer's recommendations.

Refer to Section 5 – Standard Technical Specification Section 02643 for additional air valve requirements.

2.2.5 BLOWOFF VALVES

Blowoff valve assemblies provide flushing of the distribution system to allow the removal of sediments, which accumulate in the pipeline, and facilitate drainage when placed at low spots in the line.

Fire hydrants can perform the same functions as a blowoff and are preferred by the District.

A blowoff assembly, or preferred fire hydrant, shall be installed at the end of all dead-end lines (*CCR Title 22, Division 4, Chapter 16, Article 4, §64575*) including all cul-de-sacs.

A. Sizing

Blowoff valves shall be sized to satisfy the following conditions:

1. Provide a minimum velocity of 2.5 FPS in the pipeline for the removal of sediments (*CCR Title 22, Division 4, Chapter 16, Article 4, §64575*); and the minimum size shown in Table 2.2.5.

TABLE 2.2.5

Minimum Blowoff Valve Size

| ASSOCIATED WATER MAIN, <i>diameter</i> | BLOWOFF VALVE, <i>minimum size</i> |
|---|---------------------------------------|
| 4-inch | 2-inch |
| 6-inch | 3-inch |
| 8-inch | 4-inch |
| 10 and 12-inch | 6-inch |

2.2.6 FIRE HYDRANTS

Fire hydrants shall be an UL® and FM® listed, AWWA C503 “dry barrel type” hydrant and requirements of the appropriate fire agency and Section 5 – Standard Technical Specification Section 02644 and Section 7 – Drawing W04.

Fire hydrants shall be equipped with 5-1/4-inch main valve, one 5-1/4-inch pumper nozzle, and two 2-1/2-inch hose nozzles, and minimum 6-inch diameter riser.

Normal depth of cover, from top of pipe, shall be forty-two (42) inches when served by a 6-inch or an 8-inch water main. Greater depth of bury may be required when main size is larger or when required by the topography.

Fire hydrants shall be generally located as directed by the local Fire District having jurisdiction.

Hydrant locations should be adjusted where possible to serve as a blow-off so that a single assembly can be utilized. A fire hydrant provides greater capacity for draining and flushing pipelines and should be used in lieu of a blow-off, if the velocity and pressure requirements are met.

The location of fire hydrants with respect to the traveled roadway shall be in accordance with the Section 7 – Drawing W04A.

2.2.7 THRUST RESTRAINT

Restraint shall be provided to prevent movement due to unbalanced thrust forces. Acceptable thrust restraint systems are thrust blocks or restrained joints. Section 7 – Drawings W01 provides typical dimensions and details for thrust blocks and the construction. If joint restraints are used, the length of restrained pipe is to be called out on the profile.

2.2.8 CREEK CROSSINGS

Depths and protection of pipelines crossing below the flow line of creeks or channels are dependent on-site improvements and geotechnical considerations. Criteria to consider at creek crossings are:

- A. Pipelines are to cross upstream of hydraulic structures (i.e., bridges, culverts, etc.).
- B. Crossings are to be perpendicular to flow line of creek.
- C. The protection of the pipeline is to extend ten (10) feet beyond the top of defined banks.
- D. The type and length of pipeline protection will be dependent on creek conditions.

Pipelines may be suspended from road bridges with prior approval from the Engineering Department and agency of having jurisdiction. Special design criteria will be provided by the District for this type of crossing.

2.2.9 PADDLE MARKER

In easements or where required on the plans, marker or guard posts shall be installed to identify valve locations, easement boundaries, and appurtenances. Paddle marker locations shall be identified in the plan view of the drawings. Markers shall conform to the Section 7 – Drawing G12A.

2.2.10 VAULTS

Vaults may be precast or poured-in-place. Precast vaults shall be so designed that all joints and corners are waterproof. The roof and walls of precast and poured-in-place vaults shall be made waterproof after construction by use of sealants, epoxies, or other approved methods.

If the vault is not in a street, the roof shall be designed to support the overhead earth fill and any other reasonable loading that may occur. If the vault is to be built in a street, the roof shall be designed for traffic loading. However, if there is any doubt, the vault shall be designed for traffic loading.

The vault is to be shown in the plan view, and delineate drainage piping, off-road traffic bollards, and grading away from the vault.

2.2.11 PIPE AT STRUCTURES

Flexible joints shall be provided where water lines enter encasements or other rigid structures. Flexible joints shall be within a minimum of 24-inches of such structure, unless otherwise approved. Flexible joints are bell and spigot or approved couplings.

2.2.12 FIRE SERVICE LINES

Fire service connections are to be connected to the main pipeline with a Double Check Detector Assembly (DCDA). The District jurisdiction includes the design and inspection up to and including the location of the DCDA.

2.2.13 WATER QUALITY SAMPLING STATIONS

Water quality sampling stations shall be installed when required at locations designated by the Engineering Department. Sampling stations shall be located as shown on the Section 7 – Drawing W09.

2.2.14 WATER SERVICE CONNECTION

Service connections include the service saddle, corporation stop, meter box, service tubing to the meter box, and appurtenances to install a meter. Service connections shall be sized to adequately supply the requirements of the property being served. Each service shall be shown on the plans. An individual service connection is required for each meter. Location and materials shall be installed in accordance with the Section 6 – Standard Technical Specification Section 02660 and Section 7 – Drawings W07.

Services shall a minimum 1-inch in diameter and no meter smaller than a 5/8-inch meter. The polyethylene service tubing shall be AWWA C901, CTS, SDR 9.

Where required, RPBA and strainers shall be installed downstream of the meter. The valve and strainer shall be owned and maintained by the customer and shall not be the responsibility of the District.

District-approved RPBA shall be installed on all service connections at all new multiple unit, commercial, and industrial connections. District standard installation detail is shown on Section 7 – Drawing 13A.

Services are not allowed to connect to fire hydrant branches, fire service lines, existing or new services.

2.2.15 ABANDONMENT OF SERVICE

Services to be abandoned shall be shown and called out on the plans. The water shall be disconnected at the water main, and the corporation stop or valve at the main shall be closed and the service disconnected as specified in Section 6 – Standard Technical Specification Section 02670. Section 7 – Drawing W07E details method of abandonment of service where no corporation stop exists. The corporation stop shall also be capped to prevent future leaking.

2.3 PRESSURE REDUCING STATION

2.3.1 GENERAL

The Design Report is to show the locations and flow data for all pressure reducing stations. Pressure reducing and/or regulating stations will be required to reduce system pressures to the limits required for downstream pressure zones. Stations are to be readily accessible by maintenance vehicles during all weather conditions. The facility is to be located outside the traffic way of streets or roadways.

2.3.2 VALVE SIZE

Pressure reducing valves shall be sized for low and maximum flows. Multiple valves in parallel are normally required to handle a wide range of flow rates. Typically, one valve operates during normal daily flows and two valves are in operation for the maximum demands, including fire flows. The total maximum intermittent demand is equal, at a minimum, to the total combined flow rating of the valves. Sizing of the valves generally follows the manufacturer's procedure. Existing and ultimate demands shall be considered when sizing valves.

A pressure relief valve shall be incorporated into the design of a pressure reducing station to prevent system damage in the event of a failure of the pressure reducing valves.

2.3.3 PRESSURE SETTINGS

The pressure settings are to be shown on the Section 7 – Drawing W13A. Pressure drops across valves exceeding seventy percent (70%) of the inlet pressure shall be reviewed for cavitation.

2.3.4 STATION LAYOUT

Each station shall generally conform, at a minimum, to the Section 7 – Drawing W13 and Drawing W13A. A site plan showing grading and exterior piping shall be shown on the plan and profile sheet or as a separate detail. Grading is to slope away from the vault. Where possible, interior drainage shall be piped to discharged at a location to permit gravity flow to a drainage way.

2.3.5 EQUIPMENT

Capacities, sizes, ranges, and settings of control valves shall be shown on the station details.

2.4 WATER METERS AND SERVICE LINES

2.4.1 PURPOSE

The purpose of this Section is to establish standards for water meters and the service line from the meter to the building. The meter is provided and is installed by the District. The property Owner under the inspection of the District installs the building service line.

2.4.2 METERS

Meters are provided and installed by the District upon Application for New Service Quotation and payment of fees. Typically, residential units are 5/8-inch size meter. Commercial meters will vary in size. The sizing of the meter is dependent upon the correct establishment of a normal and maximum flow rate.

Information regarding a project's flow rates is required to be submitted with commercial application for service, to this end, Chapter 4 of AWWA Manual No. M22 or *CCR, Title 24, Part 5* can be consulted. In general, the meter shall be sized for the appropriate number of fixture units. Commercial landscape irrigation shall have a separate meter and connection.

A. Meter Sizing

Water meters are designed to deliver the range of flow rates shown on Table 2.6. The selection of the size of the meter shall be based solely on the flow requirement. Meters for commercial use are sized according to the plumbing

fixtures of the building. Meter lids shall be configured to accept a radio read meter antenna node.

If there is a known increased meter usage that can be anticipated in the future, then provision should be made for larger facilities in the future. When this occurs, the meter should be installed for the needs at the time but also with a meter box and connections that are adequate for future requirements.

TABLE 2.6
METER SIZES AND CAPACITY

| METER SIZE, (inches) | MIN. TEST LOW*, (gpm) | NORMAL RANGE*, (gpm) | MAXIMUM CONTINUOUS CAPACITY*, (gpm) | MAXIMUM INTERMITTENT CAPACITY*, (gpm) |
|---|--------------------------|-------------------------|--|--|
| 5/8" | 0.25 | 1.0 - 20 | 10 | 20 |
| 1" | 0.75 | 3.0 - 50 | 25 | 50 |
| 1-1/2" | 1.5 | 5.0 - 100 | 50 | 100 |
| 2" | 2.0 | 2.0 - 160 | 80 | 160 |
| 3" | 4.0 | 4.0 - 450 | 225 | 450 |
| * AWWA C700-15 Table 1 – Characteristics of displacement-type meters. | | | | |

B. Meter Location

The District reserves the right to size and select meter locations. Meters are not allowed in driveways or other traffic areas.

1. Residential – Meters shall be located as shown on the Section 7 – Standard Drawings.
2. Commercial – Meters are to be located where access is readily available and protected from landscaping and other obstructions.
3. Landscape Irrigation – Meters where the parkways or side landscaping strips along streets are to be irrigated, a separate meter must be installed on each side of the street. In such cases, running an irrigation line from the meter to the other side of the street is not allowed.

Where a median strip must be irrigated, the meter may either be in the side parkway or in the median strip, providing that at either location the meter is easily accessible and protected from being covered by landscape materials or other obstructions.

4. Remote – A remote meter is a meter located on a parcel not served by that meter. Only under the approval of the District Engineer will remote meters be allowed.

2.4.3 BUILDING SERVICE LINE

A. Size

Service line sizing is a function of the maximum anticipated flow rates and the allowable pressure loss for adequate pressure. If pressure to the structure is questionable or if flows are anticipated to increase in the future, it is better to oversize the service line than to oversize the meter. The following service lines indicated in Table 2.7 shall be used with the respective meters as a guideline for the smaller installations:

TABLE 2.7
SERVICE LINE SIZE

| METER SIZE, (<i>inches</i>) | LINE SIZE, (<i>inches</i>) |
|-------------------------------|------------------------------|
| 5/8 | 1 |
| 1 | 1 |
| 1-1/2 | 2 |
| 2 | 2 |
| 3 | 4 |

B. Location

A service is to be provided for each lot or parcel of a subdivision. The service is to be perpendicular to the main and located at a minimum of 4-feet from the corner of the parcel, as measured from the side lot line unless shown otherwise on the approved Plans. Where appropriate, such as crossings of structures, the service may be required to be installed in a sleeve to allow access and repair.

2.5 CROSS CONNECTION AND BACKFLOW PREVENTION

2.5.1 GENERAL

District Ordinance No. 95-01 sets forth policy, authority, responsibility, and requirements for the prevention of contamination by backflow and cross-connections.

The type of backflow prevention device shall be determined by the District Cross Connection Control Specialist based on the type of use. Should the Owner wish to install a prevention device concurrently with the Improvement System without knowing the service use, a RPBA shall be installed as shown on the Section 7 – Drawing W08.

AWWA defines cross-connection as: "A connection or a potential connection between any part of a potable water system and any other environment containing other substances in a manner that, under any circumstances, would allow such

substances to enter the potable water system.” Other substances may be gases, liquids, or solids, such as chemicals, waste products, steam, water from other sources (potable or non-potable), or any matter that may change the color or add odor to the water.”

Bypass arrangements, jumper connections, removable sections, swivel or changeover assemblies, or any other temporary or permanent connecting arrangement through which backflow may occur, are considered to be cross-connections.

Cross-connections may be regarded as direct or indirect. A direct connection is an arrangement whereby a safe water system is physically joined to a system containing unsafe water. An indirect connection is an arrangement whereby unsafe water in a system may be blown, pulled by vacuum, or otherwise diverted into, a safe water system.

Backflow is defined as the undesirable reversal of flow in a potable water distribution system as a result of a cross-connection. For backflow to occur, two conditions must be present: (1) a link must exist between the potable and the non-potable system, and (2) the resultant flow produced by the differential pressure must be toward the potable system. If both systems are at pressures greater than atmospheric (positive pressure), backflow due to "back-pressure" can occur. A pump, elevated tank, or boiler can create a back pressure that is greater than the pressure in the potable system.

If the potable system is at a pressure less than atmospheric (negative pressure), the atmospheric pressure on the foreign liquid will force it toward the partial vacuum and "back-siphonage" occurs. A more explicit term for backflow when sub-atmospheric pressure exists, is back-siphonage. Back-siphonage is the backing up, or siphoning, of a foreign liquid into a potable water system.

2.5.2 TYPES OF BACKFLOW PREVENTION

Where cross-connections exist, backflow prevention device shall be provided depending on the "degree of hazard" and service. At a minimum a protection device shall provide per *CCR Title 17, Division 1, Chapter 5, Subchapter 1, Article 2, §7604, Table 1* criteria. The District requires, at minimum, a RPBA type device.

A. Reduced Pressure Principal Backflow Prevention Assembly

This device (RPBA) consists of two independently acting check valves, together with an automatically operating pressure differential relief valve located between the two check valves. All RPBA devices assemblies for water service shall, at minimum, meet the requirements and sizing criteria of ANSI/AWWA C511 (*CCR Title 17, Division 1, Chapter 5, Subchapter 1, Article 2, §7602*). Refer to Section 7 – Drawing W08.

B. Double Check Detector Assembly

A double check detector assembly (DCDA) is composed of two single, independently acting check valves and specifically designed for use on fire protection systems, only. The device protects potable water supplies from possible contamination through cross-connection to fire service pipelines. Use of DCDA devices, installation, and criteria are described in *IPC Chapter 6, Section 603.5*. Refer to Section 7 – Drawing W08.

C. Air Gap

An air gap is a physical separation between the free-flowing discharge end of a potable pipeline and an open or non-pressure receiving vessel. To have an acceptable air gap, the end of the discharge pipe must be at least twice the diameter of the pipe above the topmost rim of the receiving vessel, but in no case can this distance be less than 1-inch (*CCR Title 17, Division 1, Chapter 5, Subchapter 1, Article 2, §7602*).

2.5.3 FREEZE PROTECTION

Above-ground installation shall be protected from freezing with an insulated cabinet.

2.6 GROUNDWATER WELLS

2.6.1 GENERAL

Because of the unreliable nature of ground water sources in most of Calaveras County, such water will not be relied upon as a sole source of water for domestic, irrigation, or fire-fighting purposes.

Any request to the Board to consider groundwater augmentation of the existing system must be evaluated on the basis of short-term and long-term reliability, quality, and economics. More than one professional, expert opinion regarding the adequacy of the supply will be required. The costs of the necessary tests, expert opinion(s), and District staff time will be borne by the applicant.

The Engineering Department shall also establish the required conditions and procedures for evaluation of the groundwater augmentation proposal by the applicant. All studies shall address the requirements of the County Department of Environmental Health, and California State Water Resources Control Board, Division of Drinking Water.

The applicant shall meet with the Engineering Department to review the conditions and procedures prior to any submittals or studies.

2.6.2 EXISTING WELLS

Parcels that will be connected to the District's water system and have an active well will be required to install an approved RPBA at a location approved by the District.

***** END OF SECTION 2 – WATER STANDARDS *****

**SECTION 3
WASTEWATER STANDARDS**

SECTION 3 – WASTEWATER STANDARDS

3.1 PLANNING

3.1.1 GENERAL

The District operates gravity and pressure wastewater collection systems. This Section establishes criteria for determining the quantity of sewage flows and general pipeline location. Section 3.2 establishes design criteria for gravity flow systems and Section 3.3 for wastewater pressure systems.

All gravity sewers, force mains, and lift stations shall be of adequate size to serve the proposed development together with existing and any future development that may occur. For undeveloped land, wastewater flows shall be determined based on tributary area and associated land use (zoning) designation in the current adopted Calaveras County General Plan.

District wastewater systems are solely for the collection and transport of sanitary domestic wastewater. Under no circumstances shall any roof drains, foundation drains, or surface or subsurface drains be either directly or indirectly connection to the sewers.

3.1.2 FLOW RATES

A. Design Flows

There is no purpose is ADWF and PWWF. These terms only apply to our permit. Better to use the following

Avg. Daily Flow/ESFU = 150 GPD

Min. Daily Flow/ESFU = 50 GPD

Max. Day Volume/ESFU = 450 GPD

Peak Hour Volume/ESFU = 600 GPD

An average dry weather flow (ADWF) of 195 gallons per day shall be used for each ESFU. Except for service to single family residential units, the ADWF is calculated by using the Demand Factors (DF) that are listed in Table 2.1. For wastewater service to a single family residential unit the DF equals 1.0.

1. $ADWF = DF \times 195 \text{ GPD} \times \# \text{ wastewater services}$

In cases of unknow building occupancies or specific future residential development, sewers are to be designed. Using the undeveloped land designations shown in Table 3.1.

Collection systems shall be sized for peak wet weather flow (PWWF) as defined herein. PWWF is the average dry weather flow multiplied by a peaking factor that includes an allowance for inflow/infiltration.

The peaking factor shall be 3.0 for all conditions. The PWWF is calculated as follows:

1. $PWWF = 3.0 \times ADWF$

3.1.3 LAYOUT

A. Sewers in Streets

The sewer centerline, wherever possible, shall be located in public streets in the center of the driving lane. In multiple lane roads, the sewer mains will be located in the center of the driving lane nearest to the center of the street but are not to be located in a median strip.

On curved streets, sewers may parallel the centerline of the street by use of horizontal curves as allowed by Table 3.1. When manholes are used to change directions, the manhole shall have a minimum clearance of 5-feet from the edge of pavement or gutter.

The separation requirements between potable pipelines are described on Section 7 – Drawing G03 and requirements of *CCR Title 22, Division 4, Chapter 16, Article 4, §64572*.

Sewers located in streets shall generally follow the street alignment and remain on the same side of the street. Meandering alignments of sewers shall be avoided. The center of the driving lane alignment should be maintained as close as practical utilizing manholes if the minimum pipe radius cannot be achieved.

Sewers are not to cross above a water main.

When an area outside the development project area can be logically served by extension of the sewer in future streets or easements, the sewer shall extend to the project boundary or to the end of a paved street in a manner facilitating future extensions.

When an area outside the development project area can be logically served by extension of the sewer line in future streets or easements, the pipeline shall extend to the project boundary or to the end of a paved street in a manner facilitating future extensions.

Vertical plus horizontal curves will not be allowed between manholes unless it is demonstrated that another solution is not reasonably feasible. Vertical curves shall not be used unless excessive extra depth of excavation would be otherwise incurred.

The pipe shall not be curved to a lesser (tighter) radius than shown below. Deflection at the joints is not permissible.

TABLE 3.1
ALLOWABLE SEWER RADIUS

| NOMINAL PIPE SIZE, (<i>inches</i>) | MINIMUM RADIUS, (<i>feet</i>) |
|--------------------------------------|---------------------------------|
| 6 | 200 |
| 8 | 250 |
| 10 | 310 |
| 12 | 375 |

B. Easements

Easements describes the requirements for easements and location of pipelines within the easement. Unless there are either physical limitations or extreme economic penalties, sewers shall be installed within a paved road right-of-way. When easements are required, there shall be careful consideration of how the sewer is to be maintained and/or replaced. Where there are side slopes (perpendicular to the pipe), the plans shall clearly indicate graded access within the easement.

In general, the sewer within an easement shall be accessible by conventional maintenance vehicles traveling over all weather relatively level surfaces or driveways unless otherwise approved.

C. Structural Clearances

Sewers, up to 10-feet in depth, shall have a minimum horizontal clearance of 10-feet from the bottom outside edge of structures or footings. Sewers greater than 10-feet in depth shall have a clearance of 15- feet.

3.1.4 CROSSINGS

Sewer lines designed to cross under or over other pipes or structures shall be protected from damage and shall be constructed to prevent endangering the other pipe or structure. In this regard, particular attention should be given to the possibility and prevention of settlement-caused damage. Also, where future replacement of any line may be extremely difficult due to the pipe or structure, special design details may be required.

A minimum vertical clearance of 1-foot is required for pipe crossings (*CCR Title 22, Division 4, Chapter 16, Article 4, §64572*).

A. Creek Crossing

Depths and protection of sewers crossing below the flow line of creeks or channels are dependent on the site and geotechnical considerations. Criteria to consider at creek crossings are:

1. Sewers are to cross upstream of hydraulic structures, i.e., bridges, culverts, etc. Special design criteria will be provided by the District for sewers attached to bridges.
2. Crossings are to be perpendicular to flow line of creek.
3. The protection of the sewer is to extend 10-feet beyond the top of defined banks.
4. The type and length of sewer protection will be dependent on creek conditions.

3.2 GRAVITY DESIGN CRITERIA

3.2.1 GENERAL

This Section establishes criteria for gravity sewer systems. All gravity sewers shall be of adequate size to serve the proposed development together with existing and any future development that may occur.

3.2.2 HYDRAULICS

Gravity sewers that serve 60 ESFU's and less shall be served by a minimum 6-inch diameter sewer with a minimum slope of 0.015 ft./ft. Sewage flows and pipe sizes for greater than 60 ESFU's shall be determined by the methods outlined in this Section.

Gravity pipeline capacities shall be based on PWWF. The design flow rate for a pipeline reach shall be the flow rate entering the upstream manhole. Sewers shall be designed to flow no more than fifty percent (50%) for 6-inch pipe and no more than two-thirds full (67%) for pipe larger than 6-inches. The minimum design velocity shall be 2.0 feet per second (FPS) and the maximum shall be 10 FPS. In cases where the calculated depth of flow is less than above, the velocity at actual depth of flow shall be used for design. Increased velocities shall be accomplished by steeper grades and not by changing pipe diameter.

Manning's "n" shall be 0.013 for all pipe types.

When the above minimum criteria cannot be achieved, the Owner's Engineer may request using criteria less than the minimums. The engineer must submit, along with this request, backup data and reasons why the minimum cannot be attained. The request will be reviewed by the District, and the decision will be conveyed to the applicant.

3.2.3 PIPE DESIGN

A. Minimum Pipe Size

The minimum sewer size shall be 6-inches in diameter. Generally, collector and trunk lines shall be 6-inch to 12-inches in diameter. Trunk lines sewers greater than 12-inches in diameter will be designed and constructed under the direction of the District.

Pipe diameter is to remain constant or continually increase in the direction of flow. Pipe diameter shall not be less than the upstream pipe regardless of the slope.

B. External Loads

External loads are defined as earth loads and live loads. Common design practice shall determine the class of pipe required to resist the deflection caused by external loads.

Pipe placed in roads or easements shall be designed, at a minimum, for backfill and H-20 loading per AASHTO Standard Specifications (truck loading with impact). Higher loading may be specified by the Engineering Department or as required by good design.

C. Pipe Type

Unless otherwise approved by the District, all gravity sewers shall be polyvinyl chloride (PVC) as specified in the Section 5 – Standard Technical Specification Section 02623. For conditions where PVC is not applicable, ductile iron pipe may be specified with a District approved lining material.

Permitted depth for PVC pipe is limited to fifteen feet or less. Minimum pipe SDR for PVC pipe, 6-inch to 12-inches in diameter, by depth is shown in Table 3.2. Pipe greater than twelve (12) inches diameter shall be designed on a case-by-case basis by the Engineering Department.

TABLE 3.2
MINIMUM SDR

| DEPTH, (<i>feet</i>) | SDR |
|------------------------|-----|
| 3 to 10 | 35 |
| 10 to 15 | 26 |

3.2.4 DEPTH OF PIPE

Depth of cover is measured as the distance to the top of pipe from the finished surface over the sewer centerline for unimproved areas. In streets, cover shall be measured from the top of pipe to subgrade.

Sewers and service connections shall be installed at a depth that shall provide suitable service to the properties connected and will allow subsequent installation of waterlines and other utilities in accordance with Section 7 – Standard Drawings.

Sewers shall be installed to allow a minimum of 1-foot vertical separation under water mains and services (*CCR Title 22, Division 4, Chapter 16, Article 4, §64572*).

Minimum cover is 36-inches where there are no crossings. Where this cover cannot be maintained, other details may be required, such as higher strength pipe, pipe encasements, special backfill, or concrete trench slabs. Depths of cover less than 3-feet requires approval by the District.

3.2.5 HIGH WATER TABLE

Groundwater levels above the sewer create loading that may collapse the pipe. Where groundwater is anticipated to be above the sewer flow line, the pipe and/or trench section are to be designed to prevent pipe failure. Special trench sections are to be noted on the plans.

3.2.6 MANHOLES

A. General

The maximum distance between manholes shall be 300-feet from centerline to centerline and the maximum depth shall be 15-feet.

Unless otherwise approved, all manholes should be accessible to maintenance vehicles at all times. Therefore, manholes placed in back or side yards normally will not be approved. Access to manholes shall have a stable, all-weather graded roadway.

B. Location

Manholes shall be located at the following:

1. At all grade changes.
2. At all changes in horizontal alignment (except on curves).
3. At all changes in pipe sizes.
4. At the terminal ends of all lines.
5. Manholes will be required in cul-de-sacs.
6. At all junctions of main sewers.

At the point of tangency of each reverse curve. No reverse curves will be allowed between manholes.

Manholes generally shall be located no less than 10-feet from the curb line when within a cul-de-sac. Manholes shall not be located within the street such that rainfall runoff is directed to the manhole.

Manholes shall generally be located at least 10-feet past the last service.

C. Manhole Sizes

Standard manholes and shallow manholes shall be in accordance with the Section 7 – Standard Drawings. The minimum inside diameter for manholes shall be as indicated in Table 3.3.

TABLE 3.3
MINIMUM MANHOLE DIAMETER

| Manhole Depth, (<i>feet</i>) | Diameter, (<i>feet</i>) |
|--------------------------------|---------------------------|
| 0 - 10 | 4 |
| 10 >15 | 5 |
| > 15 | 6 |

D. Slope of Manhole Channels

Channel slopes for 6-inch and 8-inch inlet sewers are to have a minimum drop of 0.10-foot. Special channel slope construction is required for sewers 10-inches and larger as shown on Section 7 – Drawing S02D.

The maximum drop through the channel shall be 2-feet. When the channel drop is greater than 2-feet, then a drop manhole is to be installed.

E. Drop Manholes

Drop manholes may be permitted because of physical constraints. Where approved, the drop shall be constructed inside the manhole in accordance with the Section 7 – Drawing S02E.

F. Elevations of Manholes

Rim, inlet, and outlet elevations for all manholes shall be shown on the profile. In paved areas, the manhole rim elevation shall match the finished grade. In other than paved areas or traveled way, the height of the manhole rim will normally be 8-inches above the finished grade, high water mark, or above the top of the future fill areas.

The elevations shown for the tops of manholes on the design plans shall be revised and shown correctly on the Record Drawings to match final street surfaces.

G. High Water Table/Undeveloped Areas

When manholes are constructed in natural or man-made drainage courses or flood channels, the manhole covers, and rim shall be watertight and shall be fitted with a grooved gasket and bolted down with stainless steel cap screws. The top of the manhole shall be a minimum of 8-inches and a maximum of 4-feet above the projected high-water level. Water levels shall be shown on the plans.

Buoyancy shall be considered, and calculations submitted to the District if requested. The exterior of manholes shall be waterproofed in accordance with the Section 7 – Standard Drawing. In other undeveloped areas above the high-water level, bolt-down vandal-proof manhole covers shall be used. Manhole markers shall be installed for easy identification per the standard drawing.

H. Paddle Marker

In easements or where required on the plans, paddle markers shall be installed to identify manholes. Markers shall conform to the Section 7 – Standard Drawing.

I. Structural Requirements

All manholes shall be designed for the appropriate dead, live, and impact loads.

J. Lining

Manholes, including those existing manholes that will be affected by the new flows, that have turbulent flows require lining. Manholes requiring lining include:

1. Manholes with force main inlets and all upstream manholes within 300 ft.,
2. Drop manholes, and
3. All up-stream manholes within 300 ft of a lift station.

Manholes requiring lining shall be designated on the plans.

K. TV Inspection Access for Manholes

Manholes with a 90-degree bend shall be supplied with a ‘T’ channel base to provide access for video inspection.

3.2.6 SERVICE CONNECTIONS

A. General

A service connection, laterals, is that part of the service from the sewer to the property line. Installation of the service from the building to the property line is described in the Application for New Service Quotation.

Where it is known or can be reasonably assumed that a building sewer connection is required, a service lateral shall be shown on the plans and installed to the property line as a part of the sewer construction prior to paving. A service connection with cleanout shall be provided for each lot. Service connections shall be installed in conformity with the Section 7 – Standard Drawings.

B. Size

Service laterals for single-family dwellings shall be 4-inch diameter, minimum. Townhouses and other such dwellings shall be required to have separate 4-inch minimum diameter laterals. All other laterals for commercial or industrial uses shall be no less than 6-inches minimum diameter.

The maximum size for a connection by a wye or tee fitting to a larger diameter sewer shall be 6-inches. A manhole shall be installed when an 8-inch or larger sewer is connected to an equal or larger diameter sewer.

C. Depth

Service laterals from the main sewer to the building shall be constructed at a minimum two percent (2.0%) grade unless otherwise approved. In addition, the minimum depth at the curb or property line shall be 3-feet minimum and a maximum of 6-feet from top of the pipe to ground surface. Services are to cross under water mains.

D. Location

The location of each service shall be stationed and be installed in accordance with the Section 7 – Standard Drawings. No services are allowed to connect to an in-line manhole. Owner's Engineer, by showing the location of the service on the plans, represents that the service has been designed to avoid conflicts with other utilities.

E. Laterals in Cul-de-sac Streets

Three service connections are allowed to connect to a terminal manhole in a cul-de-sac. Refer to the Section 7 – Standard Drawings for the layout of the manhole service connections.

F. Spacing

Minimum spacing between manufactured wyes or taps shall be 2-feet. Wyes and taps shall be staggered left and right. No double wyes shall be allowed.

3.2.7 GREASE, SAND, AND OIL TRAPS

A. General

All building connections through which sewage containing grease, oil, and/or sand that discharge into the District sewer system shall have an oil and sand trap or grease trap installed.

B. Restaurants

The District has adopted a Fat, Oils, and Grease Control (FOG) Regulation to monitor and control “grease blockages” which cause sewer overflows for food service businesses. All restaurants and other establishments with common food preparation facilities shall have a grease trap. Standards for grease traps for restaurants are as follows:

The grease interceptor shall be located outside the building so that it is readily and easily accessible for cleaning and inspection.

The grease interceptor shall be sized and installed pursuant to the *CCR Title 24, Part 5*.

All floor drains from the kitchen area shall be plumbed separately and connected to the building's sewer downstream of the grease interceptor.

All restroom facilities shall be plumbed separately and connected to the building's sewer downstream of the grease interceptor.

The discharger shall adequately maintain the grease interceptor so that it is in proper working order at all times.

C. Other Commercial Business

All other commercial businesses, including service stations, car washes, and similar establishments as determined by the District as categorically inclusive, shall have a grease and sand trap as specified in these Standards. The restrooms of such establishments shall be plumbed separately and connected to the building sewer downstream of the trap.

3.3 PRESSURE SYSTEMS

3.3.1 GENERAL

Wastewater pressure systems include lift stations, force mains; grinder pump lots to a gravity sewer and Low Pressure “grinder pump” Systems (LPS). A description of all proposed wastewater pressure systems shall be submitted to the District for approval in the Concept/Planning Application and associated Design Report.

A. Restrictions

The use of a pressure system must be approved by the District Engineer. The following criteria shall apply to a sewer pressure system:

1. STEP (Septic Tank Effluent Pump) systems are not allowed.
2. Pressure systems shall be limited to cases where gravity flow can only be achieved by constructing sewers deeper than fifteen (15) feet. Pumped lots are not allowed to connect to a dedicated force main. A LPS is not to be the primary collection system for a development.
3. Where multiple projects or multiple phases of a project will connect to a lift station over a period of time, the wet well, pumping, and storage and/or emergency generator capacities shall be reasonably staged. The staged installations shall be described in the Design Report. Parallel force mains may be required to meet minimum velocity requirements at lower pumping rates.
4. Temporary lift stations, or those stations to be replaced by a future facility, shall be considered permanent and designed as such. All future phases and improvements shall meet these design standards in effect at the time the phased improvements are made.

3.3.2 LIFT STATIONS

A. General

The District has established a Lift Station Design Requirements and Specifications. The Design Requirements and Specifications are available in electronic format. All design criteria, materials and equipment are to conform to those Standards.

Improvement System Plans shall include the lift station design drawings, when applicable, and these drawings shall be prepared as specified.

B. Capacity

The station design capacity and pumps shall be based on PWWF, as determined in accordance with Section 3.1, and other pump flows that may enter the system. Flow information and hydraulic design criteria, including future phases of expansion, are to be shown in the Lift Station Drawings.

C. Station Configuration

Lift stations shall typically be a duplex pump, wet well submersible type with equipment and instrumentation as specified by the District. The standby pump shall have the same capacity as one duty pump. In addition, the following criteria are to be considered in the general design of the site:

1. Site Selection. Site selection shall be reviewed with the District and include consideration for zoning and proximity to homes and businesses. Land shall be dedicated to the District in fee.
2. Site Improvements. Wastewater lift stations shall include features to make the station aesthetically acceptable in the location planned. At a minimum, all electronic equipment shall be housed in a masonry structure using exterior split-face block. The site shall have fencing along the property and be paved within the fencing limits.
3. Grading. Grading of the site shall provide drainage away from the proposed structures. The lift station structures and electrical and mechanical equipment shall be protected from physical damage by flooding.
4. Accessibility and Security. The lift station shall be readily accessible by maintenance vehicles during all weather conditions. Depending on the location of the station, a paved access and site may be required. If the lift station is not located near paved roads, a separate paved access is to be provided. Security fencing and lighting will be required as shown on the drawings. Adequate working area within the site for large equipment vehicles is to be provided.

Fencing along access roads (elevations above 2,500 ft.) shall be set back by 8-feet of either side to allow for snow removal.
5. Operation and Maintenance Manual. Lift Stations and portable equipment shall be supplied with a complete set of operational instructions, including emergency procedures, maintenance schedules, tools, and such spare parts as may be necessary.
6. Operation. Duplex station shall control which will automatically alternate the pumps and can energize both pumps on an alarm for high water level. The number of on/off cycles per hour shall be as recommended by the pump manufacturer.

The system shall operate in accordance with the following wet well level indicators listed in Table 3.4 and shall be shown on the Improvement Plans.

TABLE 3.4
OPERATING LEVELS

| WETWELL LEVEL | OPERATION / INDICATION |
|---------------|-----------------------------------|
| 1 | Redundant off and low-level alarm |
| 2 | Pump(s) off |
| 3 | Lead pump on |
| 4 | Lag pump on |
| 5 | High level alarm |

7. Pumping Systems. Pumps are to be submersible type. Each pump shall have the capacity such that, with one pump out of service, the remaining pump will have capacity to handle the PWWF.

Pumps and motors shall be selected by considering initial, interim, and ultimate conditions. Insofar as is practicable, stations shall be designed to deliver as uniform a flow as practicable in order to minimize hydraulic surges and to maintain a minimum velocity of two (2) FPS in the force main. The design flow shall be within 60% to 120% of the best efficiency point (BEP) of the pump.

8. Discharge Piping. The discharge piping for each pump shall be the same size as the pump outlet or be a minimum of 4-inches. The discharge piping shall terminate in a common valve vault adjacent to the wet well as shown on the standard drawing.
9. Wet Well. Design calculations are to be submitted for the wet well. The design fill time and minimum pump cycle time shall be considered in sizing the wet well. The operational volume of the wet well shall be based on design ADWF and a filling time not to exceed thirty (30) minutes and the cycle time. When the anticipated initial flow to the station is less than the design ADWF, provisions shall be made so that the fill time indicated is not exceeded.

Buoyancy of the wastewater pumping station structures shall be considered, and adequate provisions shall be made for protection. Buoyancy calculations shall provide for groundwater at grade and a minimum 1.5 factor of safety.

10. Electrical and Communications

Electrical systems and communications components shall conform to the District's specifications. Soft starts are required for the Copper Cove service for motors 15 HP and over and for motors that are 30 HP in the rest of the District. A power disconnect shall be provided at the building when the wet well is within 25-feet, or at the wet well when greater than 25-feet from the building.

- a. Level Measurement – A transducer and a backup float system shall be provided. Measurement devices should be so located in the wet well as not to be damaged by routine maintenance activities. The float system consists of four (4) floats that are to be set at elevations as directed at the time of installation.
 - b. Equipment Removal – The lift station shall be designed to facilitate removing pumps, motors, and other mechanical and electrical equipment. Submersible pumps shall be readily removable and replaceable on guide rails without dewatering the wet well or disconnecting any piping in the wet well.
 - c. Communications – The District will provide the programming for the PLC. Propagation and polarity of the antennae is to be conformed with the District Standards.
11. Water Service. Water service with a meter and RPBA shall be provided at all installations. There shall be no physical connection between potable water supplies and the lift station wastewater piping.
 12. Standby Systems. Standby systems are to be provided to prevent the discharge of raw or partially treated wastewater to any waters and to protect public health by preventing back-up of wastewater and subsequent discharge to homes, streets, and other public and private property.

Standby systems can be provided by either storage or standby power. A combination of storage and standby power may be required if the lift station is in the vicinity of a sensitive environment. For stations without backup power, a manual transfer switch with a District-approved transfer switch is to be installed for hook up to a portable generator.

- a. Storage – Emergency storage may be utilized, provided the average dry weather design flow to the station does not exceed 20,000 gallons per day. Such storage will provide a minimum of four (4) hours of peak wet weather flow.

Emergency storage does not include upstream manholes, pipelines, or wet well operating storage volume. The storage shall have a common inlet/outlet pipe to the wet well with the invert set at the high-water level of the wet well.

- b. Standby Power – Standby power is to be provided when the ADWF exceeds 20,000 gallons per day. Standby power shall generally consist of one engine-drive electric generator, fuel storage, and enclosure. Generating unit

size shall provide power for sequential pump motor starting current and for lighting, ventilation, and other auxiliary equipment necessary for safety and proper operation of the lift station.

Details of these components shall be in accordance with the District Standard Specifications and Drawings.

- c. Fuel Type – Diesel fuel shall be used to drive generators. Propane shall be used to drive generators falling under Air Quality Control.
- d. Fuel Storage – Day storage or belly tanks are not allowed. Fuel storage shall be above ground.

13. HVAC. Heating, ventilating, and cooling of the motor control and generator building is required. Design of the system is to be in accordance with the applicable state and local codes.

Mechanical ventilation must be provided if routine maintenance will require personnel to enter the station per the requirements of NFPA 820. Thirty (30) air changes per hour are required for intermittent operation.

14. Noise Control. Noise from the generator building shall not exceed 55 decibels at 50-feet from the building perimeter.

3.3.3 FORCE MAINS

A. General

Design of force mains shall consider operating and maintenance costs, surges, velocity, and friction losses. These conditions also influence the lift station design. Sewage force mains can generate gases during periods of non-flow, resulting in odors and corrosion. This condition can be minimized by good design practice.

B. Velocity and Diameter

At design pumping rates, a cleansing velocity of at least 2 FPS shall be maintained. The maximum pipe velocity shall not exceed 8 FPS. The minimum force main diameter for raw wastewater shall not be less than 4-inches.

C. Septic Tank Effluent Pumped (STEP) Systems

STEP pressurized collection systems and force mains shall be looped in all cases. The STEP system shall be equipped with a sufficient number of line valves and looped wastewater mains so that no single shut-down will result in shutting down a pressurized transmission main of more than one thousand feet (1,000'), a pressurized collection main of more than five hundred feet (500') or

necessitate the removal from service a length of pipe greater than five hundred feet (500') in other areas. Service connections to force mains or transmission mains shall not be permitted.

D. Air Valves

Air valves shall be placed at high points and at locations along long runs in the force main to prevent air locking. Vacuum relief valves may be necessary to relieve negative pressures on force mains. The force main configuration and head conditions should be evaluated as to the need for and placement of air and vacuum relief valves. Valve size shall be calculated in accordance with Section 2.2.4. Where air and vacuum valves are required, combination valves shall be used. Automatic valves are to be provided with back-flushing provisions.

E. Termination

Force mains should enter the gravity sewer system at a point not more than 2-feet above the flow line of the receiving manhole as a drop inlet. The force main shall have a gradually ascending slope to the manhole. Manholes receiving a force main shall be lined.

F. Design Pressure

The force main shall be designed to withstand water hammer pressures and associated cyclic reversal of stresses that are expected with the cycling of wastewater lift stations. Surge protection chambers should be evaluated. Surges generally do not require analysis if the TDH (Total Dynamic Head) is less than 40 feet. For TDH greater than 40 feet, the surge potential shall be evaluated and submitted to the District for review.

G. Design Friction Losses

Friction losses through force mains shall be based on the Hazen and Williams formula with a "C" value of 140 for new force mains and 120 for existing mains in calculating pump and power requirements.

H. Pipe Type

Pipe shall be either pressure rated PVC pipe (ANSI/AWWA C900) or ductile iron pipe (ANSI/AWWA C150/151) and meet all requirements of Section 2.2.

I. Layout

Force mains are to have the required horizontal separation and be at least one (1) foot below potable water mains for both horizontal and crossings. Force mains are not permitted to cross over a potable water line. Numerous grade changes are to be avoided. At all changes in direction and/or at 300-feet, cleanouts are to be installed.

J. Detention Time

The Improvement Plans shall contain calculations to determine the maximum detention time within the force main.

***** END OF SECTION 3 – WASTEWATER STANDARDS *****

SECTION 4
RECYCLED WATER STANDARDS
(Currently Unavailable)

SECTION 5
STANDARD TECHNICAL SPECIFICATIONS

SECTION 01000
GENERAL CONSTRUCTION REQUIREMENTS

PART 1 – GENERAL

1.1 REQUIREMENTS

This Section describes general conditions and requirements for construction of the water and sewer systems. The Developer/Engineer shall prepare such general and special supplemental conditions as are necessary to define the project specifics, nature and location of the work, contractual arrangements, payment for work, and any other matters concerning the Developer and Developer's Contractor. In addition, the District's Technical Specifications shall be incorporated into and made a part of the contract for the construction of all projects.

PART 2 – PRODUCTS

2.1 PRECONSTRUCTION MEETING

Following final approval/release of plans, signed agreements, payment of fees, and issuance of all permits, a preconstruction meeting shall be scheduled by the Developer/Engineer. No construction shall begin until a preconstruction meeting has been held with the District's Inspector. Two (2) business days' notice shall be given to schedule a preconstruction meeting. Attendees of the meeting shall include all agencies of interest.

2.2 SUBMITTALS

No submittals are required for items listed in Section 6 – Approved Materials List. For those items not listed, three (3) copies of shop drawings and/or descriptive literature for materials proposed shall be submitted to the District for review. Submittal acceptance by District is required prior to use in the work.

Each submittal package shall include the following information:

- A. Project Name and District Project Number.
- B. Contractor's name.
- C. The submittal item number, beginning with 01.
- D. Date of the submittal.
- E. Any deviation from project requirements or District Standards.

When the Contractor elects to incorporate material included in the Section 6 – Approved Materials List a complete product submittal will not be required. Instead, the Contractor shall submit a Certificate of Compliance from its supplier, certifying that the supplied item is in the Section 6 – Approved Materials List.

District review of any submittal shall not relieve the Contractor of responsibility to comply with all requirements of the “Released for Construction” plans and District standards. District review shall be only for conformance with the plans of the project and for compliance with the information given in the plans and shall not extend to means, methods, sequences, techniques, or procedures of construction, safety precautions or programs incident thereto. The review of a component as such will not indicate acceptance of the assembly in which the item functions. The Contractor will be responsible for coordination of assemblies consisting of separate components.

2.3 SUBSTITUTIONS

Articles or materials not specified in the Section 6 – Approved Materials List must be submitted to the District for approval.

2.4 QUALITY OF MATERIAL

Materials and equipment to be incorporated into the project shall be new. In case a reference is not clear, a “Request for Information” (RFI) is to be transmitted to the District.

2.5 PERMITS

All permits, applicable to water and sewer construction, shall be submitted to the District at the preconstruction meeting, including, but not limited, to, the following:

- A. Encroachment. Where construction will encroach into the public right-of-way, the Contractor shall obtain all necessary encroachment permits from the State and/or County Department of Transportation.
- B. Blasting. Where the Contractor anticipates the use of explosives in conjunction with construction, a blasting permit, with plan, shall be first obtained from the appropriate agency; and all nearby property owners within 600 feet of the construction zone shall be notified, refer to Section 02221.

PART 3 – EXECUTION

3.1 PROTECTION/OPERATION OF EXISTING FACILITIES

A primary concern of the District, is the protection and operation of the District's facilities. A Developer or Contractor will not be allowed to operate any existing valves or to cause a shutdown of any portion of the system. Operation of valves will be done by District personnel only. Any planned shutdown shall be discussed at the preconstruction meeting or at least seven (7) working days in advance of the work. Shutdowns will be allowed only if no other reasonable alternative exists, such as the use of a "hot-tap" connection. When shutdowns are required, the District will make an evaluation of whether the shutdown should be done during the day, during the night, or on a weekend. Developer/Contractor economics will be weighed less heavily in the decision than in the interruption and

inconvenience to existing customers. Any shutdown will require an approval of a notification plan for existing customers by the District.

3.2 COMPACTION TESTS

The District will require certified compaction tests from the Developer/Engineer to confirm compliance with compaction specifications. Compaction shall be tested at locations selected by the District Inspector. The District may independently verify the results.

The Contractor shall make all necessary excavations for compaction tests as directed by the District.

3.3 UTILITIES AND EXISTING FACILITIES

The Contractor shall contact all owners of underground facilities known to be in the area of construction and request marking of these facilities through Underground Service Alert (USA). A notice of 2 full business days is required.

The fact that any underground utility and/or facility is not shown on the plans shall not relieve the Contractor's responsibility to comply with these standards. It shall be the Contractor's responsibility to ascertain, prior to commencing work, the existence of any underground utilities within the construction area.

The District will locate its facilities upon satisfactory advanced notification.

3.4 SHIPPING AND DELIVER

All pipes shall be braced and studded to prevent damage during shipment. Any damaged material, valve, equipment, or fittings delivered and unloaded shall not be used and shall be removed by the Contractor from the work site upon notification by the District Inspector. The District reserves the right to reject material.

Loading and unloading of pipe, as well as placement in the trench, shall be done with straps at each end. Chains, cables, or other similar devices that may damage the pipe shall not be allowed to come into contact with the pipe.

3.5 QUALITY OF WORKMANSHIP

All work shall be performed by qualified personnel experienced in the specific work, with the appropriate licenses under competent supervision and in a manner satisfactory to the District.

3.6 EXPOSING EXISTING FACILITIES

When connections are to be made to any existing pipe or appurtenance where the actual size, elevation, or position of the facility is unknown, the Contractor shall excavate and expose the existing facility.

3.7 CONNECTIONS TO EXISTING FACILITIES

The Contractor shall initiate a request for a connection to existing facilities on the form provided by the District. The Contractor shall submit a form a minimum of three (3) business days before the requested connection. Connections shall be scheduled only on Tuesdays through Thursdays. Connection requests that interrupt service to more than ten (10) customers shall be submitted not less than seven (7) business days before the connection date. Connections will not be approved for days immediately before or after a holiday.

The operation of any existing District valve or other facility shall be by District personnel only.

The Contractor shall be fully prepared to complete the connection in the time allotted and shall not stop work until the facilities are restored to service or until directed to do so by the District. All possible preparatory work shall be completed to the satisfaction of the District prior to a connection.

3.8 HOT TAPS

The Contractor shall notify the District Inspector of the scheduled time for all hot taps. Taps shall be made in accordance with the Released plans. Certified pipe welders shall make all welds on steel mains.

The Contractor shall submit information on the tapping sleeve prior to submitting the request for a hot tap.

3.9 ABANDONMENT

Abandonment of existing waterlines, sewers, and/or structures shall be as specified in these specifications and details.

3.10 INSPECTION, FIELD ACCEPTANCE, AND GUARANTEE PERIOD

The District is responsible for inspection of all excavation, pipe laying, including appurtenant structures and trench backfill from trench foundation to subgrade. All such work shall be available for inspection at all times. Construction shall begin within five (5) days after the preconstruction meeting. Two (2) business days', or forty-eight (48) hours' notice shall be given prior to the start of any construction and twenty-four (24) hours' notice for specific inspection requests. Failure to provide proper notification may delay the starting date of inspection since the District may not be able to inspect the work and will not accept any work for which inspection has not been arranged. The primary responsibility for compliance with all District requirements and standards rests with the Developer and/or Contractor. Any acceptance of a portion of the work by a District Inspector does not relieve the Developer/Contractor of this basic responsibility.

Field acceptance is made by the District Inspector and will not coincide with the date of final acceptance of the work. The two-year warranty period for all work shall begin on the

date of final acceptance. Any defective work discovered during this period shall be repaired or replaced and a new two (2) year period shall begin for that corrected work.

All overtime, holiday, or weekend inspection will be subject to District approval.

Field acceptance will be withheld until work not accepted by the District is reconstructed and complies with District Standards.

3.11 PUBLIC RELATIONS

The Contractor shall conduct its affairs in a manner, which will minimize disturbance to residents in the vicinity of the work. The job site shall be maintained in a condition, which shall bring no discredit to the District or its personnel, and all affected improvements shall be restored to their original condition.

3.12 DEFECTIVE WORK

Any defective materials or workmanship which shall become evident within two (2) years after final acceptance shall be replaced or repaired without cost to the District. Refusal of the Developer/Contractor to correct defective work which is clearly Developer's/Contractor's responsibility may be just cause to bring legal action to correct the deficiencies as well as to make a claim against the warranty bond.

3.13 HIGH WATER TABLE

Where the water tables are, or anticipated to be, within the trench excavation, pipe zone material shall be reviewed and receive prior approval from the District. The District may require sand / cement slurry for the bedding zone and/or the installation of trench stabilization material.

3.14 PROTECTION OF EXISTING UTILITIES

The Contractor shall be responsible for the care and protection of all existing water pipe, sewer pipe, gas mains, culverts, or other facilities and structures that may be encountered in or near the area of the work.

In the event of damage to any existing facilities during the progress of the work and of the failure of the Contractor to exercise the proper precautions, the Contractor will pay for the cost of all repairs and protection to said facilities. The facility owner and District have sole discretion in determining the means and methods of repair. The Contractor's work may be stopped until repair operations are complete.

***** END OF SECTION 01000 *****

**SECTION 02220
STRUCTURE EXCAVATION AND BACKFILL**

PART 1 – GENERAL

1.1 REQUIREMENTS

This Section shall govern the work for structure excavation and backfill. Structure excavation shall consist of the removal of material for the construction of foundations for vaults, manholes, or other structures, and other excavation designated on the Plans or in the Specifications as structure excavation. Trenching and backfill shall be in accordance with Section 02221.

Structure excavation and structure backfill shall include the furnishing of all materials and equipment, the construction or installation of all facilities which may be necessary to perform the excavations and to place and compact the backfill, and the subsequent removal of such facilities, except where they are required or permitted by the Plans or Specifications to remain in place.

1.2 SUBMITTALS

The following items shall be submitted and approved by the District.

- A. Test results showing gradation, durability, and sand equivalent of import material.
- B. The Annual or Project Permit as issued by the Division of Occupational Safety and Health for excavations five (5) feet or more in depth as required by Cal-OSHA, including any trench excavation or shoring plans.

PART 2 – PRODUCTS

2.1 EXCAVATION

- A. Excavation is unclassified. The Contractor shall complete all excavations regardless of the type of materials encountered. The Contractor shall make its own estimate of the kind and extent of the various materials, which will be encountered in the excavation.
- B. For District projects, no extra payment will be given for rock excavation, regardless of the method used. It is assumed that rock will be encountered in the Foothills, and it is the responsibility of the Contractor to include those costs appropriately.

2.2 BACKFILL

Native earth backfill and imported backfill material shall conform to the requirements of

PART 3 – EXECUTION

3.1 PAVEMENT

Bituminous or concrete pavements, regardless of their thickness, and curbs and sidewalks shall be cut prior to excavation for the structure in accordance with the requirements of the encroachment permit or the District.

Pavement and concrete materials shall be removed from the site.

3.2 EXCAVATION

The sides of excavations for structures shall be sufficient to leave at least 1.5 feet clear, as measured from the extreme outside of form work on the structure, as the case may be. Where excavation is inadvertently carried below designated elevations, suitable provision shall be made at the expense of the Contractor for adjustment of construction, as directed by the District, to meet requirements incurred by the deeper excavation. No earth backfill will be permitted to correct over depth excavation beneath structures, and over depth excavation in such locations shall be rectified by backfilling with sand, graded gravel, or concrete as directed by the District.

3.3 BRACING

The Contractor's design and installation of bracing and shoring shall take the necessary precautions to be consistent with the rules, orders, and regulations of the State of California Construction Safety Orders.

Excavations shall be so braced, shored, and supported that they will be safe, such that the walls of the excavation will not slide or settle and all existing improvements of any kind, either on public or private property, will be fully protected from damage.

The shoring and bracing shall be arranged so as not to place any stress on portions of the completed work.

The Contractor shall carefully remove shoring and bracing and timbering to prevent the caving or collapse of the excavation faces being supported.

3.4 DEWATERING

The Contractor shall provide and maintain means and devices to continuously remove and dispose of all water entering the excavation during construction of the structure and during backfill operations.

Water shall be disposed of in a manner that will prevent damage to adjacent property and pipe trenches and in accordance with the approved discharge permit.

The Contractor shall not allow water to rise in the excavation until backfilling around and above the structure is completed.

3.5 BACKFILL

After structures and foundations are in place, backfill shall be placed to the original ground line or to the limits designated on the plans.

No material shall be deposited against cast-in-place concrete structures until the concrete has reached a compressive strength of at least 2,500 pounds per square inch.

Backfill material shall be placed in horizontal layers not exceeding eight (8) inches in depth.

3.6 COMPACTION

Compaction requirements shall be as follows:

- A. Backfill within five (5) feet of structure: 95% relative compaction.
- B. Structural backfill beyond five (5) feet of structure: 90% relative compaction. Gravel base: 95% relative compaction.

Each layer of backfill material shall be moistened and thoroughly tamped, rolled, or otherwise compacted to the specified relative density.

Compaction equipment shall be carefully operated near structures to prevent displacement or damage to said structures. Structural fill is to be placed and compacted in uniform layers around all sides of the structure.

3.7 EXCESS EXCAVATED MATERIAL

The Contractor shall make the arrangements for and shall remove and dispose of all excess excavated material.

All surplus material shall become the property of and be disposed of offsite by the Contractor.

No excavated material shall be deposited on private property unless written permission from the owner thereof is secured by the Contractor. Before the District will accept the work as being completed, the Contractor shall file a written release signed by all property owners with whom Contractor has entered into agreements for disposal of excess excavated material, absolving the District from any liability connected therewith. Contractor will be required to obtain a grading permit from Calaveras County Department of Public work for disposal of excavated materials in excess of 50 cubic yards.

3.8 RESTORATION OF DAMAGED SURFACES AND PROPERTY

If any existing improvements, facilities, or vegetation not designated to be removed have

been damaged, removed, or disturbed by the Contractor, for whatever reason, such improvements, facilities, and vegetation shall be replaced or repaired at the expense of the Contractor.

3.9 FINAL CLEAN-UP

After backfill and compaction have been completed, the right-of-way shall be dressed smooth and left in a neat and presentable condition to the satisfaction of the District.

***** END OF SECTION 02220 *****

**SECTION 02221
TRENCH EXCAVATION, BACKFILL, AND COMPACTION**

PART 1 – GENERAL

1.1 REQUIREMENTS

This Section governs the work for trench excavation, backfill, and compaction for underground pipeline work.

1.2 SUBMITTALS

The following items shall be submitted review and acceptance by the District.

- A. Test results showing gradation, durability, and sand equivalent of pipe zone material.
- B. The Annual or Project Permit as issued by the Division of Occupational Safety and Health for excavations five (5) feet or more in depth as required by Cal-OSHA, including any structural excavations and shoring plans.

1.3 TESTING

Testing frequency and location shall be approved by the District. For development projects minimum frequency shall be every 100-feet of water or sewer line.

PART 2 – PRODUCTS

2.1 TRENCH EXCAVATION

Excavation is unclassified. The Contractor shall complete all excavations regardless of the type of materials encountered. The Contractor shall make its own estimate of the kind and extent of the various materials which will be encountered in the excavation.

For District projects, no extra payment will be given for rock excavation, regardless of the method used. It is assumed that rock will be encountered in the Foothills, and it is the responsibility of the Contractor to include those costs appropriately.

2.2 PIPE ZONE

The pipe zone limits are designated on the Section 7 – Standard Drawings. Material for the pipe zone shall conform to the following:

- A. Aggregate Base. Base shall be $\frac{3}{4}$ - inch and minus or $\frac{1}{2}$ - inch and minus. The aggregate size gradation shall comply with Caltrans Specifications for Class 2 road base. The sand equivalent shall be 30 minimum. The durability index shall be 35 minimum.

2.3 BACKFILL

Material for backfill from 12 inches above the top of the pipe to subgrade shall be free from organic matter, debris, and rocks larger than 3 inches in diameter or length. The District shall be the sole judge of conformance of backfill material to this specification.

Backfill material shall generally conform to the following gradation:

| <u>Sieve Size</u> | <u>Percent Passing</u> |
|-------------------|------------------------|
| 3" | 100 |
| #4 | 35-100 |
| #30 | 20-100 |

2.4 SLURRY BACKFILL

Cement slurry shall consist of two sacks of Portland cement per yard of sand with enough water for workability. The District shall approve all uses of slurry backfill.

2.5 WARNING TAPE

Warning tape is to be in accordance with Section 6 – Approved Materials List.

2.6 TRACER WIRE

Tracer wire is to be in accordance with Section 6 – Approved Materials List.

PART 3 – EXECUTION

3.1 EXCAVATION

Excavation for pipelines, fittings, and appurtenances shall be open trench to the depth and in the direction necessary for the proper installation of the same as shown on the contract drawings or as otherwise approved by the District. Excavation shall only proceed when the necessary materials have been delivered to the site.

The Contractor shall bear all costs of disposing of roots and all other waste materials from the excavation. Material shall be disposed of offsite at Contractor's expense.

The Contractor shall remove obstructions within the trench area or adjacent thereto, such as abandoned concrete structures, logs, and debris of all types, without additional compensation. The District may, if requested, make changes in the trench alignment to avoid major obstructions.

3.2 EXISTING PAVEMENT REMOVAL

Pavement shall be removed and replaced in the manner prescribed by the Agency issuing the encroachment permit.

Existing pavement, curbs, gutters, sidewalks, and driveways to be removed in connection with construction shall be neatly saw cut prior to removal. Saw cuts shall have a minimum depth of one (1) inch in concrete sidewalk.

Concrete sidewalks or driveways shall be removed so that a minimum of a 30-inch square is replaced. If the saw cut in a sidewalk or driveway would fall within 30 inches of a construction joint, expansion joint, or edge, the concrete shall be removed and replaced to the joint or edge. If the saw cut would fall within 12 inches of a score mark, the concrete shall be removed and replaced to the score mark. Concrete shall be removed by jackhammer.

3.3 GRADING AND STOCKPILING

The Contractor shall control grading in a manner to prevent water running into excavations. Obstructions of surface drainage shall be avoided and means shall be provided whereby storm and wastewater can be uninterrupted in existing gutters, other surface drains, or temporary drains. Material for backfill or for protection of excavation in public roads from surface drainage shall be neatly placed and kept shaped so as to cause the least possible interference with public travel. Free access must be provided to all fire hydrants, water valves, meters, and private drives.

3.4 LINE AND GRADE

The Contractor shall excavate the trench to the lines and grades shown on the plans. Any deviations shall first be approved by the District Engineer.

The trench shall be excavated to a minimum depth of 6 inches below the bottom of the pipe. The sides of the trench shall be excavated and maintained as nearly vertical as is practical.

3.5 TRENCH SUPPORT

The trench shall be adequately supported, and the safety of workers provided for as required by the standards of CAL/OSHA.

The Contractor shall be responsible for adequately shored and braced excavations so that the earth will not slide, move, or settle, and so that all existing improvements of any kind will be fully protected from damage.

No shoring, once installed, shall be removed until the trench has been approved for backfill operations. Removal of shoring shall only be accomplished during backfill operations and in such a manner as to prevent any movement of the ground or damage to the pipe or other structures.

The Contractor shall obtain all permits for any excavations over five (5) feet in depth into

which a person is required to descend or any excavation less than five (5) feet in depth in soils where hazardous ground movement may be expected and into which a person is required to descend.

Excavated material shall not be placed closer than two (2) feet from the top edge of the trench. Heavy equipment should not be used or placed near the sides of the trench unless the trench is adequately braced.

3.6 BLASTING

Blasting for excavation shall not be permitted without the written approval of the District and only after securing the required permits. Procedures and methods for blasting shall conform to all Federal, State, and local laws and ordinances. The Contractor shall notify the proper representatives of jurisdictional agencies and individuals which may have property within at least 600 feet of the construction zone or within an area in which damage could occur, at least 24 hours in advance.

Blasting mats shall be used at all times where flying rock might cause damage to any person, building, power line, or other installation.

All traffic shall be stopped a safe distance from the blasting operation, and all persons shall be removed from the area prior to blasting.

The Contractor shall designate, in writing, a single responsible individual as the Powder Foreman. Carelessness or incompetency by the Powder Foreman shall be grounds for immediate removal from said position or responsibility, and the Powder Foreman shall not be permitted to handle or use explosives on the remainder of the project. Priming of all explosives shall be with electric detonators of sufficient size to ensure efficient and complete detonation of the explosive charge. All charges consisting of more than one hole shall be wired either as series or series- parallel.

Straight parallel hookups will not be permitted.

The Contractor is responsible to provide a power source adequate for detonation of the explosive charges consistent with the accepted standard practices involving electric detonation of explosives. Excessive blasting will not be permitted, and any material outside the authorized cross section which may be loosened or shattered by blasting shall be removed.

The District Engineer shall have authority to require the Contractor to discontinue any method of blasting which leads to overshooting, is dangerous to the public, or is destructive to property or natural features.

The Contractor shall notify the District a minimum of 24 hours in advance of any blasting operations.

3.7 PRESERVATION OF TREES

Excavation within the dripline of any tree shall conform to the project's environmental monitoring program and to encroachment permits. Trees shall not be removed outside of fill or excavated areas, except as authorized by the District.

3.8 DEWATERING

The Contractor shall provide and maintain means and devices to continuously remove and dispose of all water entering the excavation during construction of the structure and during backfill operations.

Water shall be disposed of in a manner that will prevent damage to adjacent property and pipe trenches. The Contractor is responsible for meeting all Federal, State, and local regulations and rules governing the treatment and disposal of water from dewatering operations on the construction site.

The Contractor shall not allow water to rise in the excavation until backfilling around and above the structure is completed.

3.9 OVER EXCAVATION

Any over excavation carried below the grade or beyond the trench width, as specified or shown, shall be rectified by backfilling with approved sand and/or graded gravel and shall be compacted as directed by the District.

3.10 STRUCTURE PROTECTION

Temporary support, adequate protection, and maintenance of all underground and surface structures, drains, sewers, and other obstructions encountered in the progress of the work shall be furnished by the Contractor at its expense and subject to the approval of the District. Any structure that has been disturbed shall be restored upon completion of the work.

3.11 PROTECTION OF PROPERTY AND SURFACE STRUCTURES

Trees, shrubbery, fences, poles, and all other property and surface structures shall be protected unless their removal is shown on the drawings or authorized by the District Engineer.

3.12 TRENCH WIDTH

The width of the trench within the pipe zone shall be such that the clear space between the barrel of the pipe and the trench wall shall not exceed the amount shown in the standard details. In general, the following shall be adhered to:

| Nominal Pipe Diameter | Trench Width | |
|-----------------------|--------------|---------|
| | Minimum | Maximum |
| | | |

| | | |
|----------|----------|----------|
| 6"-12" | OD +12" | OD + 18" |
| 14" -18" | OD + 18" | OD + 24" |

Trench widths in excess of those specified must have prior written approval.

Maximum Length of Open Trench. Unless otherwise specified or directed by the District, the maximum length of open trench shall be 500 feet or the distance necessary to accommodate the amount of pipe installed in a single day, whichever is greater. The distance is the collective length of any location, including open excavation, pipe laying, and appurtenant construction and backfill that has not been temporarily resurfaced.

Failure by the Contractor to comply with the limitations specified herein may result in an order to halt progress of the work until compliance has been achieved. The Contractor shall provide proper barricades for excavated areas.

No open trench will be allowed from October to May.

3.13 TRENCH FOUNDATION

The trench bottom shall be graded to provide a smooth, firm, and stable foundation at every point throughout the length of the pipe. Should large gravel and cobbles be encountered at the trench bottom or pipe subgrade, they shall be removed from beneath the pipe and replaced with a uniform layer of pipe zone material which shall be compacted to provide uniform support and a firm foundation.

3.14 FOUNDATIONS IN POOR SOIL

If excessively wet, soft, spongy, unstable, or similarly unsuitable material is encountered at the surface upon which the bedding material is to be placed, the unsuitable material shall be removed to a depth as determined in the field by the District. The trench bottom shall be stabilized as detailed by the Section 7 – Standard Drawings as directed by the District. The Contractor's attention is called to Section 022021-3.8 regarding its responsibilities in maintaining adequate dewatering procedures to ensure that an otherwise stable foundation will not be rendered unfit due to accumulation of water.

3.15 BACKFILL AND COMPACTION

Backfill shall be completed within the shortest possible time so that the construction area or street can be opened to traffic. If for any reason construction of the pipeline or appurtenances thereto is delayed, the District may require that the trench be backfilled, and such areas or streets opened to traffic.

3.16 PIPE ZONE

After completion of the trench excavation and proper preparation of the foundation, 6-inches of bedding material shall be placed on the trench bottom for support under the pipe.

Bell holes shall be dug to provide adequate clearance between the pipe bell and the bedding material. All pipes shall be installed in such a manner as to ensure full support of the pipe barrel over its entire length. After the pipe is adjusted for line and grade and the joint is made, the remainder of the pipe bedding shall be placed to the limits as shown on the Drawings. All bedding material shall be compacted 95% relative compaction.

The pipe bedding backfill shall be brought to optimum moisture content and shall be placed by hand in layers not exceeding 3 inches in thickness to the centerline (springline) of the pipe. Each layer shall be solidly tamped with the proper tools so as not to injure, damage, or disturb the pipe.

Backfilling shall be carried on simultaneously on each side of the pipe to assure proper protection of the pipe.

Each lift shall be "walked in" and supplemented by slicing with a shovel to ensure that all voids around the pipe have been completely filled. Mechanical compaction such as "wackers" or "pogo sticks" as approved, shall be used for compaction of pipe zone.

3.17 INITIAL BACKFILL

The remaining portion of the trench shall be backfilled, compacted, and/or consolidated by approved methods to obtain the relative compaction shown on the Section 7 – Standard Drawings.

When backfill is placed mechanically, the backfill material shall be pushed onto the slope of the backfill previously placed and allowed to slide down into the trench. The Contractor shall not push backfill into the trench in such a way as to permit free fall of the material until at least 18 inches of cover is provided over the top of the pipe. Under no circumstances shall sharp, heavy pieces of materials be allowed to be dropped directly onto the pipe or the tamped material around the pipe. Backfill shall be placed in layers not exceeding 8 inches and compacted by an approved method.

Heavy-duty compacting equipment having an overall weight in excess of 125 pounds shall not be used until backfill has been completed to a depth of 2 feet over the top of the pipe.

If hydro-hammer is used for compaction of overlying materials, at least 4 feet of backfill must be placed over the top of pipe prior to its use. This is required to ensure that the pipe is not damaged.

3.18 FINAL BACKFILL

Final backfill placed in trenches below roadways or below shoulders of roadways shall be compacted to obtain the relative compaction shown on the Section 7 – Standard Drawings.

Backfill shall be placed in layers not exceeding 8 inches, compacted, and brought up to the subgrade of the roadway.

3.19 EXCESS EXCAVATED MATERIAL

The Contractor shall make the arrangements for and shall remove and dispose of all excess excavated material.

All surplus material shall become the property of and be disposed of offsite by the Contractor.

No excavated material shall be deposited on private property unless written permission from the owner thereof is secured by the Contractor. Before the District will accept the work as being completed, the Contractor shall file a written release signed by all property owners with whom it has entered into agreements for disposal of excess excavated material, absolving the District from any liability connected therewith.

3.20 RESTORATION OF DAMAGED SURFACES AND PROPERTY

If any existing improvements, facilities, or vegetation not designated to be removed have been damaged, removed, or disturbed by the Contractor, for whatever reason, such improvements, facilities, and vegetation shall be replaced or repaired at the expense of the Contractor.

3.21 FINAL CLEAN-UP

After backfill has been completed, the right-of-way shall be dressed smooth and left in a neat and presentable condition to the satisfaction of the District.

***** END OF SECTION 02221 *****

**SECTION 02350
PIPE BORING AND JACKING**

PART 1 – GENERAL

1.1 REQUIREMENTS

This Section governs the furnishing and installing of steel casing pipe by boring and jacking, including the installation of the carrier pipe as shown on the Section 7 – Standard Drawings. All incidentals and appurtenant operations necessary for the construction of the casing and pipe installation shall be done in strict accordance with the drawings, applicable permits, and other conditions of the contract. Should there be conflicts between this specification and the governing agency, the more restrictive condition shall apply.

The Contractor shall furnish all equipment, tools, labor, and materials required for the construction as shown and specified.

All standard specifications, i.e., ASTM, etc., are made a portion of these specifications by reference shall be the latest edition and revision thereof.

The Contractor shall be responsible for all material furnished by it and shall replace at its own expense, should the material be defective in manufacture or damaged in delivery. This shall include the furnishing of all material and labor required to replace defective material discovered prior to final acceptance of the work.

1.2 SUBMITTALS

The following shall be submitted:

- A. Plan of operation describing the sequence of work;
- B. Pit shoring plan; and
- C. Permits.

1.3 PERMITS

All work shall conform to the specifications and requirements of the agency having jurisdiction. The Contractor shall secure all required permits for construction of casing pipe installation.

1.4 SAFETY

It shall be the Contractor's responsibility to see that the work is done in conformance with CAL-OSHA and all other applicable laws and regulations.

PART 2 – PRODUCTS

2.1 GENERAL

All materials shall conform and be selected from Section 6 – Approved Materials List with the following additions:

2.2 CASING PIPE

Used pipe for casing shall be allowed if the Contractor provides proof that it is equivalent to materials specified in Section 6 – Approved Materials List. All joints shall be butt weld.

For casing sizes 30 inches and larger, inside grout ports shall be provided. The District Engineer shall approve location and frequency of the ports.

2.3 GROUT

Grout shall consist of one part Portland cement, water, and four parts sand. Sand shall be of a fineness that 100% passes a standard 8-mesh sieve and at least 45%, by weight, passes the 40-mesh sieve.

2.4 BACKFILL

The void between the carrier pipe and casing shall be filled with blown sand.

PART 3 – EXECUTION

3.1 BORE AND RECEIVING PITS

The trench for boring operations shall be adequately shored to safeguard existing substructures and surface improvements and to ensure against ground movement in the vicinity of the casing portal.

The foundation of the approach pit shall be prepared to provide firm support for the guide rails and boring machinery. Pits shall be of sufficient size to allow the insert of the lengths of casing pipe. All rails and support members shall be anchored to ensure that the action of the jacks is in line with the axis of the casing.

All pits shall be fenced and/or a type "K" barrier placed for protection. Pits to be left open overnight shall have a 6-foot-high fence, in panel sections, securely fastened together for pedestrian safety. Reflectors shall be secured to the side of the fence that faces traffic.

3.2 ALIGNMENT AND GRADE

Where tolerances are not shown on the plans, the horizontal tolerance for pressure and gravity pipeline shall be 1% left or right, from the survey line.

Vertical tolerance for pressure pipelines shall be 1% up or down from the grade line. No vertical tolerance is allowed for gravity flow pipelines.

Corrections for faulty grades shall be approved by the District.

3.3 PIPE CASING

Casing sections shall be joined by full-circumference butt welding in the field. Grade and alignment are to be checked after each section is installed.

The end of the steel casing pipe shall be kept immediately behind the cutterhead of the boring machine. The bored hole shall have a diameter no greater than one (1) inch larger than the steel casing pipe.

3.4 GROUTING

Immediately after completion of the jacking and boring operation, lean grout shall be injected through the grout connections of casings 30 inches and larger in a manner that will completely fill all voids outside the casing pipe resulting from the boring operation. Grout pressure is to be controlled so as to avoid deformation of the casing and/or movement of the surrounding ground. After completion of grouting, the grout connections shall be closed with cast-iron threaded plugs.

Voids, created by casings smaller than 30 inches, shall be grouted from ground surface.

3.5 CARRIER PIPE INSTALLATION

The carrier pipe shall be pushed into the casing pipe using skids in accordance with the detail.

It shall be the responsibility of the Contractor to size the runners in order to secure the carrier pipe from "floating" and subsequent loss of grade when the annular space between the casing pipe and the carrier pipe is filled.

Before backfilling the annular space, the carrier pipe shall pass an initial pressure or leakage test.

Tracer wire shall be installed with the pipe.

3.6 BACKFILL

The annular space between the carrier pipe and the jacked casing shall be filled with dry air blown sand.

3.7 SEALING ENDS OF THE CASING

The annular spaces at the ends of the casing shall be sealed with a seamless rubber shroud.

3.8 CLOSING THE JACKING PIT

After jacking equipment and muck from the tunnel have been removed from the approach trench of the jacking pit, the Contractor shall prepare the bottom of the jacking pit as a pipe

foundation. Loose and disturbed material below pipe grade to undisturbed earth shall be removed and then replaced and compacted in 8-inch lifts.

***** END OF SECTION 02350 *****

SECTION 02601 MANHOLES

PART 1 – GENERAL

1.1 REQUIREMENTS

The work covered by this Section shall consist of furnishing all materials, accessories, equipment, tools, transportation, service, labor, and performing all operations to furnish and install concrete manholes in accordance with this Section of the specifications and applicable Section 7 – Standard Drawings. Testing of manholes shall be done in accordance with Section 02661.

Precast concrete bases, wall sections, and covers shall be manufactured in a facility specifically designed for that purpose and shall conform to the shapes and dimensions indicated on the plans.

1.2 SUBMITTALS

For cast-in-place manhole base, the concrete mix is to be provided.

1.3 DESIGN LOADS

Design loads shall consist of dead load, live load, impact, and, in addition, loads due to water table and any other loads that may be imposed upon the manhole.

1.4 TESTING

Testing of manholes shall be performed in accordance to Section 02661.

PART 2 – PRODUCTS

2.1 GENERAL

All materials shall conform and be selected from the Section 6 – Approved Materials List with the following additions:

2.2 MANHOLE WALL SECTIONS, BASE, AND GRADE RINGS

Unless otherwise approved, all concrete manholes shall be precast. Precast manhole components shall be selected from Section 6 – Approved Materials List of the size indicated on the Drawings. One manufacturer shall supply all components.

PART 3 – EXECUTION

3.1 EXCAVATION

The Contractor shall prepare an excavation large enough to accommodate the structure and permit grouting of openings and backfilling operations. Excavations shall be made in accordance with Section 02220. No earth backfill will be permitted to correct over-depth excavation. Over excavation shall be corrected as described in Section 02220 - 3.2.

3.2 PRECAST BASES

Precast bases shall be placed on compacted drain rock and graded level. The top of the base, when installed, shall be level in all directions.

3.3 CAST-IN-PLACE BASES

Manhole base shall be poured in accordance with the Section 7 – Standard Drawings on compacted base rock. All vertical surfaces shall be poured against approved forms. The base shall extend to the lines shown on the details. A template shall be used to form the level grooved surface that will receive the first wall section.

The manhole stubs and sewer main shall be set before the concrete is placed and shall be rechecked for alignment and grade before the concrete has set. The various sized inlets and outlets to the manhole shall be located as indicated on the plans and as detailed in the detail drawings. Invert elevations of connecting sewers may vary.

The invert of the manhole base shall be hand worked to provide channels conforming in size and shape to the lower portions of the inlets and outlets. The manhole invert channels shall be smooth and accurately shaped. Channels may be formed directly in the concrete base.

All transitions shall be smooth and of the proper radius to give an uninterrupted transition of flow.

The concrete base shall be shaped with a wood float and shall receive a hard steel trowel finish before the concrete sets.

In the event additional mortar is required after initial set has taken place, the surface to receive the mortar shall be primed, and the mortar mixed with a Concrete Adhesive in the amounts and proportions recommended by the manufacturer and as directed by the District in order to secure as chip-proof a result as possible.

The bases shall set a minimum of 24 hours before manhole construction is continued. In certain critical situations, the time of setting may be reduced upon approval of the District.

3.4 MANHOLE ASSEMBLY

Manhole assembly shall be as shown on the Section 7 – Standard Drawings. Each precast concrete unit shall be set plumb using the specified filler at all joints.

It is the intent of these specifications that manholes and appurtenances be watertight and free from infiltrations. Manholes shall be free of any seeping or surface moisture.

In order to prevent accidental use of the new sewer before completion and acceptance, the inlet to existing tie-in manholes shall be sealed. The type of plugs and installation of these plugs shall be approved by the District. Plugs shall be removed after final inspection or as directed by District.

3.5 LINERS

Manholes incorporating a PVC liner shall be installed in accordance to the manufacturer's specifications. Damage to the liner shall be repaired with the manufacturer's specified tools and methods by certified personnel.

3.6 LINERS FOR EXISTING MANHOLES

Existing manholes to be lined shall be cleaned and prepared in accordance with the manufacturer's specifications. Seepages and leaks are to be sealed to the satisfaction of the District. Exterior sealing may be required. Application of the product is to be spray-applied by personnel certified by the manufacturer to a minimum thickness of 60 mm (2.5 in).

3.7 GRADE RINGS

Grade rings shall not exceed a total of 12 inches in height unless approved by the District before installation. Grade rings shall be set plumb using the specified filler at all joints.

3.8 FRAME AND COVER

The frame and cover are to be secured to the grade ring by the concrete collar as shown on the Section 7 – Standard Drawings.

3.9 NEW CONNECTIONS TO EXISTING MANHOLES

New connections to existing manholes, where stubs have not been provided, shall be made by core drilling through the wall and rebuilding the manhole bench as shown on the Section 7 – Standard Drawings and installing a rubber flexible pipe connector.

3.10 BACKFILL

Backfill around manholes shall be placed and compacted in accordance with Section 02220.

3.11 USE OF NEW SEWER

Before completion and acceptance of the sewer system, the inlet to the exiting manhole(s) and the outlet the first new upstream manhole shall be sealed with plugs. Plugs may only be removed as approved by the District. Removal of all construction debris and water shall be completed prior to the removal of the plugs.

***** END OF SECTION 02601 *****

SECTION 02615 DUCTILE IRON PIPE

PART 1 – GENERAL

1.1 REQUIREMENTS

This specification governs the furnishing and installation of ductile iron pipe material and main line fittings including laying, joining, bedding, and approvals. All incidentals and appurtenant operations necessary for the construction of pipelines shall be accomplished in strict accordance with the drawings and other terms and conditions of the contract. Pipe and fittings shall comply with ANSI/AWWA standards.

All material and products used in a drinking water system that may come in contact with drinking water shall be certified as meeting the specifications of NSF61/ANSI 372.

Fitting types covered under this section include bends, tees, crosses, reducers, couplings, caps, plugs, adapters, and all other fittings necessary for a complete pipeline installation.

The Contractor shall also furnish all equipment, tools, labor, and materials required to relocate sewers, conduits, ducts, pipes, or other structures as may be necessary to complete the installation as shown and specified.

All standard specifications, i.e., ANSI/AWWA, ASTM, etc., made a portion of these specifications by reference shall be the latest edition and revision thereof.

The Contractor shall be responsible for all material furnished by it, and shall replace at its own expense, all material found defective in manufacture or damaged in handling after delivery by the manufacturer. This shall include the furnishings of all material and labor required to replace defective material discovered prior to final acceptance of the work.

The Contractor shall be responsible for the safe storage of material until it has been incorporated into the completed project. The interior of all pipe and fittings shall be kept free from dirt and foreign matter at all times.

Pipe surfaces shall be free from nicks, scratches, and other blemishes. The joining surfaces of pipe spigots and bell sockets shall be free from gouges or other imperfections that might cause leakage.

1.2 SUBMITTALS

Submittals shall be provided for the following items plus all additional items required in the specifications for the particular type of pipe:

- A. Restraint system calculations
- B. Specialties

PART 2 – PRODUCTS

2.1 DUCTILE IRON PIPE

Ductile iron pipe shall be supplied from manufacturers listed in the Section 6 – Approved Materials List with the following options:

- A. Pressure Class. Where the class is not indicated on the plans, the pipe shall be Class 350.
- B. Laying Lengths. Standard pipe lengths shall be eighteen (18) or twenty (20) feet.
- C. Joint Type. Pipe joints shall be either rubber gasket push-on or, mechanical type joint per the appropriate AWWA Standards. Where called out on the plans, flanged spool sections can be supplied.
- D. Lining and Coating. Unless otherwise specified, the outside coating shall be a 1 mil asphaltic coating; the inside surfaces shall be cement mortar lined in accordance with ANSI/AWWA C104, without a seal coat, and to the standard thickness according to the pipe diameter.
- E. Restrained Joints. The restrained joint system shall be as listed on the Section 6 – Approved Materials List and approved for its use by the manufacturer of the pipe.
- F. Polyethylene Encasement. Pipe and fittings shall be wrapped in polyethylene in accordance with ANSI/AWWA C 105. Polyethylene shall be black, 8-mil, low-density film.
- G. Fittings. Fittings shall be ductile iron and be provided from manufacturers listed on Section 6 – Approved Materials List. All ductile iron fittings shall be manufactured to the quality, strength, and pressure requirements of ANSI/AWWA C110 with the following options:
- H. Joint Type. Joint types may be push-on, mechanical, or flange per ANSI/AWWA C111. Joint type and accessories such as gaskets, lubricants, nuts, and bolts shall be compatible and be approved with the manufacturer of the pipe.
- I. Mechanical Joint. Glands shall be ductile iron.
- J. Accessories. Tee-bolts and nuts and bolts and nuts for flanges shall be from high-strength, low alloy steel known in the industry as "Cor-Ten" or equal. Washes shall be of the same material as the nut.
- K. Flanged Joint. Maximum working pressure for flanged joints is 250 psi unless a special design is specified. Bolts and nuts for flanged joints shall

be as listed in SECTION 6.

- L. Coatings and Linings. Fittings shall be cement mortar lined per ANSI/AWWA C104 and receive a 1 mil asphaltic coating. If specified, fusion-epoxy lining and coating shall be applied in accordance with ANSI/AWWA C116. Holiday testing of the coating of all fittings is required.

Threaded holes and mating surfaces shall not be coated. Flange faces shall be coated with asphaltic varnish only. There shall be no coating of materials or mortar on gasket grooves.

PART 3 – EXECUTION

3.1 HANDLING AND TRANSPORTATION

Handling and transportation of pipe shall be in accordance with the pipe manufacturer's published instructions.

Heavy canvas or nylon slings of suitable strength shall be used for lifting and supporting materials. Chains or cables shall not be used.

Pipe and fittings shall not be stored on rocks or gravel or other hard material that might damage the pipe.

3.2 RUBBER GASKET STORAGE

All rubber gaskets shall be stored in a cool, well-ventilated place and not exposed to the direct rays of the sun. Gaskets shall not be allowed in contact with oils, fuels, petroleum, or solvents.

3.3 PIPE LAYING

Pipe shall be laid in accordance with the pipe manufacturer's published instructions, District Standards Drawings, and ANSI/AWWA C600, as complimented and modified herein.

3.4 CLEANLINESS

The interior of pipes shall be clean of foreign materials before sections of pipe are installed and shall be protected to prevent entry of foreign materials after installation.

Open ends of installed pipe shall be sealed with watertight plugs or other approved means at times when pipe installation is not in progress. Ground water shall not be allowed to enter the pipe.

3.5 INSPECTION BEFORE INSTALLATION

All pipe and fittings shall be carefully examined for cracks and other defects while suspended and before installation. Spigot ends shall be examined with particular care as this area is the most vulnerable to damage from handling. Defective pipe or fittings shall be laid aside for inspection by the District, which will accept proposed corrective repairs or rejection.

3.6 LOWERING OF PIPE MATERIAL INTO TRENCH

Proper implements, tools, and equipment, satisfactory to the District, shall be provided and used by the Contractor for the safe and convenient performance of the work. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench piece by piece in such a manner as to prevent damage to the water main materials and protective coatings and linings. Under no circumstances shall water main materials be dropped or dumped into the trench.

If damage occurs to any pipe, fittings, valves, hydrants, or water main accessories in handling, the damage shall be immediately brought to the District's attention.

3.7 LAYING OF PIPE

Pipe shall be laid in trenches to the line and grade indicated on the plans. Generally, the pipe is laid with the bell end facing the direction of pipe laying, except on steep grades.

Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe-laying crew cannot install the pipe into the trench without getting earth into it, the District's Inspector may require a heavy, tightly woven canvas bag of suitable size, or plastic caps, be placed over each end of the pipe prior to installation and left there until the connection is made to the adjacent pipe. During laying operations, no debris, tools, clothing, or other material shall be placed in the pipe.

As each length of pipe is placed in the trench, the spigot end shall be centered in the bell or coupling, and the pipe forced home and brought to correct line and grade. The pipe shall be secured in place with approved backfill material tamped under it, except at the bells or couplings. Precautions shall be taken to prevent dirt from entering the joint space.

Joints shall be assembled in accordance with the manufacturer's instructions. Each joint shall be checked with a feeler gauge to assure proper seating of the gasket.

3.8 CUTTING OF PIPE

Pipe that has been marked For Field Cut shall be used. If the pipe is not marked for field cutting, then the diameter of the pipe should be checked prior to cutting. Field cuts and connections shall be in accordance with the pipe manufacturer's published instructions.

The cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe to leave a smooth end at right angles to the axis of the pipe.

3.9 ALLOWABLE DEFLECTION

The maximum allowable angular deflection at the joints shall be 80% of manufacturer's recommendation for push-on and mechanical joints.

3.10 FITTINGS

Fittings shall be installed in the manner specified herein.

3.11 ANCHORAGE FOR FITTINGS

All fittings, unless specified in the plans, shall be provided with a thrust block constructed against undisturbed soil as shown on the Section 7 – Standard Drawings.

3.12 THRUST BLOCKS

Thrust blocks shall be constructed of Class B concrete. Care shall be taken not to obstruct the outlets of tees or crosses, which are intended for future connections. A waterproof paper or plastic bond-breaker shall be placed between plugs and caps and the concrete thrust block to facilitate their removal in the future. Thrust blocks shall be poured against undisturbed earth and shall have at least the minimum dimensions shown in the details on the Section 7 – Standard Drawings.

3.13 PAINTING AND COATING

The Contractor shall coat fittings per Section 09900 and then wrap buried fittings with polyethylene wrap.

3.14 POLYETHYLENE ENCASEMENT

The polyethylene encasement shall prevent contact between the pipe and the surrounding backfill and bedding materials but is not intended to be a completely airtight or watertight enclosure. Installation of polyethylene encasement shall be in accordance with the Section 7 – Standard Drawings and ANSI/AWWA C-105, Method A.

All lumps of clay, mud, cinders, etc. on the pipe surface shall be removed prior to installation of the polyethylene encasement. During installation, care shall be exercised to prevent soil or embedment material from becoming trapped between the pipe and the polyethylene.

For installations below the water table, both ends of the polyethylene tube shall be sealed as thoroughly as possible with adhesive tape at the joint overlap.

3.15 TESTING AND DISINFECTION

Testing and disinfection shall be performed on all pipelines, in accordance with Section 02660.

***** END OF SECTION 02615 *****

SECTION 02622
POLYVINYL CHLORIDE (PVC) PIPE (PRESSURE)

PART 1 – GENERAL

1.1 REQUIREMENTS

This specification governs the furnishing and installation of Polyvinyl Chloride Pressure Pipe (PVC) for main pipelines. All incidentals and appurtenant operations necessary for the construction of pipelines shall be accomplished in strict accordance with the drawings and other terms and conditions of the contract. Pipe and fittings shall comply with ANSI/AWWA standards.

All material and products used in a drinking water system that may come in contact with drinking water shall be certified as meeting the specifications of NSF/ANSI 61.

The Contractor shall also furnish all equipment, tools, labor, and materials required to relocate sewers, conduits, ducts, pipes, or other structures as may be necessary to complete the installation as shown and specified.

All standard specifications, i.e., ANSI/AWWA, ASTM, etc., made a portion of these specifications by reference shall be the latest edition and revision thereof.

The Contractor shall be responsible for all material furnished by it, and shall replace at its own expense, all material found defective in manufacture or damaged in handling after delivery by the manufacturer. This shall include the furnishings of all material and labor required to replace defective material discovered prior to final acceptance of the work.

The Contractor shall be responsible for the safe storage of material until it has been incorporated into the completed project. The interior of all pipe and fittings shall be kept free from dirt and foreign matter at all times.

Pipe surfaces shall be free from nicks, scratches, and other blemishes. The joining surfaces of pipe spigots and bell sockets shall be free from gouges or other imperfections that might cause leakage.

1.2 STORAGE AND CARE

The Contractor shall be responsible for the safe storage of material until it has been incorporated into the completed project. The interior of all pipe and fittings shall be kept free from dirt and foreign matter at all times.

Pipe shall be stored at the job site in unit packages provided by the manufacturer. Caution shall be exercised to avoid compression, damage, or deformation to bell ends of the pipe. If pipe is to be exposed to direct sunlight for more than fourteen (14) days, pipe must be covered with an opaque material while permitting adequate air circulation above and around the pipe to prevent excessive heat accumulation. Gaskets shall be protected from

excessive exposure to heat, direct sunlight, ozone, oil, and grease.

1.3 SUBMITTALS

Submittals shall be provided for the following items plus all additional items required in the specifications for the particular type of pipe:

- A. Thrust Restraint system calculations
- B. Specialties

PART 2 – PRODUCTS

2.1 FITTINGS

Fittings for pressure-rated PVC shall be ductile iron as specified in Section 02615. Upon approval, PVC couplings can be used for pipeline deflections.

2.2 POLYVINYL CHLORIDE PIPE (PVC)

PVC pipe and assembly appurtenances shall be supplied from the manufacturers as listed on the Section 6 – Approved Materials List with the following options:

2.3 PRESSURE CLASS

Where the class is not indicated on the plans, the pipe shall be Class 305, DR 14.

2.4 LAYING LENGTH

Standard length of 20 feet.

2.5 COLOR

Water pipe is to be BLUE, sewer pipe GREEN. Where the pipe color cannot be supplied, a plastic sleeve of the appropriate color shall be provided as approved by the District.

2.6 PVC COUPLINGS

Where couplings are used, they shall meet the requirements of AWWA C-900 and be the same pressure rating as the pipe. Couplings shall be twin gasketed, high deflection type. Couplings shall be marked with the same information as the pipe.

2.7 THRUST RESTRAINT SYSTEMS

Thrust restraint systems and mechanisms shall be designed and installed for use with PVC pipe.

PART 3 – EXECUTION

3.1 HANDLING AND TRANSPORTATION

Handling and transportation of pipe shall be in accordance with the pipe manufacturer's published instructions.

Heavy canvas or nylon slings of suitable strength shall be used for lifting and supporting materials. Chains or cables shall not be used.

Pipe and fittings shall not be stored on surfaces that might damage the pipe.

3.2 RUBBER GASKET STORAGE

All rubber gaskets shall be stored in a cool, well-ventilated place and should not be exposed to the direct rays of the sun. Gaskets shall not be allowed in contact with oils, fuels, petroleum, or solvents.

3.3 PIPE LAYING

Pipe shall be laid in accordance with the pipe manufacturer's published instructions, Section 7 – Standard Drawings, and ANSI/AWWA C605, as complimented and modified herein.

3.4 CLEANLINESS

The interior of pipes shall be clean of foreign materials before sections of pipe are installed and shall be protected to prevent entry of foreign materials after installation.

Open ends of installed pipe shall be sealed with watertight plugs or other approved means at times when pipe installation is not in progress. Ground water shall not be allowed to enter the pipe.

3.5 INSPECTION BEFORE INSTALLATION

All pipe and fittings shall be carefully examined for cracks and other defects while suspended and before installation. Spigot ends shall be examined with particular care as this area is the most vulnerable to damage from handling. Defective pipe or fittings shall be laid aside for inspection by the District, which will accept proposed corrective repairs or rejection.

3.6 LOWERING OF PIPE MATERIAL INTO TRENCH

Proper implements, tools, and equipment, satisfactory to the District, shall be provided and used by the Contractor for the safe and convenient performance of the work. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench piece by piece in such a manner as to prevent damage to the water main. Under no circumstances shall water main materials be dropped or dumped into the trench.

If damage occurs to any pipe, fittings, valves, hydrants, or water main accessories in handling, the damage shall be immediately brought to the District's attention.

3.7 LAYING OF PIPE

Pipe shall be laid in trenches to the line and grade indicated on the plans. Generally, the pipe is laid with the bell end facing the direction of pipe laying, except on steep grades.

Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe-laying crew cannot install the pipe into the trench without getting earth into it, the District's Inspector may require a heavy, tightly woven canvas bag of suitable size, or plastic caps, be placed over each end of the pipe prior to installation and left there until the connection is made to the adjacent pipe. During laying operations, no debris, tools, clothing, or other material shall be placed in the pipe.

As each length of pipe is placed in the trench, the pipe is to be assembled in accordance with the manufacturer's instructions. The spigot end shall be centered in the bell or coupling, and the pipe inserted to the pre-marked insertion line. The pipe shall be secured in place with approved backfill material tamped under it, except at the bells or couplings. Precautions shall be taken to prevent dirt from entering the joint space.

3.8 CUTTING OF PIPE

Field cuts and connections shall be made in accordance with the pipe manufacturer's published instructions. Field cut spigot ends shall be beveled and marked to match the manufacturer's insertion line.

The cutting of pipe for inserting valves, fittings, or closure pieces, shall be done in a neat and workmanlike manner without damage to the pipe so as to leave a smooth end at right angles to the axis of the pipe.

3.9 ALLOWABLE DEFLECTION

No deflection shall be allowed at the joints. The maximum allowable angular deflection at twin-gasketed couplings shall be 5°. The pipe shall not be bent to a lesser radius than the minimum shown below:

| Size, Inches | Minimum Radius of curvature, Ft. |
|--------------|----------------------------------|
| 4 | 130 |
| 6 | 180 |
| 8 | 240 |
| 10+ | Fittings required |

3.10 FITTINGS

Pipe ends are square cut with no bevels. The pipe insertion depth is to be per the fitting manufacturer's instructions. Fittings shall be wrapped in polyethylene.

3.11 TRACER WIRE

Locating wire shall be installed as indicated on the Section 7 – Standard Drawings.

3.12 WARNING TAPE

Warning tape shall be placed on top of pipe zone backfill centered over pipe as shown on the Section 7 – Standard Drawings.

3.13 TESTING AND DISINFECTION

Testing and disinfection shall be performed on all pipelines in accordance with Section 02660.

***** END OF SECTION 02622 *****

SECTION 02623
POLYVINYL CHLORIDE (PVC) PIPE (NON-PRESSURE)

PART 1 – GENERAL

1.1 REQUIREMENTS

This section of the specifications will govern the furnishing and installation of PVC pipe material and fittings for main line sewers. All incidentals and appurtenant operations necessary for the construction of pipelines shall be done in strict accordance with the drawings and other terms and conditions of the contract.

The Contractor shall also furnish all equipment, tools, labor, and materials required to rearrange sewers, conduits, ducts, pipes, or other structures as may be necessary to provide installation as shown and specified.

All standard specifications, i.e., ASTM, etc., made a portion of these specifications by reference shall be the latest edition and revision thereof.

The Contractor shall be responsible for all material furnished by it and shall replace it at its own expense should the material be defective in manufacture or damaged in handling after delivery by the manufacturer. This shall include the furnishing of all material and labor required to replace defective material discovered prior to final acceptance of the work.

The Contractor shall be responsible for the safe storage of material until it has been incorporated into the completed project. The interior of all pipe and fittings shall be kept free from dirt and foreign matter at all times.

The joining surfaces of pipe spigots and of integral bell sockets shall be free from gouges or other imperfections that might cause leakage.

1.2 STORAGE AND CARE

The Contractor shall be responsible for the safe storage of material furnished by or to it and accepted by it, and intended for the work, until it has been incorporated in the completed project. The interior of all pipe and fittings shall be kept free from dirt and foreign matter at all times.

Pipe shall be stored at the job site in unit packages provided by the manufacturer. Caution shall be exercised to avoid compression, damage, or deformation to bell ends of the pipe. If pipe is to be exposed to direct sunlight for more than fourteen (14) days, pipe must be covered with an opaque material while permitting adequate air circulation above and around the pipe to prevent excessive heat accumulation.

Gaskets shall be protected from excessive exposure to heat, direct sunlight, ozone, oil, and grease. Solvent cement, when used, shall be stored in tightly sealed containers away from

excessive heat.

1.3 SUBMITTALS

Submittals shall be provided for the following items plus all additional items required in the specifications for the particular type of pipe:

- A. Specialties

PART 2 – PRODUCTS

2.1 POLYVINYL CHLORIDE PIPE (PVC) AND FITTINGS

PVC pipe and fittings shall be made in accordance with ASTM D-3034, ASTM F789, or ASTM F679 (18” to 27”) in physical, dimensional, and chemical requirements.

2.2.1 MARKINGS

- A. Each standard length of pipe and fitting shall be clearly marked with the following:
- B. Manufacturer's name
- C. Nominal pipe size, i.e., 6 inches
- D. Cell classification or material code; i.e., 12454-B
- E. Dimension ratio; i.e., SDR35
- F. Product type; i.e., Type PSM
- G. Standard specification designation, i.e., ASTM D 3034 production code

2.3 WALL THICKNESS

Pipe shall match the SDR as shown on the plans.

2.4 LAYING LENGTH

The standard laying length shall be 20 feet.

2.5 JOINT TYPE

Pipe joints shall be constructed with an integral bell and spigot with an elastomeric gasket push-on-type joint in conformance with ASTM F 477 and ASTM D 3212. Each spigot shall have a reference mark to indicate the insertion stop position. The gasket shall be factory installed. Pipe lubricants are to be supplied by the pipe manufacturer.

Solvent cement joints are strictly prohibited.

2.6 FITTINGS

All fittings shall be as manufactured and furnished by the pipe supplier or approved equal and have bell and/or spigot configurations compatible with the pipe.

PART 3 – EXECUTION

3.1 HANDLING AND TRANSPORTATION

Handling and transportation of pipe and appurtenances shall be in accordance with the pipe manufacturer's published instructions.

Heavy canvas or nylon slings of suitable strength shall be used for lifting and supporting materials. Chains or cables shall not be used.

Pipe and fittings shall not be stored on surfaces which might damage the pipe.

3.2 PIPE LAYING

A. General. Pipe shall be laid in accordance with the pipe manufacturer's published instructions, as complimented and modified herein.

B. Cleanliness. The interior of pipes shall be clean of foreign materials before sections of pipe are installed and shall be protected to prevent entry of foreign materials after installation.

Open ends of installed pipe shall be sealed with watertight plugs or other approved means at times when pipe installation is not in progress. Groundwater shall not be allowed to enter the pipe.

C. Inspection before Installation. All pipe and fittings shall be carefully examined for cracks and other defects while suspended and before installation. Spigot ends shall be examined with particular care as this area is the most vulnerable to damage from handling. Defective pipe or fittings shall be laid aside for inspection by the District, which will prescribe corrective repairs or rejection.

D. Lowering of Pipe Material into Trench. Proper implements, tools, and equipment, satisfactory to the District, shall be provided and used by the Contractor for the safe and convenient performance of the work. All pipe shall be carefully lowered into the trench piece by piece in such a manner as to prevent damage to the materials. Under no circumstances shall the pipe be dropped or dumped into the trench.

If damage occurs to any pipe or accessories in handling, the damage shall be immediately brought to the District's attention.

- E. Pipe Assembly. Pipe laying shall proceed upgrade with spigot ends pointing in the direction of flow. The assembly of the joint shall be made in accordance with the instructions of the manufacturer of the pipe.

Pipes which are stubbed off for manhole construction or for connection by others shall be plugged or closed off with temporary plugs as specified in the manhole specifications.

The Contractor shall take all precautions necessary to prevent the "uplift" or floating of the line prior to the completion of the backfilling operation.

Pipe to be connected to manholes or concrete structures shall be in accordance to the Section 7 – Standard Drawings.

- F. Cutting of Pipe. Field cuts and connections shall be in accordance with the pipe manufacturer's published instructions.

The pipe shall be marked around its entire circumference prior to cutting to assure a square cut. A factory-finished beveled end shall be used as a guide for proper bevel angle and depth of bevel plus the distance to the insertion reference mark. The end shall be beveled using manufacturer recommendations. Sharp edges on the leading edge of the bevel shall be rounded off with a pocketknife or a file.

3.3 TRACER WIRE

Tracer wire shall be installed as indicated on the Section 7 – Standard Drawings.

3.4 WARNING TAPE

Warning tape shall be placed on top of pipe zone backfill centered over pipe as shown on the Section 7 – Standard Drawings.

3.5 TESTING AND DISINFECTION

Testing and disinfection shall be performed on all pipelines in accordance with Section 02660.

***** END OF SECTION 02623*****

SECTION 02640 GATE VALVES

PART 1 – GENERAL

1.1 REQUIREMENTS

This specification governs materials and installation of gate valves inches thru 12-inches. Valves shall be furnished and installed by the Contractor at the locations shown on the approved plans, or as required by the District.

1.2 SUBMITTALS

Special features not listed in the Section 6 – Approved Materials List, which are called out on the plans or project specifications shall be submitted for approval.

PART 2 – PRODUCTS

2.1 GATE VALVES

Gate valves shall be selected from the Section 6 – Approved Materials List

2.2 JOINT TYPE

Flanged, mechanical, and push-on joints are acceptable. Threaded connections are only to be used for above-ground applications only.

PART 3 – EXECUTION

3.1 STORAGE

Valves shall be delivered and stored in the field with the port openings covered with plastic, cardboard, or wood. These covers shall remain in place until the valve is ready to be installed. Valves shall not be stored in contact with bare ground. Valves shall not be stacked on top of one another.

3.2 INSTALLATION

Valves shall be installed in accordance with the manufacturer's instructions and to the Section 7 – Standard Drawings.

3.3 POLYETHYLENE ENCASEMENT

Valves and all bolted connections shall be encased with polyethylene plastic film wrap.

3.4 OPERATION

Immediately before installation, each valve shall be operated through one complete open-close cycle and visually checked for proper operation. Installation of valve boxes shall begin immediately after pipe sections containing the valve have been installed. All valve boxes, paving rings, and lids shall be brought to grade after pavement has been constructed.

***** END OF SECTION 02640 *****

**SECTION 02642
TAPPING VALVES AND SLEEVES**

PART 1 – GENERAL

1.1 REQUIREMENTS

This Section governs materials and installation of tapping valves and sleeves. Valve and sleeve shall be considered one unit to be furnished and installed by the Contractor.

1.2 SUBMITTALS

Provide the design data if different than the minimum requirements of the Section 6 – Approved Materials List and the manufacturer’s installation instructions.

PART 2 – PRODUCTS

2.1 TAPPING VALVES

Tapping valves shall meet all requirements for gate valves in Section 02640. Valves shall be furnished with a flanged end with centering ring on the tapping sleeve side. The outlet side of valve shall have a mechanical joint, except as otherwise approved. Seat rings shall be oversized to permit the use of full-size cutters.

2.2 TAPPING SLEEVES

As specified in the Section 6 – Approved Materials List

PART 3 – EXECUTION

3.1 INSTALLATION

Surface preparation, sleeve placement, and connection of valve shall be in accordance with manufacturer’s recommendations. Method of installation may vary, depending on type of pipe being tapped.

3.2 TESTING

Valve and sleeve shall be hydrostatically tested prior to pipe cutting. Valve and sleeve shall sustain pressure of 1.25 times the flange rating for 5 minutes.

3.3 TAPPING

Tapping shall only be done in the presence of the District’s Inspector. The tapping mechanism shall be of the self-purging type so that cutting chips are removed from the tapping machine and do not enter the pipeline. Tapping equipment is to be supported so

that its weight is not supported by the sleeve.

3.4 SIZE

The diameter of the tap shall be less than the diameter of the main being tapped.

***** END OF SECTION 02642 *****

SECTION 02643
AIR AND VACUUM VALVE ASSEMBLIES (WATER)

PART 1 – GENERAL

1.1 REQUIREMENTS

This specification governs materials and installation for air release, air, and vacuum, or combination air-vacuum and air-release valve assemblies. The type of air valve to be installed shall be as indicated on the plans. Valve assemblies include all items from the main pipeline to the valve vent as shown on the Section 7 – Standard Drawings.

1.2 SUBMITTALS

Supplier(s) statement that certifies that all materials conform to Section 6 – Approved Materials List.

PART 2 – PRODUCTS

2.1 AIR AND VACUUM VALVES

Shall be as listed in Section 6 – Approved Materials List and as shown on the Section 7 – Standard Drawings.

PART 3 – EXECUTION

3.1 INSTALLATION

The tap for the air valves shall be made in a level section of pipe no closer than 18-inches to a bell, coupling, joint, or fitting.

Tapping mains shall conform to the standard procedures for house services.

Air valve assemblies shall be installed in accordance with the Section 7 – Standard Drawings and manufacturer's instructions.

Threaded joints shall be cleaned by wire brushing or swabbing. Teflon joint compound or Teflon tape shall be applied to pipe threads before installing threaded valves. Joints shall be watertight.

Dielectric connections with PVC tape wrap shall be provided at all connections between steel or iron and brass or bronze. Copper, brass, and other nonferrous metal pipe shall be isolated from steel or cast iron by insulated couplings or unions.

The Contractor shall also isolate nonferrous pipe from steel supports and pipe straps by

means of insulating sleeves or tape wrapped around the pipe.

3.2 TESTING

Air valve assemblies shall be tested at the same time that the connecting pipelines are pressure tested.

***** END OF SECTION 02643 *****

**SECTION 02644
FIRE HYDRANT ASSEMBLIES**

PART 1 – GENERAL

1.1 REQUIREMENTS

This Section governs materials and installation for fire hydrant assemblies. Fire hydrant assembly includes all items from the main line tee to the fire hydrant as shown in the Section 7 – Standard Drawings.

1.2 SUBMITTALS

Supplier(s) statement that all materials are in accordance with Section 6 – Approved Materials List.

PART 2 – PRODUCTS

2.1 FIRE HYDRANT ASSEMBLIES

Hydrant, valves, fittings, and materials as shown on the Section 7 – Standard Drawings shall be as listed in Section 6 – Approved Materials List.

PART 3 – EXECUTION

3.1 EXAMINATION OF MATERIAL

Prior to installation, all hydrants shall be inspected for direction of opening, nozzle threading, operating-nut, and cap-nut dimensions, tightness of pressure-containing bolting, cleanliness of inlet elbow, handling damage, and cracks. Defective hydrants shall be corrected or held for inspection by the District.

3.2 PLACEMENT OF HYDRANT

All hydrants shall stand plumb and shall have their nozzles parallel with or at right angles to the curb, with pumper nozzle facing the curb.

3.3 ASSEMBLY INSTALLATION

Assemble the hydrant in accordance with the manufacturer's instruction and with the following:

- A. The shoe of the fire hydrant bury must be anchored on a concrete thrust block.
- B. The fire hydrant shall be positioned so that the bolts between the extension piece and the hydrant are accessible, both top and bottom, within the limits

shown on the Section 7 – Standard Drawings. If the hydrant is either too low or too high, it shall be corrected.

- C. All underground iron fittings shall be wrapped with polyethylene.

3.4 TESTING

Hydrants are to be tested at the same time with the main. Dry- barrel hydrants shall have the drain valves tested in the following manner:

Following the pressure test, open fire hydrant valve a few turns and allow hydrant to fill until water is at bottom of nozzle.

Close hydrant valve and observe water level drop. If water level drop is not detectable, the hydrant has failed the drainage test.

If the hydrant fails the drainage test, the drain valve may be clogged or backfill material does not permit free drainage. The Contractor shall make the necessary corrections and repairs to correct improper drainage.

***** END OF SECTION 02644 *****

**SECTION 02645
WATER SERVICE LINES AND APPURTENANCES**

PART 1 – GENERAL

1.1 REQUIREMENTS

This section governs materials and installation of the water service line from the main line to and including the meter box.

1.2 SUBMITTALS

The Supplier is to certify that the material furnished complies with the Section 6 – Approved Materials List.

PART 2 – PRODUCTS

2.1 SERVICE LINE MATERIALS AND FITTINGS

Service line materials and fittings include service line pipe, service saddles, service fittings, meter stops, corporation stops, curb stops, and ball valves. All items are to be furnished as shown in Section 6 – Approved Materials List and delivered with the required markings.

All brass products that will be in contact with potable water are to comply with State of California AB 1953 “no-lead” requirements and ANSI/NSF 61.

PART 3 – EXECUTION

3.1 POLYETHYLENE TUBING

Tubing and fittings should be stored in a way that prevents damage due to crushing or piercing, excessive heat, harmful chemicals, or exposure to sunlight for prolonged periods. The manufacturer's recommendations regarding storage should be followed.

Handling operations and trench installation and backfill shall be performed with reasonable care to prevent scratches, nicks, and gouges in the tubing.

Tubing excessively cut or kinked shall not be used.

Bends in PE tubing shall not occur closer than 10 diameters from any fitting or valve. The minimum radius of curvature is 30 diameters or the coil radius when bending with the coil. Bending of coiled tubing against the coil shall not go beyond straight. Polyethylene tubing that becomes kinked during handling or installation shall not be used, and care should be taken to ensure that kinking does not develop after installation. Service line from the main line tap to the angle meter stop shall be one continuous length of tubing.

PE tubing shall be installed in trench bottoms with 6 inches of bedding material to provide continuous and uniform support. The initial backfill shall be 6 inches above the tubing and shall be free from rock, stones, and debris.

3.2 SERVICE SADDLES

The service saddle shall be no closer than 18 inches to a valve, coupling, joint, or fitting, unless it is at the end of the main.

The surface of the pipe shall be free of all loose material and have a hard, clean surface before placing the service saddle.

The service saddle shall be tightened firmly to ensure a tight seal; however, care shall be used to prevent damage or distortion of either the pipe, corporation stop, or service saddle by over-tightening.

The drilling of the pipe shall be performed in accordance with the manufacturer's instructions.

3.3 FITTINGS, ANGLE METER STOPS, AND BOXES

Installation of fittings, meter stops, and boxes shall be as recommended by the manufacturer. Pipe or fittings made of nonferrous metals (bronze) shall be isolated from ferrous metals with insulating unions or couplings as directed by the District.

3.4 HYDROSTATIC TESTING

The Contractor shall hydrostatically test all service appurtenances at the same time of the main line.

***** END OF SECTION 02645 *****

SECTION 02660
TESTING AND DISINFECTING OF WATER MAINS

PART 1 – GENERAL

1.1 REQUIREMENTS

All completed waterlines, as well as the service assemblies and appurtenant structures, will be pressure tested and disinfected by the Contractor in the Inspector's presence prior to field acceptance of the work. The pressure test is to be performed prior to disinfection of the pipeline, unless the District approves concurrent pressure testing and disinfection.

The Contractor shall furnish all pipe and fittings for connection to the main, pumps, pressure regulator, a calibrated water storage tank, disinfectant, and all other materials; fittings and pipelines required to perform the tests and make the necessary repairs.

When lines to be tested are in areas that will be paved, testing shall be done after the rock subgrade is placed and compacted. No lines shall be accepted as passing until all underground construction that may disturb the waterline is compacted.

The pressure test and the test for allowable leakage shall be performed simultaneously. Testing shall not commence until the water main, and all appurtenances have been completely installed and all concrete thrust blocks have cured. The Contractor may, at any time and at his expense, perform his own pressure and leak test; however, these tests will in no way offset the requirement for a final pressure, leak test, and disinfection.

Disinfection shall be in accordance with ANSI/AWWA C651 with additional requirements as described in this section.

After having been successfully tested and disinfected, the water main may be connected to the District's water system.

Water mains under construction that become flooded by storm water or groundwater shall be flushed with potable water until clear water is evident.

1.2 SUBMITTALS

The Contractor shall notify the District a minimum of seven (7) business days in advance of its proposed testing schedule for review and concurrence. If requested, the Contractor's proposed plans for water conveyance, disinfection, control, and disposal, shall also be submitted in writing.

PART 2 – PRODUCTS

2.1 GENERAL

All test equipment, chemicals for chlorination, temporary valves, bulkheads, or other water control equipment and materials shall be determined and furnished by the Contractor, subject to the District's review. No materials shall be used which would be injurious to the construction or its future function.

2.2 HYDROSTATIC TESTING EQUIPMENT

The Contractor shall be responsible for supplying and operating all testing equipment. The District may furnish a test gauge at its option. Temporary piping connecting to an existing main for water supply shall be configured as shown in the Section 7 – Standard Drawings.

2.3 CHLORINE

Chlorine for disinfection shall be in the form of sodium hypochlorite solution complying with ANSI/AWWA B300. Both disinfectants are to comply with NSF/ANSI 60.

PART 3 – EXECUTION

3.1 GENERAL

The Contractor shall correct all defects in workmanship or materials, which become evident by inspection or testing at any time during the work.

In the presence of the District, all pressure pipelines shall be tested and all potable water components shall be disinfected.

Disinfection operations shall be scheduled by the Contractor as late as possible during the contract time period so as to assure the maximum degree of sterility of the facilities before the District accepts the Work. The District shall perform bacteriological testing.

Release of water from pipelines, after testing and disinfecting have been completed, shall be in accordance with a written disposal plan reviewed by the District.

3.2 HYDROSTATIC TESTING

Only potable water shall be used for testing. The purpose of the hydrostatic test is both to test the ability of the pipeline to withstand pressure and test for allowable leakage. These tests shall run simultaneously. All valves and appurtenances shall be operated during the test period. Thrust blocks shall have been in place for at least thirty-six (36) hours if high-early-strength cement was used or at least seven (7) days if standard cement was utilized.

3.3 PREPARATION

Prior to testing, the water main shall be slowly and carefully filled with water at the low end of the section being tested. All air shall be expelled slowly from the pipe and appurtenances in a manner so as not to create excessive surge pressures. The release of air can be accomplished by opening services, fire hydrants, blow-offs, and air release

valves. Where air valves or other suitable outlets are not available for releasing air before applying the test, approved taps and fittings shall be installed and later securely plugged.

All appurtenances shall be left on during the testing procedure. The valve controlling the admission of water into the section of pipe to be tested should be opened wide before shutting the hydrants or blow-offs. After the system has been filled with water and all air expelled, all the valves controlling the section to be tested shall be closed; and the line shall remain in this condition under a slight pressure for a period of not less than twenty-four (24) hours.

The Contractor may, at its own risk, test against existing valves. Suspected leaking of these valves will not be accepted as a reason for having not passed the leakage test requirements. These valves shall either be repaired or replaced prior to the start of another testing sequence. All new valves shall be tested against a reduced pressure side. Butterfly valves shall be tested in both directions.

3.4 TEST SECTION LENGTH

The length of pipe being tested at any one time shall not exceed 2,000 feet unless otherwise approved by the District.

3.5 TEST PRESSURE

The test pressure shall be 150 psi or 50 psi greater than design pressure of the system, whichever is greater, measured at the lowest point of the section of the pressure zone being tested.

Test pressure shall be maintained throughout the period of test. Measurement of the amount of additional water pumped in during test provides a measurement of the amount of leakage, if any.

3.6 TEST DURATION

The test duration shall be two (2) hours. Pressure in the water main shall be maintained within 2 psi of the calculated test pressure for the full two-hour duration. The individual testing of the valves may be of a shorter duration as approved by the District.

3.7 REPAIRS

During the pressure and leakage test, all accessible appurtenances shall be inspected for visual signs of leakage. All visual leaks shall be corrected immediately, regardless of the amount of leakage and the test shall be run again for its full duration. All leaks detected shall be repaired to a watertight condition. All repairs made shall be retested in accordance with the specifications. All repairs shall be made, and a successful test accomplished prior to taking bacteriological samples.

3.8 DISINFECTING

After completion of pressure testing, the Contractor shall disinfect all water mains, services, and appurtenances. Disinfection shall be accomplished in accordance with the latest revision of AWWA C651.

Chlorination and dichlorination shall be performed by competent individuals knowledgeable and experienced in the operation and safety of disinfecting procedures with the applicable Federal, State, and local laws and regulations. Transporting, storage, and handling of these materials shall be performed in accordance with Federal and State Hazardous Materials Regulations.

The basic disinfection procedure consists of:

- A. Preventing contaminating materials from entering the water main during storage, construction, or repair.
- B. Chlorinating any residual contamination that may remain and flushing the chlorinated water from the main.
- C. Protecting the existing distribution system from backflow due to hydrostatic pressure test and disinfecting procedures.
- D. Determining the bacteriological quality by laboratory test after disinfecting.
- E. Final connection of the approved new water main to the active distribution system.

3.9 SODIUM HYPOCHLORITE SOLUTION

Sodium hypochlorite can be used for swabbing as well as pipeline disinfecting. The solution shall be injected using a chemical feed pump designed for chlorine solutions. A backflow prevention device shall be installed at the point of connection to the potable water source. The District shall approve the point(s) of injection.

3.10 FILLING AND CONTACT

The main shall be filled at a rate no greater than one (1) foot with an initial chlorine concentration high enough to maintain a constant minimum residual concentration of 25 ppm throughout the system for a duration of at least twenty-four (24) hours. During this time, valves, hydrants, blowoffs, air valves, and other appurtenances shall be operated and flushed to move the chlorinated water throughout the system to ensure disinfection.

3.11 FINAL FLUSHING

After the applicable retention period, heavily chlorinated water should not remain in prolonged contact with pipe. In order to prevent damage to the pipe lining or corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed and dechlorinated from the main until chlorine measurements match the existing system chlorine levels.

Chemicals used for dichlorination shall be as listed in Appendix C of AWWA C651.

Contractor shall submit the method of dichlorination.

3.12 BACTERIOLOGICAL TESTS

After completion of testing and sterilization, and before the new water main is connected to the distribution system, the Contractor/Developer will take water samples for bacteriological examination through an approved laboratory. Should any of the samples fail to meet minimum State of California, Department of Public Health requirements, the Contractor will continue to chlorinate and flush the system, as directed, until a satisfactory sample is obtained. The Contractor/Developer shall submit a sampling plan for CCWD approval along with sample sites.

After final flushing and after the water has remained in the new main for at least 16 hours, two consecutive sets of acceptable samples, taken at least twenty-four (24) hours apart, shall be collected from the new main. At least one set of samples shall be collected from every 1,200 feet of the new water main, plus one (1) set from the end of the line, and at least one (1) set from each branch. . Bacteriological testing shall be per CCWD Standards and AWWA C651, Section 5.1, whichever is more stringent, and shall be completed by the Contractor/Developer with CCWD approval. A standard heterotrophic plate count may be required, at the option of District.

If trench water has entered the new main during construction or if, in the opinion of District, excessive quantities of dirt or debris have entered the new main, bacteriological samples shall be taken at intervals of approximately two hundred (200) feet and shall be identified by location. Samples shall be taken of water that has stood in the new main for at least sixteen (16) hours after final flushing has been completed.

3.13 RE-DISINFECTION

If the initial disinfection fails to produce satisfactory bacteriological samples, the main shall be flushed again and shall be resampled. If check samples show the presence of coliform organisms, then the main shall be re-chlorinated until satisfactory results are obtained.

NOTE: High velocities in the existing system, resulting from flushing the new main, may disturb sediment that has accumulated in the existing mains. When check samples are taken, it is well to also sample water entering the new main.

3.14 DISINFECTING CUT-IN CONNECTIONS

When connecting to an existing water main with a cut-in tee, the trench excavation is to be dewatered during the tie-in work. The interior of the pipe, couplings, fittings, valves, and other components that make up the connection assembly shall be swabbed with a minimum 1% solution of chlorine in accordance with AWWA C650.

3.15 HOT TAPS

Before the tapping sleeve is installed, the exterior surface of the main is to be cleaned and

the interior surface of the tapping sleeve, outlet, and valve shall be swabbed with a minimum 1% solution of chlorine

***** END OF SECTION 02660 *****

**SECTION 02661
WASTEWATER COLLECTION SYSTEM TESTING**

PART 1 – GENERAL

1.1 REQUIREMENTS

This Section governs the testing requirements and procedures for acceptance of all completed sewers, manholes, and force mains. All underground utilities and road work, up to the sub-base, shall be completed and compacted prior to testing.

It is the intent of the plans and specifications that the completed sewer pipes, along with manholes and other appurtenances, are watertight.

Gravity sewer mains, including services, shall be air tested for leakage, be visually inspected by video camera, and measured for deflection by a mandrel. Manholes shall be hydrostatically tested for infiltration. Force mains shall be pressure tested.

All tests shall be made in the presence of the District Inspector. The Contractor is responsible for the safety of all personnel during testing procedures.

Even though a section may have previously passed the leakage test, each section of sewer shall be tested subsequent to the last backfill compacting operation if, in the opinion of the District, heavy compaction equipment or any of the operations of the Contractor or others may have damaged or affected the structural integrity or water tightness of the pipe, structure, and appurtenances.

OFFICIAL DISTRICT TESTING WILL NOT BE PERMITTED UNTIL AFTER ALL OTHER UTILITIES HAVE BEEN INSTALLED AND THEIR TRENCH COMPACTION VERIFIED.

When lines to be tested are in areas that will be paved, testing shall be done after the rock sub-grade is placed and compacted.

1.2 ACCEPTANCE

The sewer will not be considered acceptable until the leakage or infiltration test has passed.

If the leakage or infiltration rate is greater than the amount specified, the pipe joints shall be repaired or, if necessary, the pipe shall be removed and relayed by the Contractor and re-tested.

1.3 SUBMITTALS

The Contractor shall notify the District a minimum of seven (7) business days in advance of its proposed testing schedule for review and concurrence.

PART 2 – PRODUCTS

2.1 GENERAL

All test equipment, valves, plugs, or other control equipment and materials shall be determined and furnished by the Contractor, subject to the District's review. No materials shall be used which would be injurious to the construction or its future function.

2.2 PLUGS

Either mechanical or pneumatic plugs may be used. All plugs shall be designed to resist the testing pressures.

2.3 AIR CONTROL EQUIPMENT

The air control equipment shall include a shut-off valve, pressure regulating valve, pressure relief valve, input pressure gage, and a continuous monitoring pressure gage with a range of 0 psi to at least 10 psi and have an accuracy of 0.4 psi. The pressure gage shall have minimum divisions of 0.10 psi. The District may compare the Contractor's gage with a District-owned gage at any time.

All pressuring equipment shall include a regulator or relief valve set to no higher than 9 psi.

PART 3 – EXECUTION

3.1 MANDREL TEST (DEFLECTION) FOR GRAVITY SEWERS

After completion of the sewer line, the line shall be balled and flushed just prior to pulling the mandrel through. Debris from flushing shall be screened (¼-inch mesh screen) and collected so as not to enter into the existing system.

All sewer lines shall be tested for obstructions with an approved 7.5-percent mandrel and cleaned by balling and flushing. This shall be done with an approved commercial sewer cleaning ball. The ball shall be controlled by a tag line or rope or sewer rods and permitted to move slowly through the sewer.

Any obstructions or irregularities shall be removed or repaired by the Contractor. All testing, cleaning, and repairing shall be done to the satisfaction of the District. The Contractor shall dispose of all waste, including water, at its own expense. The water shall not be allowed to enter existing sanitary sewer systems without prior approval of the District.

3.2 LEAKAGE TEST FOR GRAVITY SEWERS (PVC PIPE)

After laying, backfilling, and compacting, all sewers shall be tested for leakage. The program of testing follows the procedures as outlined in "Uni-Bell PVC Pipe Association

Recommended Practice" UNI-B-6-98. The Contractor shall, at its own expense, correct any excess leakage, and repair any damage to the pipe and its appurtenances or to any structure indicated by or resulting from these tests.

3.3 AIR TEST FOR LEAKAGE

The Contractor shall test all sewers by means of the low-pressure air test specified herein unless otherwise directed by the District. Length of line tested at one time shall be limited to the length between adjacent manholes. House sewers shall be considered part of the lateral to which they are connected.

Air test procedure shall be as follows:

- A. Plug Installation. Plugs shall be placed in the line at each manhole and secured. Brace each plug to the manhole wall to prevent blowouts.
- B. Adjustments for Ground Water Pressure. When the prevailing ground water is above the sewer being tested, air pressure shall be increased 0.43 psi for each foot the water table is above the flow line of the sewer.
- C. Pressure Stabilization. Add air slowly to the portion of the pipe installation under test until the internal air pressure is raised to 4.0 PSIG greater than the average backpressure of any ground water above the pipe invert but never greater than 9 PSIG.

After an internal pressure of 4.0 PSIG is obtained, allow two (2) minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.

When pressure has been stabilized, the air hose shall be shut off; and the pressure shall be decreased to 3.5 PSIG.

- D. Timing Pressure Loss. At a pressure reading of 3.5 PSIG, timing shall commence with a stopwatch. If the time shown in the table below for the designated pipe size and length elapses before a pressure drop, then that section of pipe has passed. If the test did not pass, the leak shall be found and repaired to the satisfaction of the District and the length of repaired line re-tested.

| MINIMUM AIR PRESSURE TIME, minutes | | | |
|------------------------------------|----------------------------|---------|---------|
| Size, inches | Length of Pipe Tested, ft. | | |
| | 0-200 | 201-250 | 251-300 |
| 6 | 2:50 | 2:50 | 2:50 |
| 8 | 3:47 | 3:47 | 3:48 |

| | | | |
|----|------|------|------|
| 10 | 4:43 | 5:00 | 6:00 |
| 12 | 5:40 | 7:10 | 8:30 |

- E Safety Precaution. The air test may be dangerous if, because of lack of understanding or carelessness, a line is improperly prepared.

It is extremely important that the various plugs be installed and braced in such a way as to prevent blowouts. Inasmuch as a force of 250 lb./f. is exerted on an 8-inch plug by an internal pipe pressure of 5 psi, it should be realized that sudden expulsion of a poorly installed plug or of a plug that is partially deflated before the pipe pressure is released can be dangerous.

3.4 MANHOLE TEST

All manholes shall be vacuum tested for leakage after assembly but prior to backfilling, mortaring of joints, application of coatings, and welding of liner seams. The Contractor shall furnish all labor, tools, and equipment necessary to make the tests and to perform any work incidental thereto. The Contractor shall correct any excess leakage and repair any damage to the manhole and its appurtenances at its own expense. The vacuum test shall be as follows:

- A. All lift holes and inside and outside joints shall be plugged with an approved non-shrink grout.
- B. All pipes entering the manhole shall be plugged, taking care to securely brace the plug from being drawn into the manhole.
- C. The test head shall be placed at the inside of the top of the cone section and the seal inflated in accordance with the manufacturer's recommendations.
- D. A vacuum of ten 10-inches of mercury (approximately 5-psig shall be drawn, and the vacuum pump shut off.
- E. With the valves closed, the time shall be measured for the vacuum to drop to 9-inches. The manhole shall pass if the time is greater than:
 - 1. 60 seconds for 48" diameter manholes
 - 2. 5 seconds for 60" diameter manholes
 - 3. 90 seconds for 72" diameter manholes

If the manhole fails the initial test, necessary repairs shall be made with a non- shrink grout while the vacuum is still being drawn. Re-testing shall proceed until a satisfactory test is obtained.

The manhole shall be visually inspected after backfill operations. Should shifting or other

movement occur, the manhole is to be re-tested.

3.5 HOLIDAY TESTING

PVC-lined and coated surfaces shall be holiday tested by certified personnel with an electrical holiday detector with the instrument set at 20,000 volts, or as directed by the District. All imperfections detected by the holiday testing shall be repaired as described by the manufacturer's instructions and re-tested. No holidays are to be detected.

3.6 TELEVISION INSPECTION

The Contractor shall video all sewer collectors and laterals prior to pavement placement in accordance with the following. The inspection must be provided by a third-party vendor having a minimum of five (5) years' experience in TV inspection and by an operator/technician with at least two (2) years' experience.

The complete job is ready for television inspection when the following work has been completed and inspected by the District:

- A. All sewer pipelines are installed, backfilled and compacted.
- B. All manholes are in place and pipelines are accessible from manholes and pressure testing of pipelines and vacuum testing of manholes is completed.
- C. All other underground facilities, utility piping and conduits are installed.
- D. Final street subgrade is complete.
- E. Pipelines to be inspected have been cleaned and flushed for a minimum of 30 minutes.
- F. Air testing and mandriling of sewer lines is complete.

After the above work is complete, the Contractor shall schedule the video inspection. The video test shall be done in the presence of the District Inspector. Water is to flow through the lines for 12 hours prior to the video work. During the video for service, some water must be flowing for camera orientation. The camera shall be a device to measure depths.

Contractor shall prepare and deliver a DVD copy of the video to the District. Should any corrective action be necessary, the District reserves the right to require another test of any repair, and the deficient areas shall be video tested again after the repairs are completed.

Observations from video inspections that will be considered defects and will require correction prior to paving include, but are not limited to:

- A. Low spots (1/4-inch or greater)

- B. Offset pipe, joint separations
- C. Cocked joints
- D. Cracked, “ovalled”, “egged” or otherwise damaged pipe
- E. Infiltration
- F. Debris or other foreign matter
- G. Irregular condition without logical explanation
- H. Standing water in service laterals
- I. Other obvious deficiencies

3.10 REPAIRS

The District shall be notified in writing no fewer than three (3) working days in advance of the date corrections are to begin. All noted defects are to be corrected within three (3) working days of receiving the District Correction Notice. Repairs are to be made with materials and methods acceptable to the District. The District’s Inspector shall inspect the corrective work and complete a Correction Report. Following confirmation by both the Contractor and District Inspector that corrections are complete, a determination will be made if subsequent testing and/or televising will be required.

Prior to acceptance or during the warranty period, should corrections/repairs not be completed to the satisfaction of the District or within the time allotted for corrections, District shall, at its option, undertake the work. The District, at its discretion in evaluating the nature of the noted deficiencies, may require re-video of a portion or the whole of the system following completion of corrective action. Work performed by the District or its selected agent in performing either corrective action or re-video following corrective action will be billed at the current rates in effect at the time the work is completed, to be paid from the performance bond prior to Acceptance, or the warranty bond for the warranty-period inspection.

3.11 SEWER FORCE MAIN TEST

Leakage test for sewer force mains shall follow the procedures set forth in Technical Specification 02660.3.2. All defective elements shall be repaired, or removed and replaced, and then re-tested until all visible leakage has been stopped and the allowable leakage requirements have been met.

***** END OF SECTION 02660 *****

**SECTION 02670
ABANDONMENT OF FACILITIES**

PART 1 – GENERAL

1.1 THE REQUIREMENTS

This section governs abandonment of pipelines, manholes, vaults, valve boxes, services, meter boxes, cleanouts, force mains, and other existing structures. Abandonment of facilities will be in accordance with the Section 7 – Standard Drawings.

1.2 SUBMITTALS

Schedules and method of abandonment shall be submitted to the District for approval.

PART 2 – PRODUCTS

2.1 GENERAL

Concrete, fittings, backfill material, and other material used for abandonment shall comply with the Section 7 – Standard Drawings and Section 6 – Approved Materials List.

PART 3 – EXECUTION

3.1 PIPELINE SYSTEMS

Pipelines are to be abandoned by either plugging or crimping the ends (for 2-inch and smaller pipes) or filling the entire pipeline with pumped flowable cement slurry (for pipes larger than 2-inches). Pipelines to be filled shall be securely closed at all pipe ends by an approved cap or, at manhole entries, by a watertight plug of concrete or brick and cement mortar, not less than 2 feet thick.

3.2 STRUCTURES

Structures, such as manholes and vaults, shall have all openings, inlets, and outlets sealed off; and the structure shall be removed to a point at least three (3) feet below the proposed street grade or ground surface and filled. When structure is within the County right-of-way, all backfill material shall be compacted Class 2 Aggregate Base. Structures not located in County right-of-way may be backfilled with native material as approved by the District and the surface restored to the surrounding conditions. Seeding and erosion control may also be required for the restored areas.

3.3 SERVICES AND CLEANOUTS

Abandon services and appurtenances in accordance with the Section 7 – Standard

Drawings.

3.4 SALVAGE OF MATERIALS

Salvaged castings, such as frames and covers and other appurtenances, unless otherwise specified, shall be delivered to a District facility pre-arranged with the District.

***** END OF SECTION 02670 *****

**SECTION 03300
REINFORCED CONCRETE**

PART 1 – GENERAL

1.1 REQUIREMENTS

This Section specifies the materials, mixing, placement, form work, reinforcement and curing of reinforced concrete.

1.2 SUBMITTALS

Prior to concrete placement, the following shall be submitted:

- A. Supplier's concrete mix data sheet showing contents and proportions of cement, aggregate, water, and any admixtures.
- B. Reinforcing steel schedule.
- C. Delivery tickets, after placement.

PART 2 – PRODUCTS

2.1 CONCRETE

Portland cement concrete shall be as described in Section 6 – Approved Materials List composed of Portland cement, fine aggregate, coarse aggregate, admixtures, if used, and water, proportioned and mixed as specified in the Caltrans Standard Specifications Section 90, "Portland Cement Concrete."

Concrete for each portion of the work shall be of the class as shown on the plans or as indicated below for the type of work performed.

| Caltrans Class | Type of Work |
|----------------|--|
| A | All reinforced structures, manhole bases, piers, vaults. |
| B | Anchors, thrust blocks, encasements, cradles, and miscellaneous unreinforced concrete. |

Rapid setting concrete may be used. Accelerating admixtures may be added to the concrete mix as approved by the District.

2.2 GROUT

Grout for patching, sealing, and repair shall be as listed in Section 6 – Approved Materials List.

2.3 REINFORCING STEEL

Reinforcing steel shall conform Section 6 – Approved Materials List. Reinforcing steel shall be fabricated in accordance with the current edition of the Manual of Standard Practice, published by the Concrete Reinforcing Steel Institute. Reinforcing steel shall be delivered to the site bundled and tagged for identification.

2.4 TIE WIRE

Tie wire shall be 16-gage minimum, black, soft annealed.

2.5 BAR SUPPORTS

Bar supports exposed to view after form stripping shall be galvanized or plastic coated. Concrete supports (blocks) shall be used for reinforcing for concrete placed on grade.

2.6 FORMS

Forms shall be constructed of clean lumber and shall be braced to provide sufficient strength and rigidity to hold the concrete and to withstand the necessary pressure and consolidation without deflection from the prescribed lines.

The surface of forms against which concrete is placed shall be smooth and free from irregularities, dents, sags, or holes. The surface shall leave uniform form marks conforming to the general lines of the structure.

Forms previously used shall be thoroughly cleaned of all dirt, mortar, and foreign matter before being re-used.

PART 3 – EXECUTION

3.1 FORMWORK

The Contractor shall notify the District a minimum of one (1) working day before the intended placement of concrete to enable the District to check the form lines, grades, and other required items before placement of concrete. Unless otherwise indicated on the plans, all exposed sharp concrete edges shall be $\frac{3}{4}$ -inch chamfered.

Before placing concrete, the form surface shall be clean and coated with form oil of high penetrating qualities where applicable.

3.2 REINFORCEMENT PLACEMENT

Reinforcing steel shall be placed in accordance with the current edition of Recommended Practice for Placing Reinforcing Bars, published by the Concrete Reinforcing Steel Institute.

All reinforcing steel shall be of the required sizes and shapes and placed where shown on the drawings.

Reinforcing steel shall not be straightened or re-bent in a manner that will damage the material. The Contractor shall not use bars with bends not shown on the drawings.

All bars shall be free from rust, scale, oil, dried mortar, or any other coating that would reduce or destroy the bond between concrete and steel.

Reinforcement steel shall be positioned in accordance with the drawings and secured by using annealed wire ties or clips at intersections and supported by concrete or metal supports, spacers, or metal hangers. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage. In addition to any shown on the drawings, bars may be found necessary or desirable by the District for the purpose of securing reinforcement in position and shall be provided.

All reinforcing steel and wire mesh shall be completely encased in concrete. Reinforcement shall be placed a minimum of 2 inches clear of any metal pipe or fittings. The reinforcement shall be so secured in position that it will not be displaced during the placement of concrete.

Reinforcing dowels shall be secured in place prior to placing concrete. The Contractor shall not press dowels into the concrete after the concrete has been placed. The minimum lap for all reinforcement shall be 40 bar diameters.

Additional reinforcement shall be placed around the pipe or openings as indicated in the drawings.

3.3 WIRE MESH PLACEMENT

Wire mesh reinforcement is to be rolled flat before being placed in the form. The Contractor shall support and tie wire mesh to prevent movement during concrete placement. Welded wire fabric shall be extended to within 2 inches of the edges of the slab. Splices shall be lapped with at least 1½ courses of the fabric and a minimum of 6 inches. Laps and splices shall be securely tied at ends and at least every 24 inches with tie wire.

The Contractor shall pull the fabric into position as the concrete is placed by means of hooks and then work concrete under the steel to ensure that it is at the proper distance above the bottom of the slab.

3.4 EMBEDDED ITEMS

All embedded bolts, dowels, anchors, pipes, conduits, sleeves, and other such items shall be held correctly in place in the forms before concrete is placed.

Items of aluminum shall not be embedded in concrete.

Pipes and conduits shall not be placed closer than 3 diameters or widths on center.

3.5 CONCRETE PLACEMENT

Prior to placing concrete, all debris (loose tie wire, rocks, wood, etc.) shall be removed and the surfaces are to be dampened which will be in contact with the concrete.

Concrete, either ready mix or batch mixed, shall be placed in the forms before taking its initial set. No concrete shall be placed in water except with approval of the District.

Concrete shall be deposited as nearly as practical in its final position to avoid segregation. Concrete shall not be permitted to fall more than 6 feet.

As the concrete is placed in the forms, or in excavations to be filled with concrete, it shall be thoroughly consolidated and compacted throughout the entire layer by internal vibration and tamping bars. In walls, the lift depth shall be limited to two (2) feet.

Vibration shall not be used to move concrete horizontally. The vibrator shall be inserted vertically such that there is an overlap of the fields of action.

All concrete surfaces upon which or against which the concrete is to be placed, and to which new concrete is to adhere, shall be roughened, thoroughly cleaned, wet or sandblasted to bare aggregate as directed. An approved bonding agent shall be used before the concrete is deposited.

3.6 CONCRETE JOINTS

Location of and type of construction joints shall be as directed by the District Engineer. The surface of all construction joints shall be cleaned, and all laitance removed.

3.7 CONCRETE FINISHING

Immediately upon the removal of forms, all voids shall be neatly filled with mortar. Surfaces of concrete to be permanently exposed to view shall be smooth, free from projections, and thoroughly filled with mortar.

Exposed surfaces of concrete not finished against forms, such as horizontal or sloping surfaces, shall be screeded to a uniform surface and worked with suitable tools to a light broom finish.

3.8 PROTECTION AND CURING OF CONCRETE

The Contractor shall protect all concrete against damage. Exposed surfaces of new concrete shall be protected from the direct rays of the sun and from frost by being kept damp for at least two (2) weeks after the concrete has been placed or by using an approved curing process.

***** END OF SECTION 03300 *****

**SECTION 03405
PRECAST CONCRETE VAULTS**

PART 1 – GENERAL

1.1 REQUIREMENTS

The work covered by this Section shall consist of furnishing all materials, accessories, equipment, tools, transportation, service, labor, and performing all operations to furnish and install the precast concrete vaults in accordance with this section of the specifications and applicable drawings. Excavation and backfill shall be in accordance with Section 02220.

Precast concrete vaults and covers shall be manufactured in a plant especially designed for that purpose and shall conform to the shapes and dimensions indicated on the plans.

1.2 SUBMITTALS

Prior to installation the following is to be submitted:

- A. Manufacturer's catalog data on all precast concrete items.
- B. Dimensions of vault, thickness of walls, and top slab.

1.3 DESIGN LOADS

Design loads shall consist of dead load, live load, impact, and, in addition, loads due to water table and any other loads which may be imposed upon the structure. Live loads shall be for HS20 per AASHTO standard specifications for highway bridges. Design wheel load shall be 16 kips. The live load shall be that which produces the maximum shears and bending moments in the structure. Minimum wall thickness shall be 6 inches.

PART 2 – PRODUCTS

2.1 Concrete – Class A.

Sectional Vaults – Vaults provided in sections are acceptable.

Reinforcement – Reinforcement shall be deformed reinforcement in accordance with ASTM A615 or ASTM A185 for welded wire fabric.

Access Hatch – Access hatch shall be as shown on the Section 7 – Standard Drawings.

2.2 EXTERIOR COATING

All exterior surfaces shall be coated with a minimum 30 mil of bituminous mastic.

PART 3 – EXECUTION

3.1 INSTALLATION

The base of the vault shall be placed on compacted, crushed rock sub-base, graded to level and to the elevation shown on the plans.

Openings or "knockouts" in precast concrete vaults shall be located as shown on the drawings and shall be sized sufficiently to permit passage of the largest dimension of pipe and/or flange. Upon completion of installation, all openings in the vault walls around pipes shall be sealed per the standard wall penetration detail.

All joints between precast concrete vault sections shall be made watertight. The joint sealing compound shall be installed according to the manufacturer's recommendations to provide a watertight joint, which remains impermeable throughout the design life of the structure.

The Contractor is responsible for placing the cover at the proper elevation as shown on the plans and shall make all necessary adjustments so that the cover meets these requirements.

The vault floor shall contain an 18-inch minimum diameter hole for installation of a gravity drain or sump. The vault floor shall be constructed so that there is a positive slope to the sump.

***** END OF SECTION 03405 *****

**SECTION 09900
PAINT AND COATING SYSTEMS**

PART 1 – GENERAL

1.1 REQUIREMENTS

The Section governs materials and application of paint (coating systems) for protection of specified exposed water, recycled water, and wastewater infrastructure, including associated surface preparation, coating application, protection of surfaces not to be coated, cleanup, and appurtenant work.

The term "paint," "coatings," or "finishes" as used herein, shall include surface treatments, emulsions, enamels, paints, epoxy resins, and other protective coatings, whether used as a primer, intermediate coat, or finish coat. The term "DFT" means minimum dry film thickness, without any negative tolerance. DFT means dry film thickness and should be called out in a range of film thickness.

1.2 REFERENCES

The following Occupational Safety and Health Administration (OSHA) regulations, The Society for Protective Coatings, formally the Steel Structures Painting Council, (SSPC), and National Association of Corrosion Engineers International (NACE) standards are incorporated into this Section by reference.

- A. OSHA Part 26 – Safety and Health Regulations for Construction
- B. NACE 6D-173 – Manual for Painter Safety
- C. SSPC PA1 – Paint Application Specification No. 1.
- D. SSPC-PA2 – Paint Application Specification No. 2
- E. SSPC-SP1 – Solvent Cleaning
- F. SSPC-SP2 – Hand Tool Cleaning
- G. SSPC-SP3 – Power Tool Cleaning

1.3 SUBMITTALS

Prior to application of any painting or protective coating system, the following information shall be submitted for review and acceptance by the District:

- A. List of coating system materials, method of application, method of surface preparation, and surface method protect.
- B. Finished coating system color samples as specified below.
- C. Manufacturer's data sheet for each product, including statements on the suitability of the material for the intended use and location of use.

1.4 FINISH COAT COLOR SCHEDULE

Above ground or exposed facilities shall be color coded to differentiate from potable water (except fire hydrants), recycled water, and wastewater facilities as follows:

- A. Potable Water: Blue, Hex Code No. 005F85
- B. Reclaimed Water: Purple, Hex Code No. 833177 or BA9FC9
- C. Wastewater: Green, Hex Code No. 006B46

PART 2 – PRODUCTS

2.2 GENERAL

The Contractor shall verify that the coating materials comply with all Volatile Organic Compound (VOC) limits set forth by the Calaveras County Air Pollution Control District, part of Mountain Counties Air Basin.

Only compatible materials from a single manufacturer shall be used in the work. Particular attention shall be directed to compatibility of primers and finish coats. If necessary, a barrier coat shall be applied between existing prime coat and subsequent field coats to ensure compatibility.

Coating materials shall be sealed in containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, and name of manufacturer, all of which shall be plainly legible at the time of use.

All coatings and pigments to be used on potable water services shall have FDA approval for use with potable water.

2.2 COATING SYSTEMS

- A. Alkyd Primer – All primer shall be lead free and rust-inhibitive, synthetic alkyd based. It shall be designed for use with an alkyd enamel finish coat.
- B. Alkyd Enamel – Enamel shall be a high gloss industrial type, lead free, synthetic alkyd based, intended for use on exterior metal surfaces.
- C. Epoxy Paint – Epoxy shall be a colored polyamide cured epoxy with not less than 49% solids by volume.

PART 3 – EXECUTION

3.1 APPLICATION OF COATING SYSTEM

The requirements for painting and coating ferrous surfaces shall generally conform to the

SSPC (Steel Structures Painting Council) and to the manufacturer's recommendations. Application of the paint or coating system shall not be permitted if, in the opinion of the District, the equipment, climate, or safety conditions do not meet the above recommendations.

The following surfaces shall not be painted and shall be protected during the painting of adjacent areas:

- A. Concrete, asphalt, wood, masonry, rocks and soil.
- B. High density polyethylene piping.
- C. Electrical materials and equipment including galvanized steel, PVC coated steel, and PVC conduit and tubing, pull boxes, and boxes.
- D. Light poles and light figures.
- E. Instrument cabinets.
- F. Flexible electrical conduits “whips”, either galvanized steel or PVC coated steel.
- G. Nameplates, manufacturer’s data plates, UL, instruction, identification and warning labels.
- H. Grease fittings.
- I. Glass, glazing, and porcelain materials.
- J. Light switches, buttons, knobs, illumination lights, and receptacle plates.
- K. Exposed wire or exposed wire terminations.
- L. Mating, contacting, or rotating machined surfaces, shafts, gears, and bearings.
- M. Gratings, hatch covers, drain covers, and valve lids.
- N. Aluminum, brass, bronze, chrome, copper, rubber, or nickel-plated items including tubing, piping, and fittings.
- O. Stainless steel items including piping, bolts, nuts and washers, air release valves, and cabinets.
- P. Flexible hoses.
- Q. Solenoid valves.
- R. Pipe and conduit supports and mounting brackets, and associated hardware.

3.2 SAFETY

All work shall be conducted in accordance will all requirements set forth in OSHA Part 26.

The application of paint and coatings may be hazardous. The Contractor shall provide and require the use of personal protective and lifesaving equipment for all persons working in

or about the project. Head and face protection and respiratory devices shall be worn by all persons at all times while in the vicinity of the work.

Where ventilation is used to control potential exposures to workers, as set forth by OSHA, ventilation shall be adequate to reduce the concentration of the air contaminant to the degree that a hazard to the worker does not exist.

Temporary ladders and scaffolding shall conform to the applicable requirements of the OSHA.

3.3 WORKMANSHIP

Skilled craftsmen and experienced supervision shall be used on coating work.

Coating shall be done in a workmanlike manner so as to produce an even film of uniform thickness. Edges, corners, crevices, and joints shall receive special attention to insure thorough surface preparation. The finished surfaces shall be free from runs, drops, ridges, waves, laps, brush marks, and variations in color, texture, and finish. The hiding shall be so complete that the addition of another coat would not increase the hiding. Special attention shall be given so that edges, corners, crevices, welds, and similar areas receive a film thickness equivalent to adjacent areas, and installations shall be protected by the use of drop cloths or other precautionary measures.

Damage to other surfaces resulting from the work shall be cleaned, repaired, and refinished to original condition.

3.4 STORAGE, MIXING, AND THINNING OF MATERIALS

Unless otherwise indicated, the coating manufacturer's printed recommendations and instructions for thinning, mixing, handling, applying, and protecting its coating materials, for preparation of surfaces for coating, and for other procedures relative to coating shall be strictly observed.

Coating materials shall be used within the manufacturer's recommended shelf life.

Coating materials shall be stored under the conditions recommended by the manufacturer's product data sheets, and shall be thoroughly stirred, strained, and kept at a uniform consistency during application.

3.5 PREPARATION FOR COATING

Surfaces to receive protective coatings shall be prepared as indicated prior to application of coatings. The Contractor shall examine surfaces to be coated and shall correct surface defects before application of any coating material. Marred or abraded spots on shop-primed and on factory-finished surfaces shall receive touch-up restoration prior to any field coating application. Surfaces to be coated shall be dry and free of visible dust.

Surfaces that are not to receive protective coatings shall be protected during surface

preparation, cleaning, and coating operations.

Hardware, lighting fixtures, switch plates, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not to be painted shall be removed, masked, or otherwise protected. Drop cloths shall be provided to prevent coating materials from falling on or marring adjacent surfaces. Working parts of mechanical and electrical equipment shall be protected from damage during surface preparation and coating operations. Openings in motors shall be masked to prevent entry of coating or other materials.

Spraying shall be conducted under carefully controlled conditions. The Contractor shall be fully responsible for and shall promptly repair any and all damage to adjacent work or adjoining property occurring from coating operations.

Cleaning and coating shall be coordinated so that dust and other contaminants from the preparation process will not fall on wet, newly coated surfaces.

3.6 SURFACE PREPARATION FERROUS SURFACES

Surfaces shall be commercially blast cleaned (SSPC SP3). Equipment used shall be commercially produced equipment with a successful service record.

Surfaces shall be clean and dry prior to coating application.

3.7 PLASTIC AND NONFERROUS METALS SURFACE PREPARATION

Plastic and nonferrous surfaces shall be hand sanded and cleaned (SSPC SP2) prior to cleaning with a chemical detergent or degreaser (SSPC SP1).

Surfaces shall be clean and dry prior to coating application.

3.8 APPLICATION OF COATINGS

The application of protective coatings to steel substrates shall be in accordance with SSPC PA1.

Cleaned surfaces and each coat shall be inspected prior to applying each succeeding coat. The Contractor shall schedule such inspection with the District in advance.

Coatings shall be applied in accordance with the manufacturer's instructions and recommendations and this Section, whichever has the most stringent requirements.

Special attention shall be given to edges, angles, weld seams, flanges, nuts and bolts, and other places where insufficient film thicknesses are likely to occur. Use stripe painting with a brush in these areas.

Finish coats, including touch-up and damage repair coats shall be applied in a manner that will present a uniform texture and color matched appearance.

Coatings shall not be applied under the following conditions:

- A. Temperatures exceeding the manufacturer's recommended maximum and minimum allowable.
- B. Dust or smoke laden atmosphere.
- C. Damp or humid weather.
- D. Air temperature is expected to drop below 40 degrees or above 90 degrees F.
- E. Wind conditions are not calm.

3.9 CURING OF COATINGS

The Contractor shall maintain curing conditions in accordance with the conditions recommended by the coating material manufacturer or by this Section, whichever is the most stringent, prior to placing the completed coating system into service.

3.10 FIELD INSPECTION AND TESTING

The Contractor shall give the District a minimum of three (3) days advance notice of the start of any field surface preparation or coating application.

Work shall be performed only in the presence of the District, unless the District has granted prior approval to perform such work in their absence.

Inspection by the District, or the waiver of inspection of any particular portion of the work, shall not relieve the Contractor of his responsibility to perform the work.

Scaffolding shall be erected and moved to locations requested by the Engineer to facilitate inspection. Additional illumination shall be furnished on areas to be inspected.

On ferrous metals, the dry film coating thickness shall be measured in accordance with the SSPC-PA2 using a magnetic type of dry film thickness gauge. Each coat shall be tested for the correct thickness. No measurements shall be made until at least eight (8) hours after application of the coating. On non-ferrous metals and other substrates, the coating thicknesses shall be measured at the time of application using a wet film gauge.

***** END OF SECTION 09900 *****

SECTION 6
APPROVED MATERIALS LIST

GENERAL

| Item | Description | Manufacturer/Model |
|----------------------------|---|--|
| Carrier Pipe | PVC or Ductile Iron Pipe with Restrained Joints | See Approved Water / Wastewater Material List |
| Carrier Pipe Skids | For carrier pipe sizes 12-inch diameter and less; Plastic High-Density Polyethylene, centered and restrained, with all stainless-steel hardware. Provide four (4) spacers per full stick of pipe unless otherwise approved by CCWD. | CALPICO / Model PX-SS CCI Piping Systems, Model CSPCASCAD E CCSPL (Gold) |
| Casing Pipe | Steel ASTM A283, Grade C, or ASTM A245 commercial grade. Conforming to CalTrans requirements. | |
| Casing Pipe End Seal | Seamless or Wrap Around with 2 ½-inch wide stainless-steel bands and permanent compression adhesive strips along split seam. | CALPICO, CCI Piping Systems, CASCADE |
| Concrete | CalTrans Specification Section 90, "Portland Cement Concrete." Maximum water/cement ratio to be 0.55. <i>Class A</i> – Type II Portland Cement (6 sack), 3,500 psi 28-day compressive strength, 2 to 4-inch slump. <i>Class B</i> – Type II Portland Cement (5 sack), 2,000 psi 28-day compressive strength, 2 to 4-inch slump. | |
| Concrete Bonding Adhesive | Bond fresh concrete to hardened concrete and steel. Use as admixture for grouting base plates. | SIKA / Sikadur 32 |
| Grout | Concrete patching, sealing, filling, and repair for below grade structures. | ThoRoc/SP15 Spray Mortar BASF / SP 15 Spray Mortar |
| Paddle Marker | CalTrans Type Object Marker Standard Plans A73A and A73B. Flexible and vehicle impacts resistant. Provide colors, custom signage, custom decals and reflective sheeting to suite CCWD requirements. Provide anchor barbs or U-channel anchors. | CARSONITE, CRM (Road Marker), CTFM (Tuff-Flex Marker), SNFB (Sno Pole), CSS (Sign Support Post), CSP (Support Post) |
| Pipe Penetration Wall Seal | Mechanical modular rubber links to seal pipe to concrete wall openings with 316 stainless steel bolts and nuts. (watertight seal) | Link-Seal Model S-316 CCI Wrap- It Link, Type WL-SS |
| Reinforcing Steel | ASTM A615, Grade 60 for Class A concrete structures, Grade 40 for Class B concrete structures, unless otherwise specified. | Camblin Steel Service, Inc. or equal |
| Tracer Wire | #10 AWG solid copper, ASTM B-3, UL listed for direct burial applications, High Molecular Weight PE Insulation 0.045-inch (45 mil) thick, 600-volt. | AGAVE WIRE, PRO-LINE, PRO- TRACE AW Alan Wire KrisTech |

| | | |
|------------------------|--|---|
| Tracer Wire Connectors | Electrically connect tracer wires. Direct buy splice kit for underground applications. Install per manufacturer directions. | 3M / DBR/Y-6DRYCONN / KDBR/Y-600 |
| Utility Tape | 10-mil minimum PVC tape for above and below ground use. | 3M / Scotchrap 50, 51 Christy's Calpico |
| Warning Tape | 6-inch wide 4-mil tape marked as follows: Water – Colored Blue “CAUTION: Water Line Below” Sewer – Colored Green “CAUTION: Sewer Line Below” | PRESCO / BRADY |
| Wire Welded Fabric | ASTM A185, size and spacing per Plans. | |

WATER

| Item | | Description | Manufacturer/Model |
|--|--|--|--|
| Angle Meter Stop | | ANSI/AWWA C800, NSF/ANSI 61 compliant, locking wing, no-lead/low-lead brass, w/insert stiffeners, grip joint for CTS PE or Copper Tubing, 300-psig working pressure. | Ford / BA43-xxxW-NL, BFA43-xxxW-NL Mueller / P-24258N, P-24276N |
| Backflow Prevention Devices | | | |
| 1. Reduced Pressure Assembly | 1. Reduced Pressure (NSF-61, lead free) | 1" – 2" | Febco / LF825Y Watts / L F 909 / Zurn 975XL2 / Apollo RPFL 4A |
| | | 4"- 10" | Watts / LF909, LF957RPDA / Ames / C400, LFC500 / LFM500 / Zurn 375AST/375ASTDA |
| 2. Double Check Detector Valve Assembly (Commercial Only) | 3. Double Check Detector (NSF-61, lead free) | 4" – 10" | Watts / LF757DCDAOSY Ames / Colt LFC300OSY / Zurn 350ADA / 350ASTDA |
| Bolts and Nuts, for fittings, valves, etc. | | Conforming to AWWA C111, Flange Connections – ASTM A307, Gr B, with Xylan coating. Mechanical Joints T-Bolts and Nuts – Cor-Ten with Xylan coating | TRIPAC 2000 ROMAC R-BLUE Sigma COR-BLUE Tyler Union / Flurokote #1 |
| Corporation Stop (Ball Corp) | | ANSI/AWWA C800, NSF/ANSI 61 compliant, no-lead/brass (MIP thread inlet x Pack Joint outlet for CTS with set screw) | Ford / FB1100 NL4 / Mueller P-25028N |
| Coupling, Flange Adapter (Operating pressure not to exceed rated pressure) | Unrestrained | AWWA C219, NSF/61 compliant, Ductile Iron, fusion bonded epoxy coated bolts and nuts, 304 stainless steel for water systems and 316 stainless steel for sewer systems. | ROMAC / FCA 501, Macro HP FC, Krausz, Hymax-2 |
| | Restrained | AWWA C219, NSF-61 certified, ductile iron body fusion bonded epoxy coated with stainless steel bolts and nuts. | ROMAC / RFCA/RFCA-PVC-Mueller / Hymax Grip / EBAA / 2100 MegaFlange |
| Dismantling Joint, Restrained | | Double ended flanged adapter, adjustable length, Fusion bonded epoxy, NSF 61 certified, AWWA Class-E (275-psig) flanges, all stainless-steel bolts, nuts and tie-rods. | ROMAC / DJ 400 / DJ 405 / FORD FDJ-ExxY-R-U |

| | | |
|---|---|---|
| Fire Hydrants (Dry-Barrel / 250-psig rated) | AWWA C502, NSF/ANSI 61 Compliant, 5 ¼-inch main valve and two (2) 2 ½-inch hose nozzle, one pump nozzle, 6-inch MJ shoe connection, upper barrel epoxy lined and coated with exterior UV resistant alkyd enamel topcoat, bronze drain, color: per local Fire District. | Mueller / 250, A-423 American Darling / B-84-B-5 |
| Fittings, Brass (Underground Service Line Fittings) | AWWA C800, NSF/ANSI 61 compliant, heavy cast brass, lead free. | Mueller / Ford Meter Box |
| Fittings, Ductile Iron | ANSI/AWWA C 110, C 111, C 153, C116, NSF/ANSI 61 and 372 compliant, ductile iron, for water systems fusion bonded epoxy coating and lining for use with C900 PVC or zinc coated cement mortar lining for use with ductile iron pipe, for sewer lift stations ceramic novalac epoxy lining (Protecto 401). | US Pipe Tyler Union Sigma Corp Star Pipe Products |
| Fittings, PVC | Twin Gasketed, High Deflection Coupling (2.5-deg per side, 5-deg per joint) | NAPCO Fluid-Tite |
| Gate Valves Bronze, Brass | Above Ground ¼ to 2-inch, non-rising, solid disk (lead free required for water systems). | Red-White / 206/206AB-LF, 267/267AB-LF |
| Meter Idlers | ANSI/AWWA C800, NSF/ANSI 61 compliant, no-lead/low-lead brass. | Ford / Idler-3,-4, -6, -7 Mueller / H-10887 |
| Meter Valve | ANSI/AWWA C800, NSF/ANSI 61 compliant, no-lead/low-lead brass. | Ford / B43-444W-NL, B Mueller / B-24351N, B-24337N |
| Pipe, Brass and Fittings | Lead free, NSF 61 and 372 compliant, Red Brass Nipples, ASTM B43, Sch 40 and 80, ASME B1.20.1 threads, fittings conforming to ASME B16.15, Class 125 and Class 250. | Matco Norca / Merit Brass |
| Pipe, Ductile Iron | ANSI/AWWA C 151, C111, C115, C116, C104, NSF/ANSI 61 compliant. Zinc coated and cement mortar lined for water service, and ceramic novalac epoxy lining (Protecto 401) for | American Ductile Iron Pipe McWane Ductile U.S. Pipe |

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|--|---|--|
| | sewer service. Pressure Class 350 (bell and spigot joints) and Special Thickness Class 53 (flanged). | |
| Pipe, Restraining mechanisms | Restraining glands with gripping type wedges, integral gasket and locking segments. Ductile iron mechanical joint restraint glands to be furnished polyester coated with fluoropolymer coated nuts and bolts. | EBABA / Megalug / Romac / Grip Ring / US Pipe/ TR Flex, Tyton w/Field Lok / American / Flex-Ring, Fastite Sigma / One-Lok / McWane / TR Flex |
| Pipe, PVC C900 | ANSI/AWWA C900, NSF/ANSI 61 Compliant. (Both restrained and unrestrained joints). PR 235 (DR18) under 150-psi, PR 305 (DR14) 150-psi and above. Color coded to service (water, sewer, and reclaimed water). | NAPCO (C900 & Certa-Lok RJIB) / JM Eagle (Blue Brute & Loc 900) / Diamond Plastics (C900 & Lok-21) / Vinyltech |
| Pressure Reducing Valves (Globe) | Ductile Iron Body w/Fusion Epoxy Lined and Coated, SS trim and tubing, flange connections. (Class 150 under 200-psi, Class 300 at/above 200-psi) | CLA-VAL / 90G-01BCSYKCX / CLA-VAL / 50A-01KO-BKCX |
| Pressure Relief Valves | Ductile Iron Body w/Fusion Epoxy Coated Inside, Bronze trim and tubing, flange connections | CLA-VAL / 50A-01 BKCX |
| Sampling Station | Water quality sampling stations w/ brass pipe bury encased in galvanized pipe and vent tube to prevent freezing. | Kupferle Foundry / Eclipse #88 |
| Service Coupling Compression (no lead) | 1 to 2-inch PE CTS tubing | Ford / C44-44-NL, C44-77-NL Mueller / P-15403N |

| | | | |
|---|---|---|--|
| Service Fittings (no lead) | | Bronze Adaptors Couplings, Bends and Unions | Ford / L44-44-NL, L44-77-NL Mueller / P-15526N (90-deg bend) |
| Service Saddles | | ANSI/AWWA C800, compliant with NSF/ANSI 61, Double strap, bronze, IP threads. | Romac / 202B (under 200-psi) / Mueller BR2B (ductile iron under 200-psi / Jones / J-996 or Mueller H-13000 (PVC under 200-psi) / Ford 5912 (PVC under 150-psi) / Romac 202NSSU (ductile iron above 200-psi to 350-psi) |
| Service Tubing | | ANSI/AWWA C 901, Flexible Polyethylene tubing, CTS, ASTM D2737/D3350, PE4710, NSF/ANSI 61, 14 and 372 compliant, SDR 9, 250-psi rated. | Centennial Plastics 4710 JM Eagle HDPE Water Service / ADS PolyFlex Potable (CTS PE4710) |
| Tapping Sleeves | | AWWA C223, Fabricated ASTM A36 steel sleeve, epoxy coated or stainless steel, all nuts and bolts stainless steel, test plug, NSF 61 compliant, AWWA C207 Class E Flange, 250-psi working pressure rated . | Romac / FTS 420, STS420, SSTIII Ford / FTSC, FTSS, FTSAS / Power Seal / 3460CS, 3460HP, 3490AS |
| Utility Boxes | Blow-Off, Air Valves | Steel Cover marked “Water”. Size as shown on drawings. Provide vent tubes for all air valves. | Box: Christy B1730, FL36 & B40 Covers & Vent Tubes: Placer Waterworks PW/AE218-M, PW/AE3618-M, PW/AE318 |
| | Valve Box | Concrete w/traffic lid | Christy Concrete Products / G5 |
| | Meter Box and AMR Cover (5/8” – 1” meter) | <u>Below Elev. 2,500 feet</u> | Christy Concrete Products / N30 with R-Series Composite Lid (non-traffic rated) / OldCastle / Fibrelyte FL30 (incidental wheel loads Tier 8 loading, off pavement) |
| | | <u>Above Elev. 2,500 fee</u> | Heavy Wall BCF1324 with polymer concrete lid / Oldcastle / Fibrelyte FL30 |
| Meter Box and AMR Cover (1½ “ – 2” meter) | <u>Below Elev. 2,500 feet</u> | Christy Concrete Products / N36 with R-Series Composite Lid (non-traffic rated) / Oldcastle / Fibrelyte FL36 (incidental wheel loads Tier 8 loading, off pavement) | |

| | | | |
|--|--------------|---|---|
| | | <u>Above Elev. 2,500 fee</u> | Carson / Heavy Wall BCF1730 with polymer concrete lid (Tier 8 loading) / Oldcastle / Fibrelyte FL 36 (Tier 8 loading) |
| Valves | Air / Vacuum | 1-inch and 2-inch inlet, pump applications, vacuum break, AWWA C512 and NSF 61 and 372 compliant, underground, fusion epoxy lined and coated AWWA C550, 300-psi rated. | Cla-Val 33A/ ValMatic / 101S, 102S |
| | Air Release | 1-inch and 2-inch inlet, stainless steel lever, place on long ascending pipeline, AWWA C512 and NSF 61 and 372 compliant, underground, fusion epoxy lined and coated AWWA C550, 300-psi rated. | APCO / 200A / ValMatic / CMC 38 / Cla-Val 34 |
| | Combination | 1-inch and 2-inch inlet, single body, placed at high points, AWWA C512 and NSF 61 and 372 compliant, underground, fusion epoxy lined and coated AWWA C 550, 300-psi rated. | APCO / S-143C, S-145C / ValMatic / 201C.2, 202C.2 / Cla-Val / 36 & 39 |
| Valves, Ball (1" – 2") | | Brass or Bronze, above ground use, threaded joint ends, NSF 61 and 372 compliant. | Red-White / 5044F, 5049AB LF Crane / , LF9202 / NIBCO T-FP600A-LF |
| Valves, Butterfly (> 12") | | AWWA C504 Class 250B, Ductile Iron Body, ss shaft, epoxy coated/lined, ANSI B16.1 125# Flange, NSF 60 and 372 compliant. | Mueller / Lineseal XPII Pratt / HP 250II / Val-Matic / VM-2004 |
| Valves, Gate, Brass/Bronze (1" – 2") | | Above ground use, non-rising, solid disk, screwed ends, NSF 61 and 372 compliant. | Red-White / 206AB LF / NIBCO T-113-LF |
| Valves, Gate, Resilient Wedge (2" – 12") | | AWWA C509 or C515, ductile iron, NRS, open left, NSF61 and 372 compliant, 2-inch square operating nut (unless otherwise noted), fusion epoxy coated and lined. By-pass valve required for 16-inch and larger. Type 316 stainless steel stems and hardware for sewer | Mueller / A-2361 American Darling / 2500 & 3500 / Kennedy Valve / KS-FW, KS-RW |

| | | |
|-------------------------|--|---|
| | service. | |
| Valves, Tapping | Tapping valves shall be resilient wedge gate valves. The mating valve flange to the tapping sleeve outlet must have a raised male face, conforming to MSS SP-60, to ensure true alignment of valve and tapping sleeve. | American Darling / Mueller / Kennedy Valve |
| Vault, Precast Concrete | For pressure reducing stations, control valves, sump pit. Non-traffic Cover: Double leaf aluminum, top mounted, bolt down, torsion rod, spring assisted, hot dip galvanized, non-skid surface, recessed padlock hasp, safety bar, stainless steel hardware. Traffic Cover: Double leaf aluminum, flush mounted, bolt down, H20 traffic rated, torsion rod, spring assisted, recessed padlock hasp, stainless steel hardware, | Christy / Oldcastle / Jensen Precast / Vault Access Solutions (VAS) / BILCO |

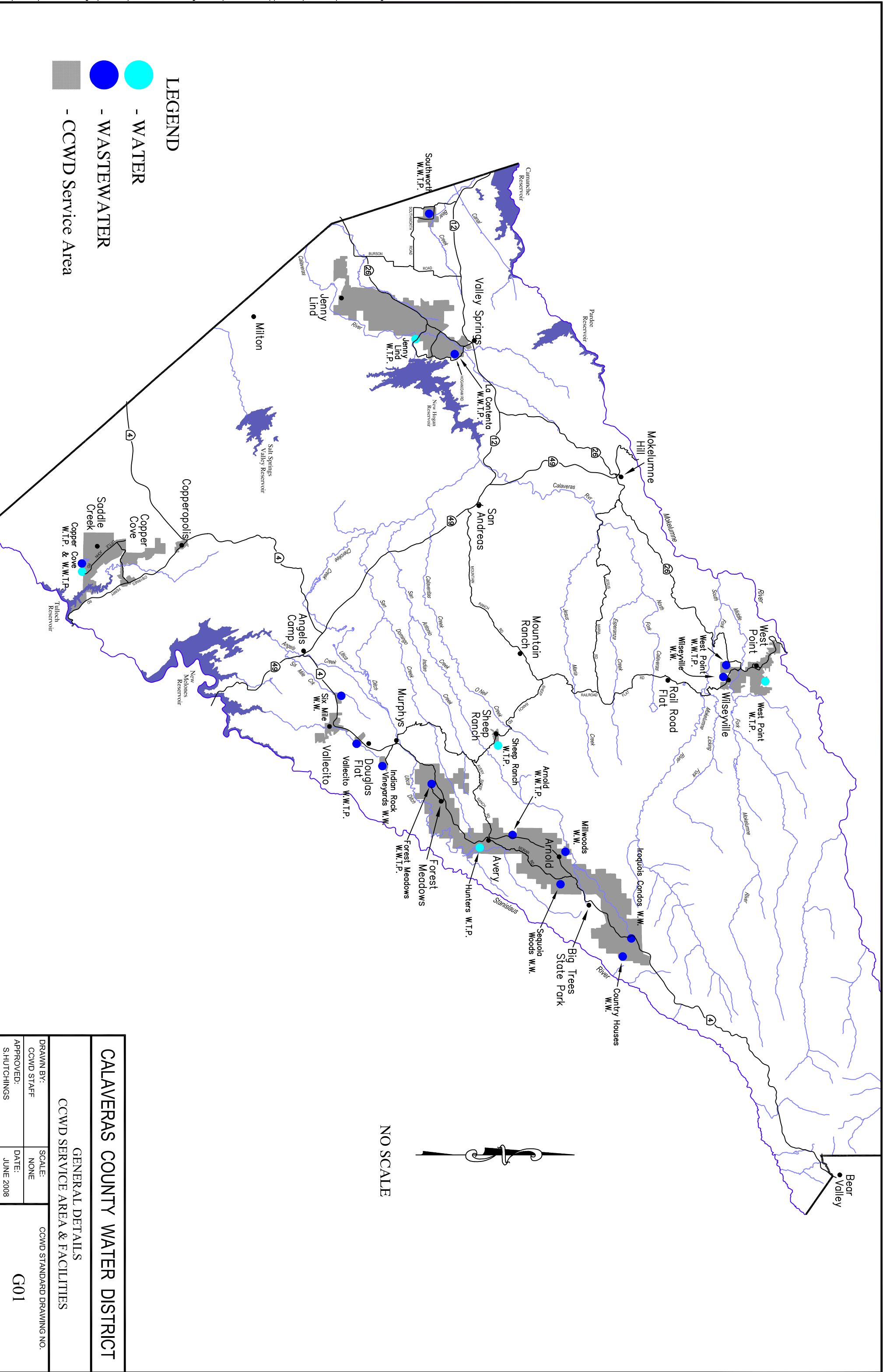
Note: All material coming in contact with potable water is to be ANSI/NSF 61 compliance

SEWER

| Item | Description | Manufacturer/Model |
|--|--|--|
| Air/Vacuum Valve and Air Release (Combination air-valve) | Stainless steel body, polypropylene float, specifically designed for sewage and wastewater, 250-psi rated (optional Nylon body requires CCWD approval). | A.R.I. USA / Model D-025L |
| Cleanout Box | Concrete traffic valve box with iron lid marked "SEWER" | Christy Concrete Products / G5CBOX |
| Liner Systems – Existing Concrete manholes/vaults | <ol style="list-style-type: none"> 1. Microsilica enhanced, fiber reinforced wet spray mortar for underground use. 2. PVC t-ribbed sheet lining 3. 100% solids Epoxy system | <ol style="list-style-type: none"> 1. BTF / ThoRoc SP15 Spray mortar 2. Ameron / Arrow-Lock System 3. ConTech / Hd-ro-pox 251 |
| Liner Systems – New Concrete manholes/vaults | PVC T-ribbed sheet cast into concrete manhole/vault components. | Ameron / T-Lok PVC Liner / Armorlok PVC Linder / Epoxy coating |
| Manhole Frame and Cover | 24-inch diameter cast iron frame and cover, with machined seats, closed pickhole, O-ring gasket, marked "SEWER" | South Bay Foundry/ SBF-1900 D&L Foundry / A-1024-R4 |
| Manhole, Precast Concrete Epoxy coated T-Lok | Manhole barrel section, bases, concentric cones, grade rings designed for minimum H-20 loading, manufacturer to supply integrated rubber watertight pipe connectors and flexible joint gaskets. | Jensen Precast Oldcastle Hanson Pipe & Precast Armorock (polymer concrete) |
| Mortar Seal | Sealing and filling at pipe openings and joints. | |
| Pipe Connector – Manholes | ASTM C-923, rubber Flexible type pipe connector for manholes, stainless steel clamps. | NPC/ Kor-N-Seal (cored hold) / A-Lok / G3 (cored hole) / Press-Seal / PSX Direct Drive Nitrile (cored hole) / Press-Seal / WS Water Stop (caste in place) / A-Lok / Water-Stop |
| Sewer Pipe & Fittings, Gravity (4" – 12") | <u>SDR 26 (PS115), PVC complying with ASTM D1784, ASTM D-3034 and F1336, integral bell joint ASTM D3212, gasket ASTM F477,</u> | JM Eagle / NAPCO / Diamond Plastics / HARCO Fittings / TIGRE |

| | | |
|------------------------------------|--|--|
| | <u>Color:</u> Green | |
| Sewer Service & Fittings, Pressure | PVC Pipe ASTM D-1785 sch 40 or 80, Socket type fittings ASTM D-2466 | |
| Sewer Popper | Sewer popper valve at building | Jones Stephens / sewer popper #S62-304 |

**SECTION 7
STANDARD DRAWINGS**



LEGEND

- - WATER
- - WASTEWATER
- CCWD Service Area

NO SCALE



Bear Valley

CALAVERAS COUNTY WATER DISTRICT

**GENERAL DETAILS
CCWD SERVICE AREA & FACILITIES**

| | | | | | |
|---------------------------|--|--------------------|--|---|--|
| DRAWN BY: CCWD STAFF | | SCALE: NONE | | CCWD STANDARD DRAWING NO. G01 | |
| APPROVED: S.SHUTCHINGS | | DATE: JUNE 2008 | | | |

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TITLE SHEET / COVER SHEET

- 1. PROJECT AREA AND VICINITY MAPS
- 2. TABULAR SHEET INDEX FOR ALL SHEETS
- 3. CCWD STANDARD DRAWING SCALE
- 4. USGS DATUM ELEVATION PROVIDED
- 5. ALL AGENCY & PROJECT ENGINEER SIGNATURES. PROJECT ENGINEER ALSO SIGNS & STAMPS EVERY SHEET
- 6. LEGEND (INCLUDE ON SECOND SHEET IF NECESSARY)
- 7. GENERAL NOTES (INCLUDE ON SECOND SHEET IF NECESSARY)

ALL PLAN VIEWS

- 1. DELINEATE ALL EASEMENTS, EXISTING AND PROPOSED
- 2. DRAWING SCALE – HORIZ.
- 3. BEARING/DISTANCE BETWEEN ANGLE PT'S, BC-EC'S, AND CURVE DATA ALONG ϕ OF PIPE OR ROAD
- 4. CALL OUT AND STATION ALL FITTINGS AT ANGLE POINTS.
- 5. STATION ϕ PIPE & ANGLE PT, BC-EC, ARV, BO, MH ϕ , CO & FH, OR NOTE STATIONING TIED TO ϕ OF ROAD
- 6. FIELD VERIFY TIE-IN LOCATIONS
- 7. SHOW EACH TIE-IN w/DETAIL
- 8. SHOW ALL UTILITIES
- 9. SHOW HORIZ. SEPARATION FOR ALL LINES INCLUDING STORM DRAIN LINES
- 10. PROVIDE DETAIL DRAWINGS OF ALL LIFT STATIONS, BOOSTER PUMPS, PRV'S, CREEK CROSSINGS, BORING AND/OR TUNNELING, & EROSION CONTROL IF SLOPE ON PIPE TRENCH EXCEEDS 3:1
- 11. SHOW/STATION ALL WATER/SEWER SERVICES
- 12. SHOW/STATION ALL MATCH LINES. SHOW SHEET NUMBER OF MATCHING SHEETS
- 13. CALL OUT & STATION BEGINING/END OF RESTRAINED JOINT SECTIONS

OVERALL PROJECT UTILITY MAP CLEARLY SHOWING:

- 1. ALL EXISTING AND PROPOSED UTILITIES INCLUDING BUT NOT LIMITED TO: WATER, SEWER, RECLAIMED WATER MAINS & SERVICES
- 2. PRV STATION LOCATION/SETTINGS
- 3. NORMALLY CLOSED VALVES & PRESSURE ZONES
- 4. P & P SHEET REFERENCE/KEY
- 5. ALL EXISTING OR PROPOSED EASEMENTS, INCLUDING CCWD DEDICATED UTILITY EASEMENTS & P.U.E.'s
- 6. ALL STREET NAMES, LOT #'S & ADJACENT A.P.N.'s
- 7. ALL PUMPED LOTS W/PUMP HEAD & LOT ELEV.
- 8. G.P.S. (LAT/LONG) TABLE FOR ALL MANHOLES

ALL PROFILE VIEWS

- 1. PIPE TYPE, SIZE & CLASS
- 2. SHOW/STATION ALL CROSSINGS WITH CLEARANCES
- 3. SHOW LENGTH OF PIPE
WATER: FITTING TO FITTING
SEWER: ϕ TO ϕ OF MH – W/ SLOPE
- 4. SHOW COVER ALONG ϕ OF PIPE
- 5. STATION ALL APPURTENANCES
- 6. SHOW STA/ELEV AT LOW, HIGH & ANGLE PT'S. SHOW STA VERT. ANGLE & CURVES. SHOW VERT. CURVE DATA TABLE
- 8. SHOW CREEK CROSSING VERT. DEPTH
- 9. CALL OUT & STATION RESTRAINED JOINT SECTIONS
- 10. SHOW INVERT & M.H. RIM ELEVATIONS
- 11. SHOW DIRECTION (N,S,E,W) OF ALL INVERTS AND INDICATE INFLOW/OUTFLOW IN ALL MH WITH MORE THAN TWO CONNECTIONS
- 11. DRAWING SCALE – HORIZ. & VERT.

| | | |
|--|------------------|------------|
| CALAVERAS COUNTY WATER DISTRICT | | |
| GENERAL DETAILS UTILITY MAP, PLAN & PROFILE CHECKLIST | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | G02 |
| APPROVED: CHARLES PALMER | DATE: 09/2021 | |

GENERAL NOTES

- 1 ALL WORK SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THE PLANS, NOTES, DETAILS, AND PROVISIONS AS SPECIFIED HEREON AND IN ACCORDANCE WITH THE LATEST VERSION OF THE CALAVERAS COUNTY WATER DISTRICT STANDARD SPECIFICATIONS. ALL REQUIREMENTS, STANDARDS, AND SPECIFICATIONS OF ALL AGENCIES HAVING JURISDICTION OVER THE WORK SHALL BE DONE TO THE SATISFACTION OF ALL OF THE INVOLVED AGENCIES.
- 2 ALL SEWER AND WATER WORK WILL BE DONE UNDER THE INSPECTION OF CALAVERAS COUNTY WATER DISTRICT (CCWD). SEE SECTION 01000, SUB-SECTION 3.10.
- 3 CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL UNDERGROUND FACILITIES AFFECTED BY THE WORK AND SHALL CONTACT UNDERGROUND SERVICES ALERT (USA) 48 HOURS PRIOR TO ANY EXCAVATION WORK FOR IDENTIFICATION AND LOCATION OF UNDERGROUND UTILITIES. (PHONE: 1-800-227-2600)
- 4 THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION AND DEPTH OF ALL FACILITIES PRIOR TO ANY EXCAVATION.
- 5 WHERE DEPTH OF EXCAVATIONS INTO WHICH WORKERS DESCEND IS 5 FEET OR DEEPER, CONTRACTOR REQUIRED TO OBTAIN EXCAVATION PERMIT FROM NEAREST CAL/OSHA OFFICE & PROVIDE COPY TO CCWD PRIOR TO CONSTRUCTION.
- 6 AT AREAS ABOVE 2,500 FEET ELEVATION, ALL CASTING AND CONCRETE COLLARS IN THE ROADWAY SHALL BE DEPRESSED 1/4 INCH FOR SNOWPLOWING.
- 7 CONNECTIONS TO EXISTING WATER OR SEWER FACILITIES SHALL HAVE PRIOR APPROVAL AND BE DONE IN ACCORDANCE WITH CCWD TIE-IN PROCEDURES, PLANS AND SPECIFICATIONS.
- 8 THE CONTRACTOR SHALL HAVE A COPY OF CCWD APPROVED CONSTRUCTION PLANS AND SPECIFICATIONS ON SITE. SPECIFICATIONS, SPECIFIC NOTES, AND DETAIL DRAWINGS THEREON AND IN THE GEOTECHNICAL REPORT TAKE PRECEDENCE OVER GENERAL DRAWINGS AND PLANS UNLESS OTHERWISE DIRECTED BY THE DISTRICT ENGINEER. ANY DEVIATION FROM APPROVED PLANS DURING CONSTRUCTION WILL REQUIRE PRIOR WRITTEN NOTICE TO CCWD, OTHER APPROPRIATE PUBLIC AGENCIES, AND SHALL RECEIVE APPROVAL BY CCWD.
- 9 ONLY CCWD PERSONNEL SHALL OPERATE EXISTING FACILITIES.
- 10 THE HIGHEST REQUIRED FIRE FLOW IS _____GPM AT 20 PSIG RESIDUAL.
- 11 BASED UPON STATIC CONDITIONS AND A HYDRAULIC GRADE LINE OF _____FEET., THE MAXIMUM AND MINIMUM PRESSURES ARE CALCULATED TO BE _____PSI (LOT#_____) AND _____PSI (LOT#_____), RESPECTIVELY.
- 12 PIPELINES SHALL BE DISINFECTED, TESTED, AND INSTALLED IN ACCORDANCE WITH CCWD'S STANDARDS.
- 13 SERVICE INSTALLATIONS IN ROADWAYS WITH CUTS OR FILLS GREATER THAN 6 FEET IN HEIGHT AND SLOPES STEEPER THAN 3:1 ARE REFERENCED UNDER CCWD STANDARD DETAIL W_____.
- 14 LIDS FOR WATER FACILITIES SHALL BE MARKED "WATER" AND LIDS FOR SEWER FACILITIES SHALL BE MARKED "SEWER"
- 15 CURBS SHALL BE MARKED WITH A "W" BRAND WHERE WATER SERVICES INTERCEPT AND AN "S" BRAND WHERE SEWER SERVICES INTERCEPT.
- 16 CONTRACTOR SHALL BE RESPONSIBLE TO COMPLY WITH STORM WATER POLLUTION PREVENTION PLAN (SWPPP).
- 17 NO SERVICES SHALL BE INSTALLED IN DRIVEWAYS.

CALAVERAS COUNTY WATER DISTRICT

GENERAL DETAILS GENERAL PROJECT NOTES

| | | |
|-----------------------------|------------------|---|
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. G03 |
| APPROVED: CHARLES PALMER | DATE: 09/2021 | |

ABBREVIATIONS

| | |
|------|--|
| AB | AGGREGATE BASE CLASS II, 3/4" MAX. |
| AC | ASPHALT CONCRETE TYPE 'B', 1/2" MAX, MED. GRADING |
| ARV | AIR RELEASE VALVE |
| AVV | AIR VAC VALVE |
| AWWA | AMERICAN WATER WORKS ASSOCIATION |
| BO | BLOW OFF |
| BV | BALL VALVE |
| BFD | BACK FLOW DEVICE |
| CO | CLEANOUT |
| COR | CORNER |
| DE | DRAINAGE EASEMENT |
| DI | DRAIN INLET |
| DIP | DUCTILE IRON PIPE |
| DW | DRIVEWAY |
| EL | ELEVATION |
| EOP | EDGE OF PAVEMENT |
| FH | FIRE HYDRANT |
| FL | FLANGE |
| FM | FORCE MAIN |
| GV | GATE VALVE |
| LS | LIFT STATION |
| MH | MANHOLE |
| MJ | MECHANICAL JOINT |
| PE | POLYETHYLENE |
| PRV | PRESSURE REDUCING VALVE |
| PS | PUMP STATION |
| PSI | POUNDS PER SQUARE INCH |
| PVC | POLYVINYL CHLORIDE PIPE |
| SL | SEWER LATERAL |
| SRV | SURGE RELIEF VALVE |
| SS | SANITARY SEWER/STAINLESS STEEL |
| WM | WATER METER |

GENERAL LEGEND

| | |
|--------------------|--------------------------|
| — — — | CENTER LINE |
|) <u>36" CMP</u> (| CULVERT (NOTE SIZE) |
| — <u>15' PUE</u> — | EASEMENT (NOTE TYPE) |
| — X — X — | FENCE |
| — CATV — G — T — | UTILITY LINE (NOTE TYPE) |
| — # — E — | POWER LINE AND POLE |
| — // — E — // | POWER LINE (UNDERGROUND) |
| — R — | PROPERTY LINE |
| — ROW — | RIGHT OF WAY LINE |
| — EOP — | EDGE OF PAVEMENT |
| — ROW OR EOP — | ROADWAY |
| — 6" PVC SS — | SANITARY SEWER LINE |
| — 6" ABS S — | SEWER LINE BY OTHERS |
| — 8" PVC W — | WATER LINE |
| — 6" AC W — | WATER LINE BY OTHERS |
| — — — — — | STORM DRAIN |

NOTES

1. THE SYMBOLS AND NOTATION SHOWN ABOVE SHALL BE USED ON ALL PLANS SUBMITTED FOR THE APPROVAL OF CCWD.

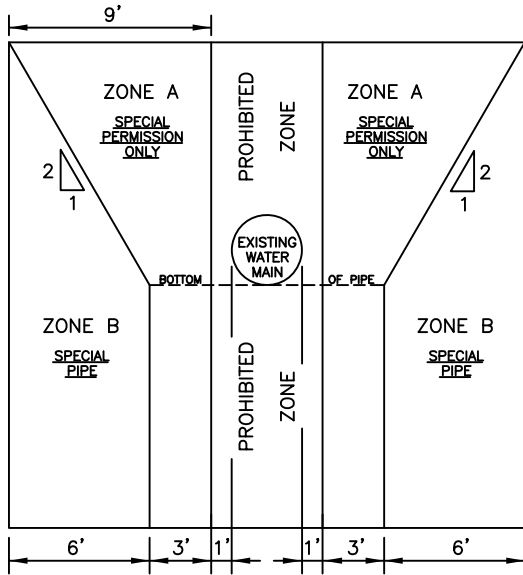
CALAVERAS COUNTY WATER DISTRICT

**GENERAL DETAILS
GENERAL LEGEND AND ABBREVIATIONS**

| | | |
|-----------------------------|------------------|--|
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. G03A |
| APPROVED: CHARLES PALMER | DATE: 09/2021 | |

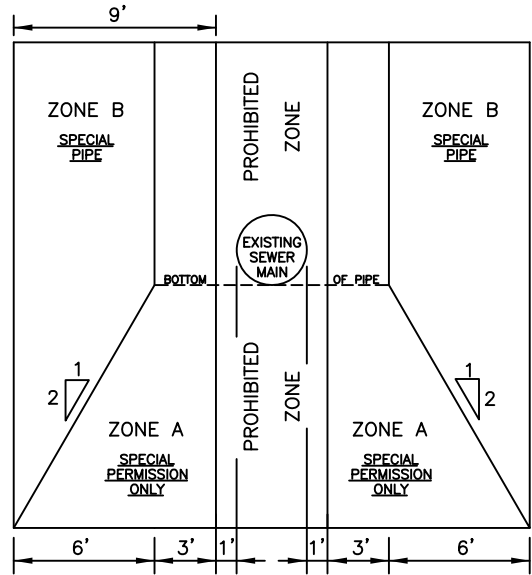
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CASE 1 PARALLEL CONSTRUCTION
NEW SEWER - EXISTING WATER

- ZONE A: SEWER LINES NOT PERMITTED WITHOUT WRITTEN PERMISSION FROM COUNTY ENVIRONMENTAL HEALTH AND CCWD
- ZONE B: NEW SEWER MAIN SHALL BE CONSTRUCTED OF:
PVC PIPE WITH RUBBER RING JOINTS (ASTM D3034)
CAST OR DUCTILE IRON PIPE WITH COMPRESSION JOINTS



CASE 2 PARALLEL CONSTRUCTION
NEW WATER - EXISTING SEWER

- ZONE A: WATER LINES NOT PERMITTED WITHOUT WRITTEN PERMISSION FROM COUNTY ENVIRONMENTAL HEALTH AND CCWD
- ZONE B: IF EXISTING SEWER MAIN DOES NOT MEET CASE 1 - ZONE B REQUIREMENTS NEW WATER MAIN SHALL BE:
CLASS 200 PVC (DR 14 / AWWA C900-97)
DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING
DIPPED & WRAPPED 1/4" WALL WELDED STEEL PIPE

WATER MAIN SEPARATION:

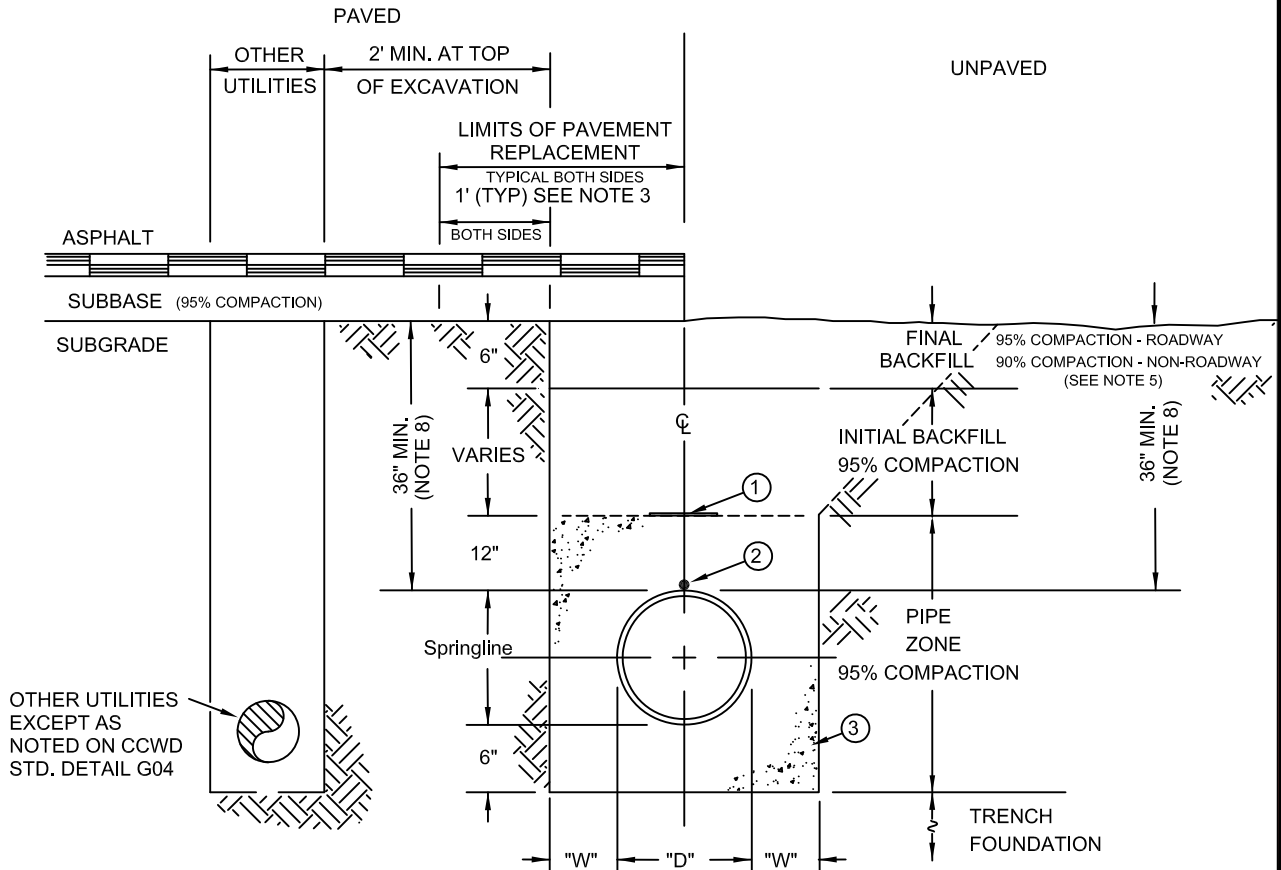
- A. NEW WATER MAINS AND NEW SUPPLY LINES SHALL BE INSTALLED AT LEAST 10 FEET HORIZONTALLY FROM AND ONE FOOT VERTICALLY ABOVE ANY PARALLEL PIPELINE CONVEYING:
- 1 - UNTREATED SEWAGE
 - 2 - PRIMARY OR SECONDARY TREATED SEWAGE
 - 3 - DISINFECTED SECONDARY-2.2 OR 23 RECYCLED WATER (AS DEFINED IN SECTIONS 60301.220 & 60301.225*)
 - 4 - HAZARDOUS FLUIDS SUCH AS FUELS, INDUSTRIAL WASTES AND WASTEWATER SLUDGE
- B. NEW WATER MAINS AND NEW SUPPLY LINES SHALL BE INSTALLED AT LEAST 4 FEET HORIZONTALLY FROM AND ONE FOOT VERTICALLY ABOVE ANY PARALLEL PIPELINE CONVEYING:
- 1 - DISINFECTED TERTIARY RECYCLED WATER (AS DEFINED IN SECTION 60301.230*)
 - 2 - STORM DRAINAGE PIPES OR CATCHMENTS
- C. NEW SUPPLY LINES CONVEYING RAW WATER TO BE TREATED FOR DRINKING PURPOSES SHALL BE INSTALLED AT LEAST 4 FEET HORIZONTALLY FROM AND ONE FOOT VERTICALLY BELOW ANY WATER MAIN
- D. IF CROSSING A PIPELINE CONVEYING A FLUID LISTED IN (A) OR (B) ABOVE, A NEW WATER MAIN SHALL BE CONSTRUCTED PERPENDICULAR TO AND AT LEAST ONE FOOT ABOVE THAT PIPELINE. NO CONNECTION JOINTS SHALL BE MADE IN THE WATER MAIN WITHIN EIGHT HORIZONTAL FEET OF SAID FLUID PIPELINE
- E. THE VERTICAL SEPARATION SPECIFIED IN (A) (B) & (C) IS REQUIRED ONLY WHEN THE HORIZONTAL DISTANCE BETWEEN A WATER MAIN AND PIPELINE IS ELEVEN FEET OR LESS AS MEASURED FROM THE OUTSIDE EDGE OF EACH PIPE
- F. NEW WATER MAINS AND NEW SUPPLY LINES SHALL NOT BE INSTALLED WITHIN 100 FEET HORIZONTALLY OF ANY SANITARY LANDFILL, WASTEWATER DISPOSAL POND, OR HAZARDOUS WASTE DISPOSAL SITE, OR WITHIN 25 FEET OF ANY CESSPOOL, SEPTIC TANK, SEWAGE LEACH FIELD, SEEPAGE PIT OR GROUNDWATER RECHARGE PROJECT SITE.
- G. THE MINIMUM SEPARATION DISTANCES SET FORTH IN THIS SECTION SHALL BE MEASURED FROM THE NEAREST OUTSIDE EDGE OF PIPE TO THE NEAREST OUTSIDE EDGE OF PIPE IN ALL CASES

*REFERENCED IN CALIFORNIA ADMINISTRATIVE CODE, TITLE 22

NOTES:

1. THE ABOVE CONSTRUCTION CRITERIA APPLIES TO HOUSE SEWER LATERALS CROSSING ABOVE A WATER MAIN
2. SEWER LINES LARGER THAN 24" DIAMETER AND SEWER LINES WITHIN 25 FEET OF LOW-HEAD WATER MAIN SHALL BE REVIEWED AND APPROVED BY COUNTY ENVIRONMENTAL HEALTH DEPT.
3. IN NO CASE SHALL WATER MAINS AND ANY NON-POTABLE PIPELINE CONVEYING SEWAGE OR ANY OTHER FLUID NOTED ABOVE BE INSTALLED IN THE SAME TRENCH

| | | |
|---|--------------------|---------------------------|
| CALAVERAS COUNTY WATER DISTRICT | | |
| GENERAL DETAILS SEPARATION STANDARDS | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. |
| APPROVED BY: CHARLES PALMER | UPDATE: 09/2021 | G04 |



NOTES:

1. FOR EXCAVATIONS THAT WORKERS ENTER/DESCEND, PERMITS SHALL BE REQUIRED FOR ALL EXCAVATIONS OVER 5 FEET IN DEPTH AND ANY EXCAVATIONS LESS THAN 5 FEET IN DEPTH IN SOILS THAT HAZARDOUS GROUND MOVEMENT MAY OCCUR.
2. PIPE TO BE LAID WITH LABEL UP ON EACH JOINT.
3. ROAD REPAIR SHALL CONFORM TO ROAD AGENCY PERMIT CONDITIONS AND SPECIFICATIONS. WIDTH OF REPAIR PER COUNTY OR CALTRANS REQUIREMENTS
4. WHEN COUNTY PUBLIC WORKS OR CALTRANS ENCROACHMENT PERMIT CONDITIONS ARE MORE RESTRICTIVE, THEY WILL TAKE PRECEDENCE.
5. EXCEPT FOR TRENCHES CUT IN ROAD SUBGRADE SLOPES AND FILLS, TRENCH WALLS ARE TO BE VERTICAL AND REMAIN WITHIN DESIGNATED LIMITS. ROADWAY INCLUDING AREAS UNDER PAVING, AREAS WITHIN 5-FT OF EDGE OF PAVEMENT, AND ALL SLOPES AND FILLS WITHIN ROADBED'S STRUCTURAL SECTION/SUBGRADE SHALL BE BACKFILLED TO 95% RELATIVE COMPACTION.
6. TRACER WIRE TO BE INCLUDED ON ALL PIPELINES INCLUDING SERVICE LATERALS.
7. SEE DETAIL G05A FOR UNSTABLE CONDITIONS.
8. PRECEDENCE SHALL BE GIVEN TO DEPTH OF COVER SHOWN ON PLAN AND PROFILE SHEETS, AND NOT LESS THAN 36-INCHES MINIMUM COVER.

| PIPE ZONE EXCAVATION LIMITS | | |
|-----------------------------|----------|----------|
| D | W (min.) | W (max.) |
| <10" | 6" | 9" |
| ≥10" | 9" | 12" |

| ITEM # | DESCRIPTION |
|--------|---|
| ① | 2" WIDE WARNING TAPE (COLOR - MARKING) BLUE - "WATER" GREEN - "SEWER" |
| ② | TRACER WIRE |
| ③ | PIPE ZONE MATERIAL |

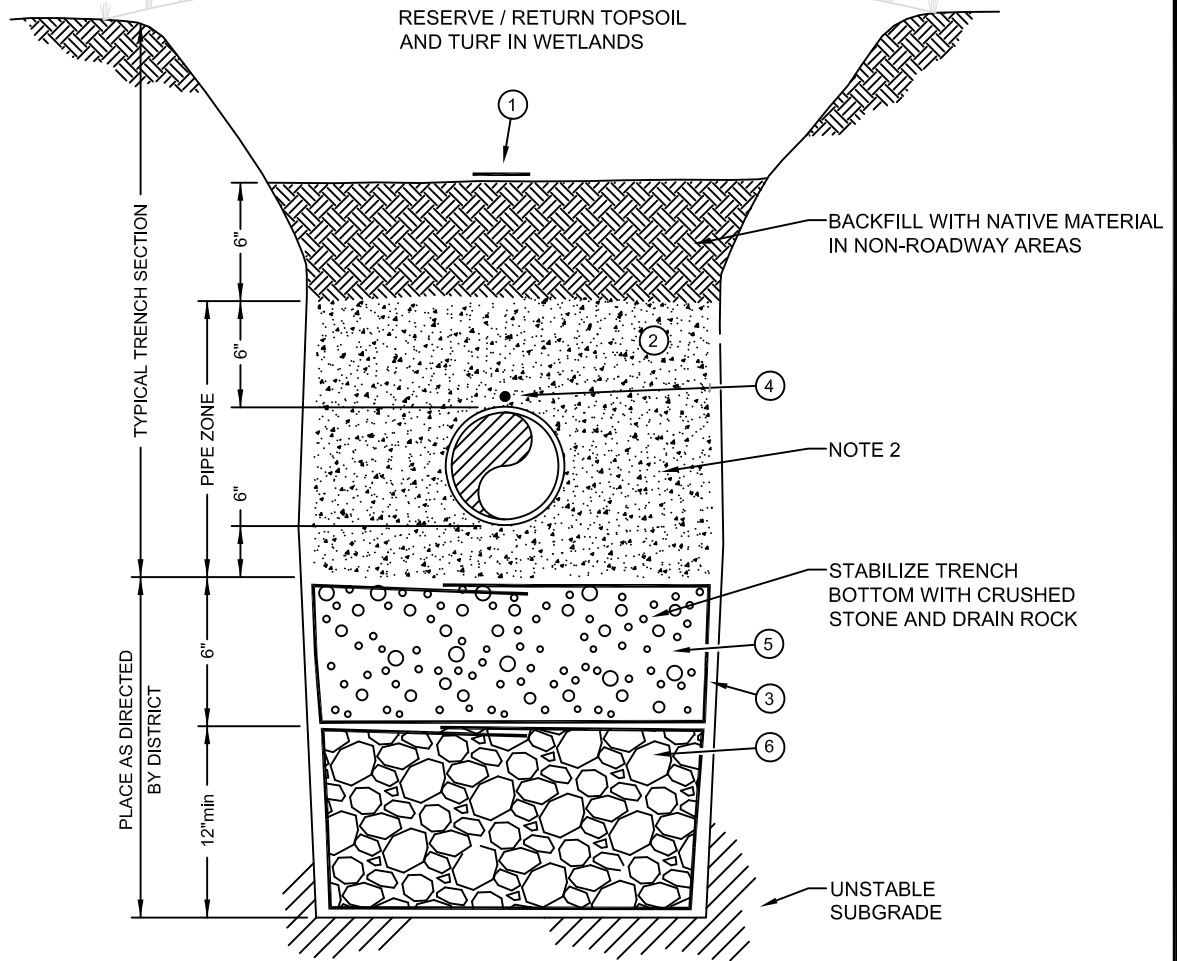
CALAVERAS COUNTY WATER DISTRICT

**GENERAL DETAILS
TRENCH SECTION**

| | | |
|--------------------------------|--------------------|---|
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. G05 |
| APPROVED BY: CHARLES PALMER | UPDATE: 09/2021 | |

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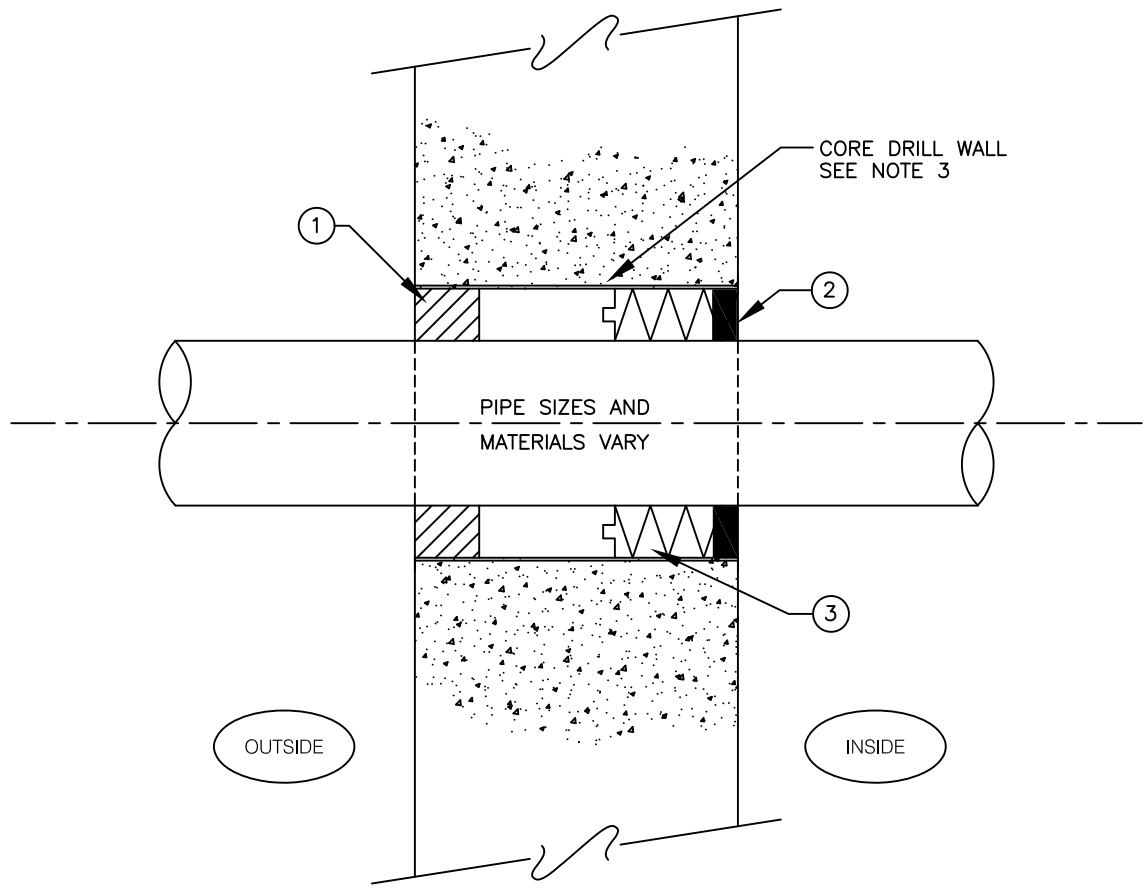
| ITEM # | DESCRIPTION |
|--------|---|
| ① | WARNING TAPE (SEE DETAIL G05) |
| ② | CALTRANS CLASS 2 (A.B.) AGGR. BASE |
| ③ | NONWOVEN GEOTEXTILE CLOTH, MINIMUM 8 oz |
| ④ | TRACER WIRE |
| ⑤ | 3/4" CRUSHED ROCK |
| ⑥ | 1-1/2" DRAIN ROCK |

NOTES:

1. CONSTRUCTION SHALL HAVE PRIOR APPROVAL BY THE DISTRICT.
2. ALL EXCAVATION SHALL BE IN CONFORMANCE WITH CAL/OSHA REQUIREMENTS.
3. ELEC. CONDUITS INSTALLED BY CCWD SHALL MEET CURRENT PG&E TRENCH STANDARDS & INCLUDE WARNING TAPE AS SHOWN.

| | | |
|--|------------------|--|
| CALAVERAS COUNTY WATER DISTRICT | | |
| GENERAL DETAILS | | |
| TRENCH SECTION - UNSTABLE SUBGRADE | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. G05A |
| APPROVED BY: CHARLES PALMER | DATE: 09/2021 | |

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WALL PENETRATION - NEW & EXISTING

(NOT TO BE USED FOR MANHOLES)

| ITEM # | DESCRIPTION |
|--------|--|
| ① | CAULKING OR SIMILAR MATERIAL FILL OUTSIDE VOID |
| ② | TH THOROC SP 15 SPRAY MORTAR SEAL |
| ③ | MODULAR SEAL SEE NOTE 1 |

NOTES:

1. LINK-SEAL MODULAR SEAL WITH EPDM RUBBER SEAL ELEMENTS. SIZE MODULAR SEAL PER MANUFACTURER'S INSTRUCTIONS TO FIT PIPE MATERIAL AND DIAMETER.
2. SIZE WALL SLEEVE TO FIT MODULAR SEAL PER MANUFACTURER'S INSTRUCTIONS.
3. BASED ON PIPE DIAMETER AND MATERIAL, CORE DRILL HOLE TO FIT LINK-SEAL ACCORDING TO MANUFACTURER'S INSTRUCTIONS. CORE DRILL HOLE SHALL BE SMOOTH WITHOUT ANY VOIDS OR RIDGES.

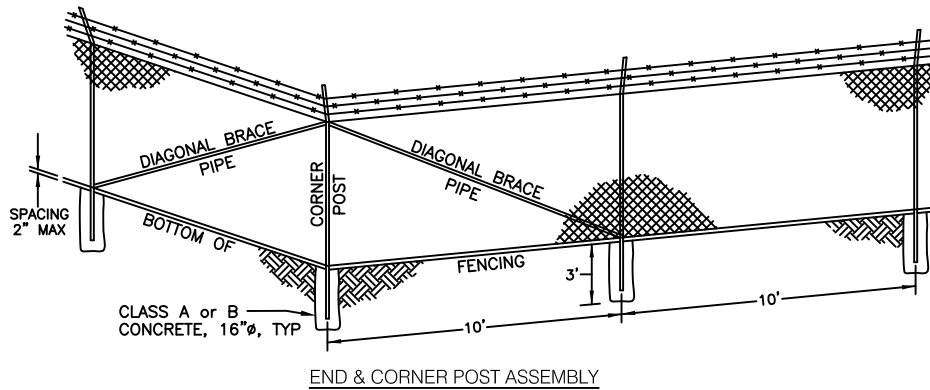
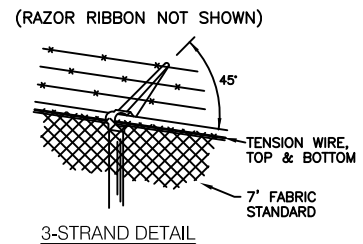
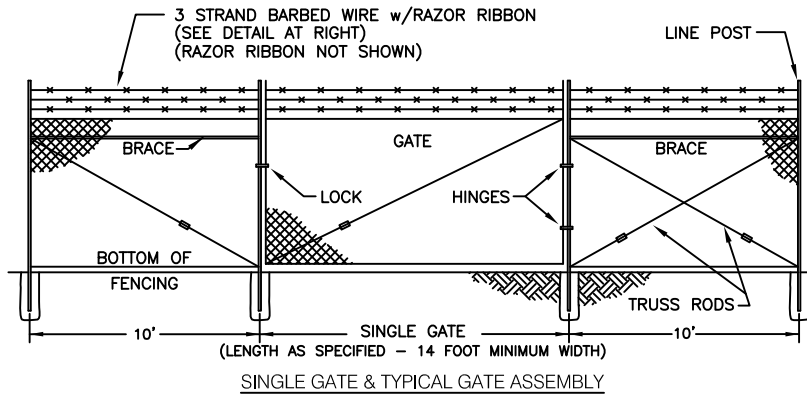
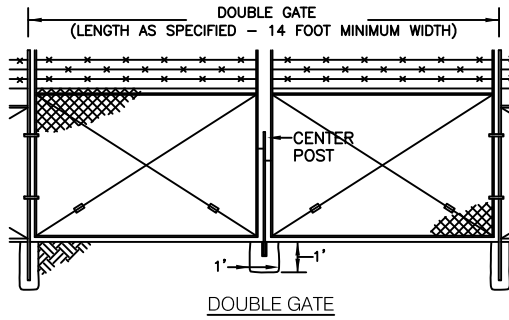
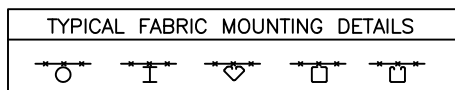
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|--|--------------------|---|
| CALAVERAS COUNTY WATER DISTRICT | | |
| GENERAL DETAILS WALL PENETRATION | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. G06 |
| APPROVED: CHARLES PALMER | UPDATE: 09/2021 | |

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| TYPICAL MEMBER DIMENSIONS | | | | | | | | | | |
|---------------------------|--------------|-----------|-------------|---------------------------|---------------|---------------|--------------|----------------|---------------|---------------|
| FENCE HEIGHT | LINE POSTS | | | END, LATCH & CORNER POSTS | | | BRACES | | | |
| | ROUND (I.D.) | H | ROLL FORMED | ROUND (I.D.) | ROLL FORMED | | ROUND (I.D.) | H | ROLL FORMED | |
| | | | | | ∩ | □ □ | | | □ | □ |
| OVER 6' | 2" | 2 1/4"x2" | 2"x1 3/4" | 2 1/2" | 3 1/2"x3 1/2" | 2 1/2"x2 1/2" | 1 1/4" | 1 1/2"x1 5/16" | 1 5/8"x1 1/4" | 1 3/4"x1 1/4" |

| GATE POST | | | |
|--------------|---------------------|------------|-----------------|
| FENCE HEIGHT | GATE WIDTH | NOMINAL ID | WEIGHT PER FOOT |
| OVER 6' | UP THROUGH 6' | 3" | 7.58 |
| | OVER 6' TO 12' | 5" | 14.62 |
| | OVER 12' TO 18' | 6" | 18.97 |
| | OVER 18' TO 24' MAX | 8" | 28.55 |

NOTE: ABOVE POST DIMENSIONS AND WEIGHTS ARE MINIMUMS. LARGER SIZES MAY BE USED.

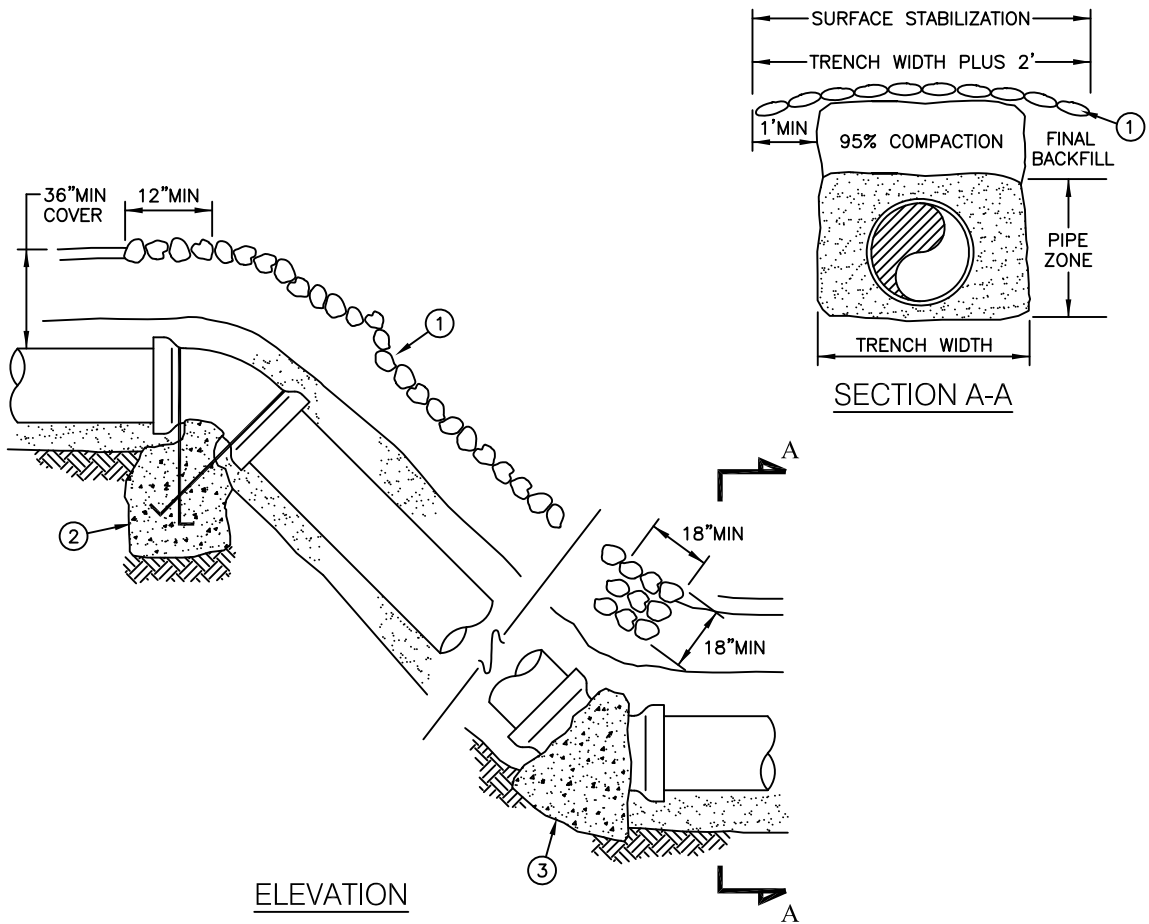


NOTES:

1. TABLE SHOWS EXAMPLES OF POST AND BRACE SECTIONS WHICH MAY COMPLY WITH THE SPECIFICATIONS.
2. SECTIONS SHOWN IN THE TABLES MUST ALSO COMPLY WITH THE STRENGTH REQUIREMENTS AND OTHER PROVISIONS OF THE SPECIFICATIONS.
3. OTHER SECTIONS WHICH COMPLY WITH THE STRENGTH REQUIREMENTS AND OTHER PROVISIONS OF THE SPECIFICATIONS MAY BE USED ON APPROVAL OF THE ENGINEER.
4. OPTIONS EXERCISED SHALL BE UNIFORM ON ANY ONE PROJECT.
5. DIMENSIONS SHOWN ARE NOMINAL.

| | | |
|--|--------------------|---|
| CALAVERAS COUNTY WATER DISTRICT | | |
| GENERAL DETAILS | | |
| CHAIN-LINK FENCE AND GATES | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. G07 |
| APPROVED BY: CHARLES PALMER | UPDATE: 09/2021 | |

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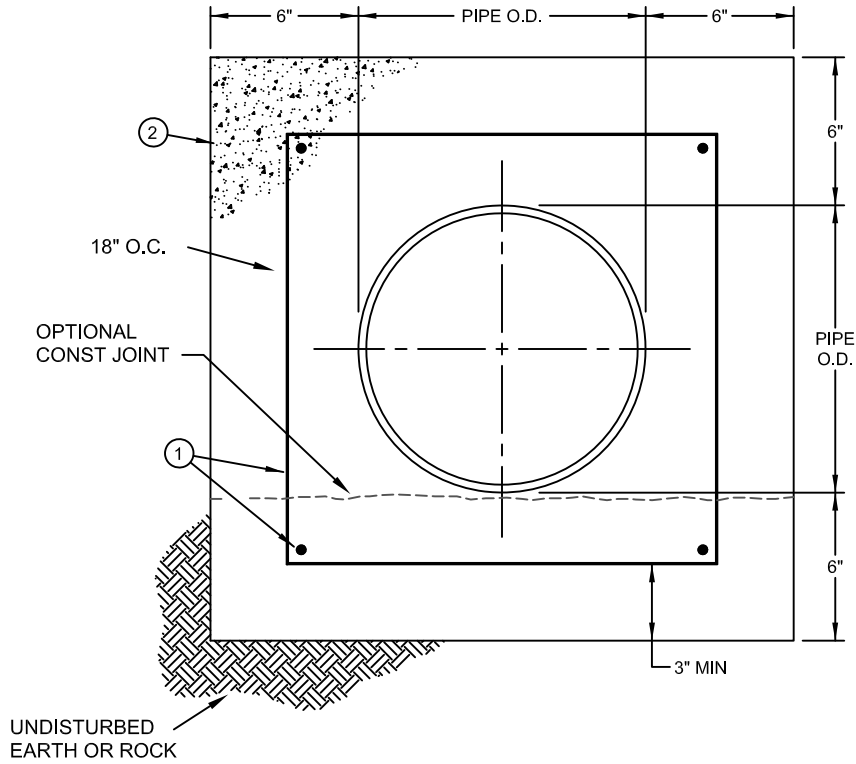


NOTES:

1. SLOPE PROTECTION AND/OR TRENCH STABILIZER SHALL BE PROVIDED FOR SLOPES GREATER THAN 30% OR AS REQUIRED. EXTEND BEYOND DRAINAGE WAYS. PIPE IN STABILIZED AREAS SHALL BE DUCTILE IRON WITH RESTRAINED JOINTS ON SLOPE, EXTENDING TWO PIPE LENGTHS BEFORE AND AFTER SLOPE.
2. 6" ROCK, OR WATER BAR, CROWNED AS SHOWN IN SECTION A-A SHALL EXTEND 1' (ONE FOOT) MINIMUM PAST TRENCH WIDTH, AS DIRECTED.

| ITEM # | DESCRIPTION |
|--------|--|
| ① | 6" ROCK, ONE LAYER GROUTED IN PLACE OR OTHER STABILIZATION AS APPROVED BY CCWD |
| ② | VERTICAL THRUST BLOCK |
| ③ | HORIZONTAL THRUST BLOCK |

| | | |
|--|--------------------|---|
| CALAVERAS COUNTY WATER DISTRICT | | |
| GENERAL DETAILS SLOPE PROTECTION | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. G08 |
| APPROVED BY: CHARLES PALMER | UPDATE: 09/2021 | |



CONCRETE ENCASEMENT

NOTES:

1. INSTALL SAND BAGS UNDER THE PIPE AT MIDPOINT AND AT EACH JOINT TO SUPPORT PIPE.
2. PIPE JOINTS SHALL BE TIED DOWN TO PREVENT FLOATING.
3. ALL ENCASED PIPE SHALL BE DUCTILE IRON AND WRAPPED
4. PIPE SHALL BE DUCTILE IRON WITH RESTRAINED JOINTS EXTENDING TWO PIPE LENGTHS BEFORE AND AFTER ENCASEMENT

| ITEM # | DESCRIPTION |
|--------|--------------------|
| ① | #4 REBAR |
| ② | CLASS "3" CONCRETE |

CALAVERAS COUNTY WATER DISTRICT

GENERAL DETAILS
CONCRETE ENCASEMENT

DRAWN BY:
CCWD STAFF

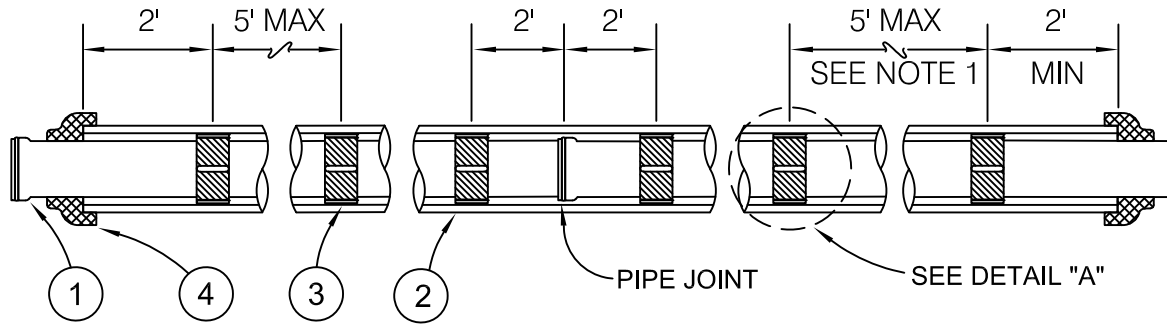
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CCWD STANDARD DRAWING NO.

APPROVED BY:
CHARLES PALMER

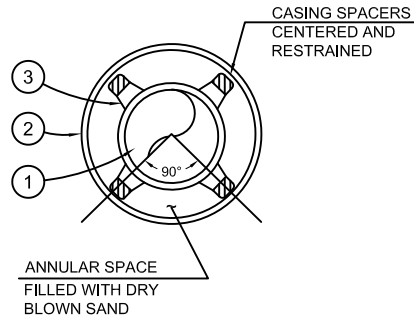
UPDATE:
09/2021

G09



PROFILE

| ITEM | DESCRIPTION |
|------|--|
| ① | CARRIER / WATER MAIN, CLASS 350 DUCTILE IRON PIPE WITH RESTRAINED JOINTS (U.S. PIPE TR-FLEX, AMERICAN FLEX-RING OR EQUAL) |
| ② | STEEL CASING PIPE WITH 0.25-INCH THICK WALL, AND ALL JOINTS FULLY BUTT WELDED |
| ③ | NON-METALIC CASING SPACERS, GPT INDUSTRIES RANGER II, CALPICO MODEL PX-SS, OR EQUAL |
| ④ | END SEALS, SYNTHETIC RUBBER, WRAP AROUND WITH SELF-ADHERING SEAM OR SLIP-ON BOOT, STAINLESS STEEL BANDS (CALPICO, GPT INDUSTRIES OR EQUAL) |



DETAIL "A"

NOTES:

1. Provide minimum four spacers per standard length 18' to 20' pipe supporting each side of joints uniformly spacing insulators along each pipe segment.
2. All work shall conform to requirements of the Cal-Trans Encroachment Permits Manual, and specific terms and conditions of the State and/or County issued encroachment permit.
3. Contractor shall obtain a project or annual permit for excavations for subject work in conformance with Cal-OSHA regulations. All pits shall be sheeted, shored and braced according to the Division of Industrial Safety, Construction Safety Orders, Article 6, Excavations, Sections 1539-1543.
4. Bore and receiving pits shall conform to Cal-Trans Encroachment Permits Manual, Chapter 600 and adequately shored to ensure against ground movement and to safeguard existing surface improvements and substructures. Pits shall not affect public or private facilities or create a hazard to traveling public; damage to State facilities shall be replaced in-kind or repaired to original condition.
5. All pits shall be fenced and Type-K barrier placed for protection adjacent to traffic and road; Type-K railing shall be placed at 20:1 taper or as otherwise directed by District. Pits left open overnight shall have a 6-ft high fence with panel sections securely fastened together for pedestrian safety. Reflectors shall be secured to sides of fence that face traffic.
6. For State Highway crossings, subsurface monitoring points shall be installed and surveyed prior to starting work. Points shall be monitored regularly during bore and jack operations and Cal-Trans representative notified immediately of any ground movement or change in elevation.

| Carrier Pipe Size | Casing Pipe | |
|-------------------|-------------|-----------------|
| | Size | Wall Thickness* |
| 4" | 12" | 1/4" |
| 6" | 14" | 1/4" |
| 8" | 16" | 1/4" |
| 10" | 18" | 1/4" |
| 12" | 20" | 1/4" |
| 16" | 30" | 3/8" |
| 20" | 36" | 3/8" |
| 24" | 42" | 1/2" |

* thickness for casing pipes less than 150'(ft) in length.

CALAVERAS COUNTY WATER DISTRICT

**GENERAL DETAILS
CASING DETAIL**

DRAWN BY:
CCWD STAFF

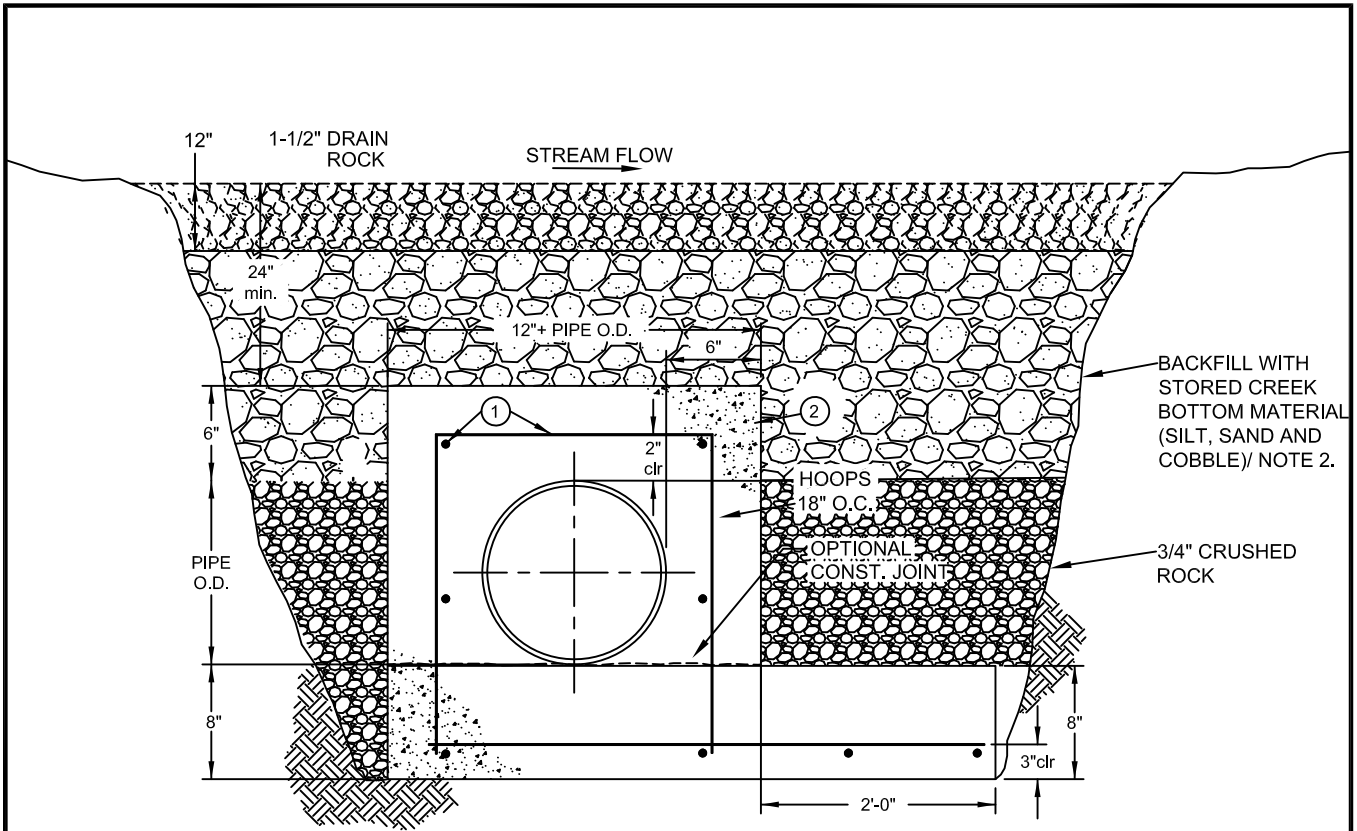
SCALE:
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CCWD STANDARD DRAWING NO.

APPROVED BY:
CHARLES PALMER

UPDATE:
09/2021

G10



STREAM CROSSING IN SOIL

NOTES:

1. PIPE SHALL BE DUCTILE IRON WITH RESTRAINED JOINTS EXTENDING TWO PIPE LENGTHS BEFORE AND AFTER ENCASEMENT
2. BACKFILL & COMPACT WITH NATIVE/STORED CREEK BOTTOM MATERIAL; USE IMMEDIATELY ADJACENT/NEARBY MATERIAL FROM STREAM BANKS IF LOWER MOISTURE CONTENT IS NEEDED FOR COMPACTION.

| ITEM # | DESCRIPTION |
|--------|------------------|
| ① | #4 REBAR |
| ② | CLASS 3 CONCRETE |

CALAVERAS COUNTY WATER DISTRICT

**GENERAL DETAILS
STREAM CROSSING**

DRAWN BY:
CCWD STAFF

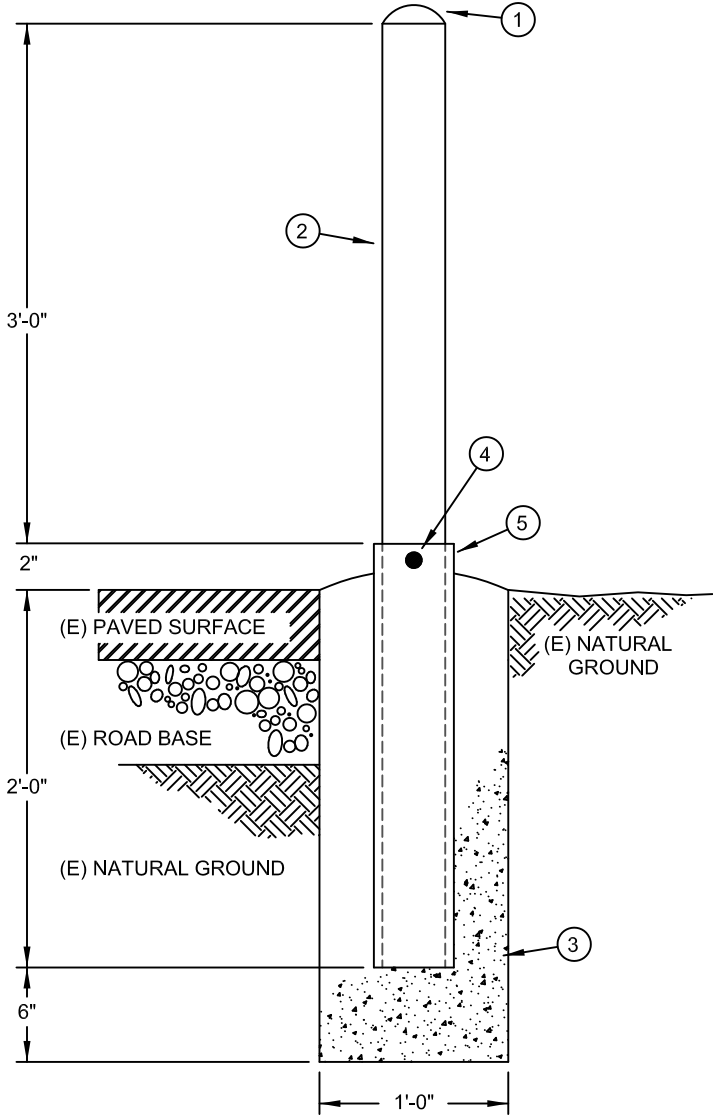
SCALE:
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CCWD STANDARD DRAWING NO.

APPROVED BY:
CHARLES PALMER

DATE:
09/2021

G11



REMOVABLE GUARD POST

| ITEM # | DESCRIPTION |
|--------|--|
| ① | 3" PVC END CAP |
| ② | 3" SCH 40 STEEL POST, PAINTED SAFETY YELLOW, PLAIN END |
| ③ | CLASS 3 CONCRETE |
| ④ | 1/2" BOLT THRU SLEEVE & POST w/NUT |
| ⑤ | 4" STEEL SLEEVE EXTENDING 2" ABOVE CONCRETE |

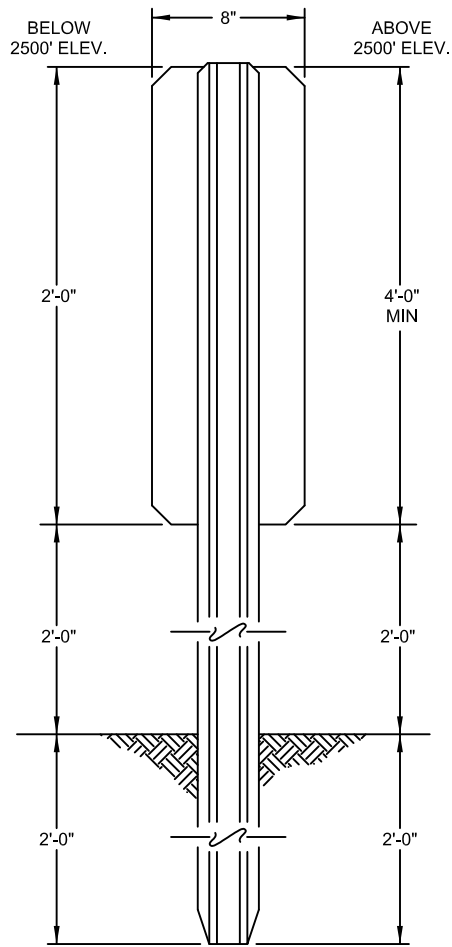
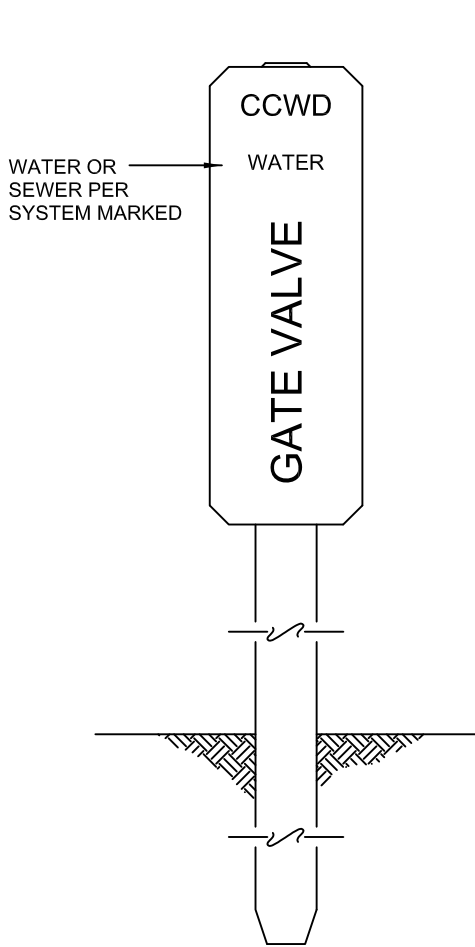
NOTES:

1. EXPOSED PIPE TO BE PAINTED YELLOW WITH TWO COATS OF PRIMER.

| | | |
|---|--------------------|---|
| CALAVERAS COUNTY WATER DISTRICT | | |
| GENERAL DETAILS REMOVABLE GUARD POST | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. G12 |
| APPROVED BY: CHARLES PALMER | UPDATE: 09/2021 | |

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PADDLE MARKER PLACEMENT

| <u>SEWER</u> | <u>WATER</u> |
|------------------|------------------|
| GATE VALVE | GATE VALVE |
| AIR RELIEF VALVE | AIR RELIEF VALVE |
| MANHOLES | FIRE HYDRANT |

NOTES:

1. THE MARKER SHALL BE FLAT WHITE STEEL PLATE WITH BLUE LETTERING FOR WATER AND GREEN LETTERING FOR SEWER AS NOTED ABOVE
2. SEE CALTRANS STANDARD MARKER TYPE TYPE L-1 PER CALTRANS STANDARD PLANS.
3. PADDLE MARKER SHALL FACE TOWARDS APPURTENANCE
4. ABOVE 2500' ELEVATION MARKERS SHOULD BE USED WITH SNOW POLES.
5. PLACE SIGN OUTSIDE OF PAVED AREAS NO MORE THAN 36" FROM CCWD APPURTENANCE BEING MARKED.
6. MARKERS TO BE PLACED WHERE NOTED IN TABLE ABOVE UNLESS OTHERWISE INDICATED ON CONSTRUCTION PLANS.

CALAVERAS COUNTY WATER DISTRICT

**GENERAL DETAILS
PADDLE MARKER**

DRAWN BY:
CCWD STAFF

SCALE:
NONE

CCWD STANDARD DRAWING NO.

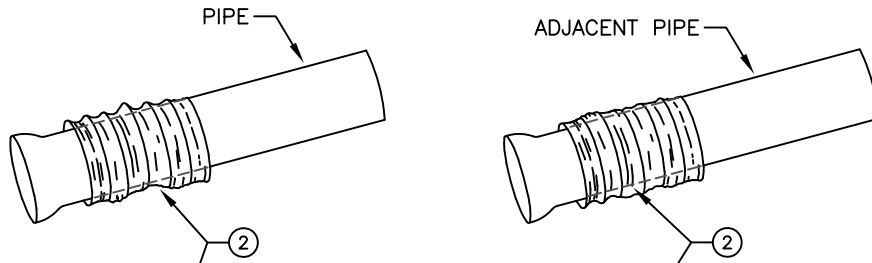
APPROVED BY:
CHARLES PALMER

DATE:
09/2021

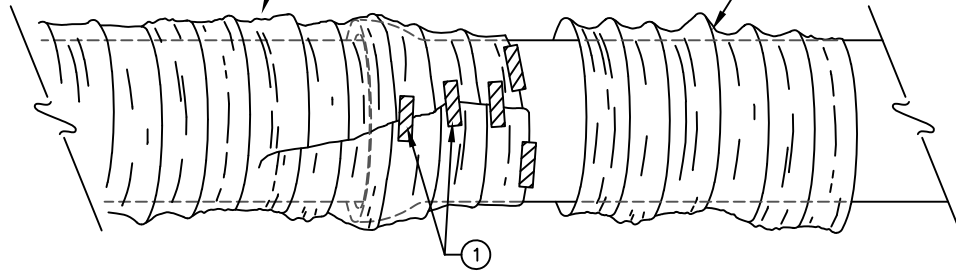
G12A

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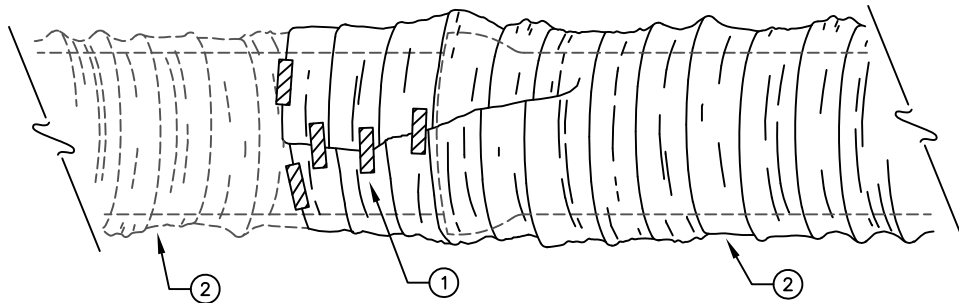
STEP 1
SIDE VIEW



STEP 2
TOP VIEW



STEP 3
TOP VIEW

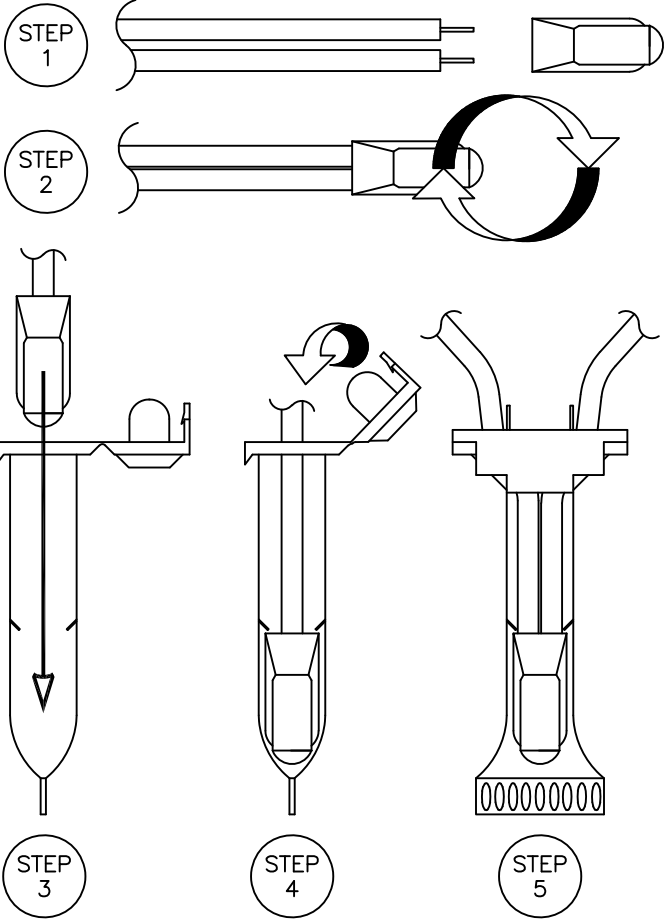


FIELD INSTALLATION - POLYETHYLENE WRAP

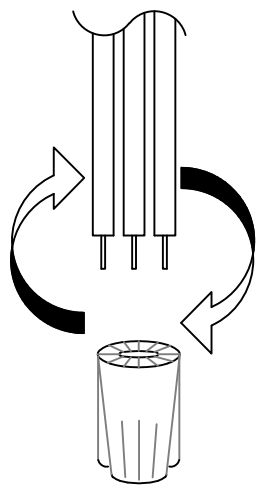
- STEP 1: PLACE TUBE OF POLYETHYLENE MATERIAL ON PIPE PRIOR TO LOWERING INTO TRENCH.
- STEP 2: PULL THE TUBE OVER THE LENGTH OF THE PIPE AND TAPE TO TOP OF PIPE AT JOINT. FOLD THE MATERIAL AROUND THE ADJACENT SPIGOT END AND WRAP WITH TAPE TO HOLD THE PLASTIC TUBE IN PLACE.
- STEP 3: OVERLAP FIRST TUBE WITH ADJACENT TUBE AND SECURE WITH UTILITY TAPE. THE POLYETHYLENE TUBE MATERIAL COVERING THE PIPE SHALL BE LOOSE. EXCESS MATERIAL SHALL BE NEATLY DRAWN UP AROUND THE PIPE BARREL, FOLDED ON TOP OF THE PIPE AND TAPED IN PLACE.

| ITEM # | DESCRIPTION |
|--------|--------------|
| ① | UTILITY TAPE |
| ② | PIPE WRAP |

| | | |
|--|--------------------|---|
| CALAVERAS COUNTY WATER DISTRICT | | |
| GENERAL DETAILS POLYETHYLENE WRAP | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. G13 |
| APPROVED BY: CHARLES PALMER | UPDATE: 09/2021 | |



TRACER WIRE SPLICE DETAIL
TWO WIRES ONLY



TRACER WIRE SPLICE DETAIL
TWO TO FOUR WIRES

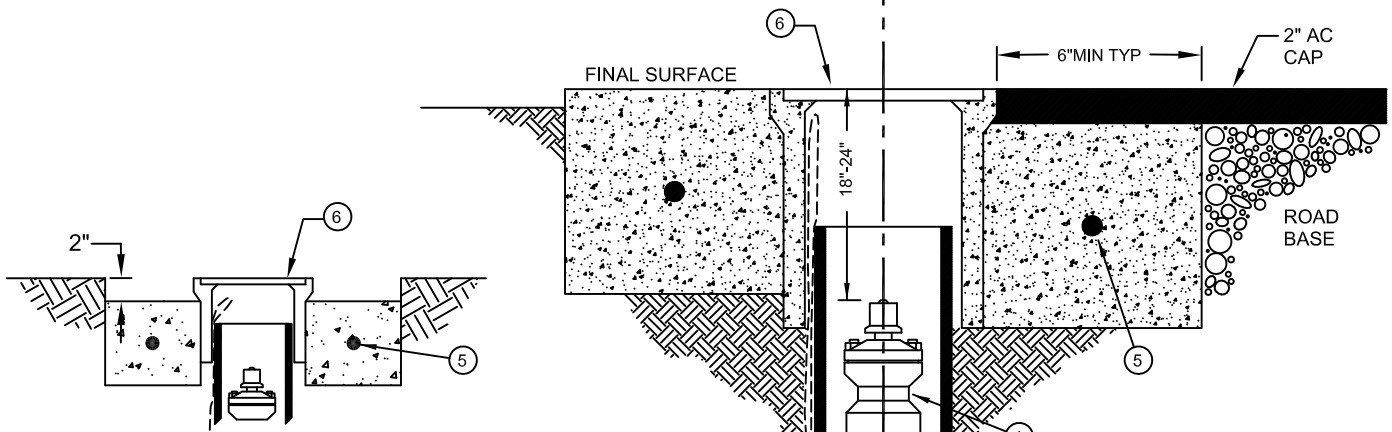
NOTES:

1. LOCATING WIRE SHALL BE INSTALLED WITH ALL PIPE. SERVICE LINES FROM WATER MAIN TO METER, WHICH ARE NOT PERPENDICULAR TO THE MAIN, SHALL HAVE A LOCATING WIRE ALSO. WIRE TO BE TAPED TO BASE OF CURB STOP.
2. LOCATE WIRE DIRECTLY ON TOP OF PIPE AND TAPE TO PIPE (TWO PLACES EVERY FULL PIPE SECTION).
3. STRIP APPROXIMATELY 3" (in) OF INSULATION AT THE TERMINATION OF THE WIRE IN THE VALVE OR METER BOX.
4. AT THE TERMINATION OF LOCATING WIRE, INSTALL AN EXTRA VALVE BOX IF NECESSARY. SHOW LOCATION ON PLANS.
5. THE CONTRACTOR SHALL TEST THE CONTINUITY OF THE FINISHED INSTALLATION.

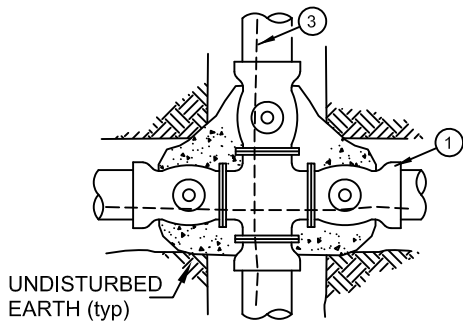
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|--|------------------|--|
| CALAVERAS COUNTY WATER DISTRICT | | |
| WATER DETAILS | | |
| LOCATING WIRE SPLICES | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W02A |
| APPROVED BY: CHARLES PALMER | DATE: 09/2021 | |

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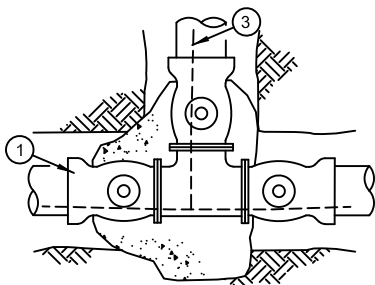
OUTSIDE OF ROADWAY IN ROADWAY



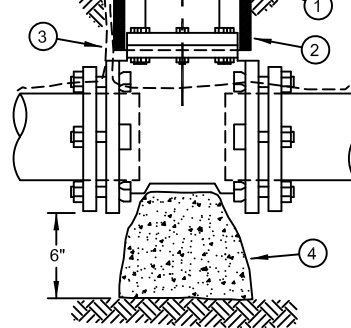
INSTALLATION IN LANDSCAPING



CROSS INSTALLATION



TEE INSTALLATION



GATE VALVE DETAIL

| ITEM # | DESCRIPTION |
|--------|--|
| ① | GATE VALVE, RESILIENT SEAT |
| ② | 8" C900 P.V.C. RISER |
| ③ | TRACER WIRE FOR ALL INSTALLATIONS (PER DETAIL W02 & W02A) |
| ④ | CONCRETE BLOCK, 3sqft AREA, BOTTOM THRUST AREA, REQUIRED FOR VALVES 8" OR LARGER |
| ⑤ | #4 REBAR HOOP |
| ⑥ | CHRISTY G5 OR APPROVED EQUAL CONCRETE VALVE BOX BODY WITH TRAFFIC TYPE CI COVER MARKED WATER. RECESS BOX 1/4" MAX. FOR SNOW REMOVAL ABOVE 2000'. |

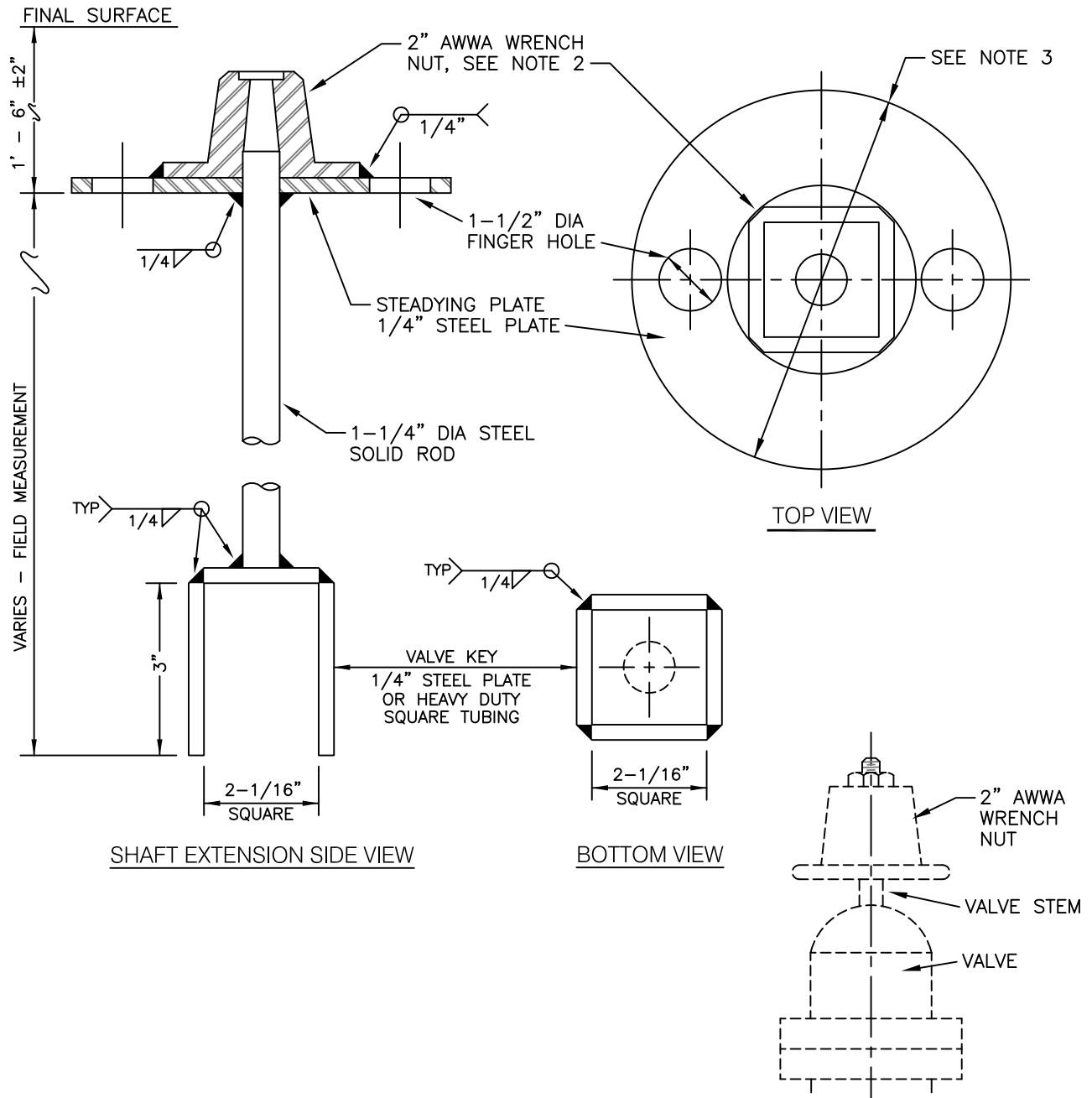
NOTES:

1. ALL GATE VALVES SHALL BE EPOXY COATED, AWWA APPROVED AND FULLY ENCAPSULATED WITH RESILIENT SEAT, MECHANICAL JOINT OR FLANGE.
2. VALVES PLACED FOR FUTURE LINE EXTENSIONS SHALL HAVE A BLIND FLANGE PLACED OVER THE OUTLET.
3. WHEN OPERATING NUT IS GREATER THAN 36" FROM FG, INSTALL STEM EXTENSIONS. (see CCWD W03A)

CALAVERAS COUNTY WATER DISTRICT

**WATER DETAILS
GATE VALVE INSTALLATION**

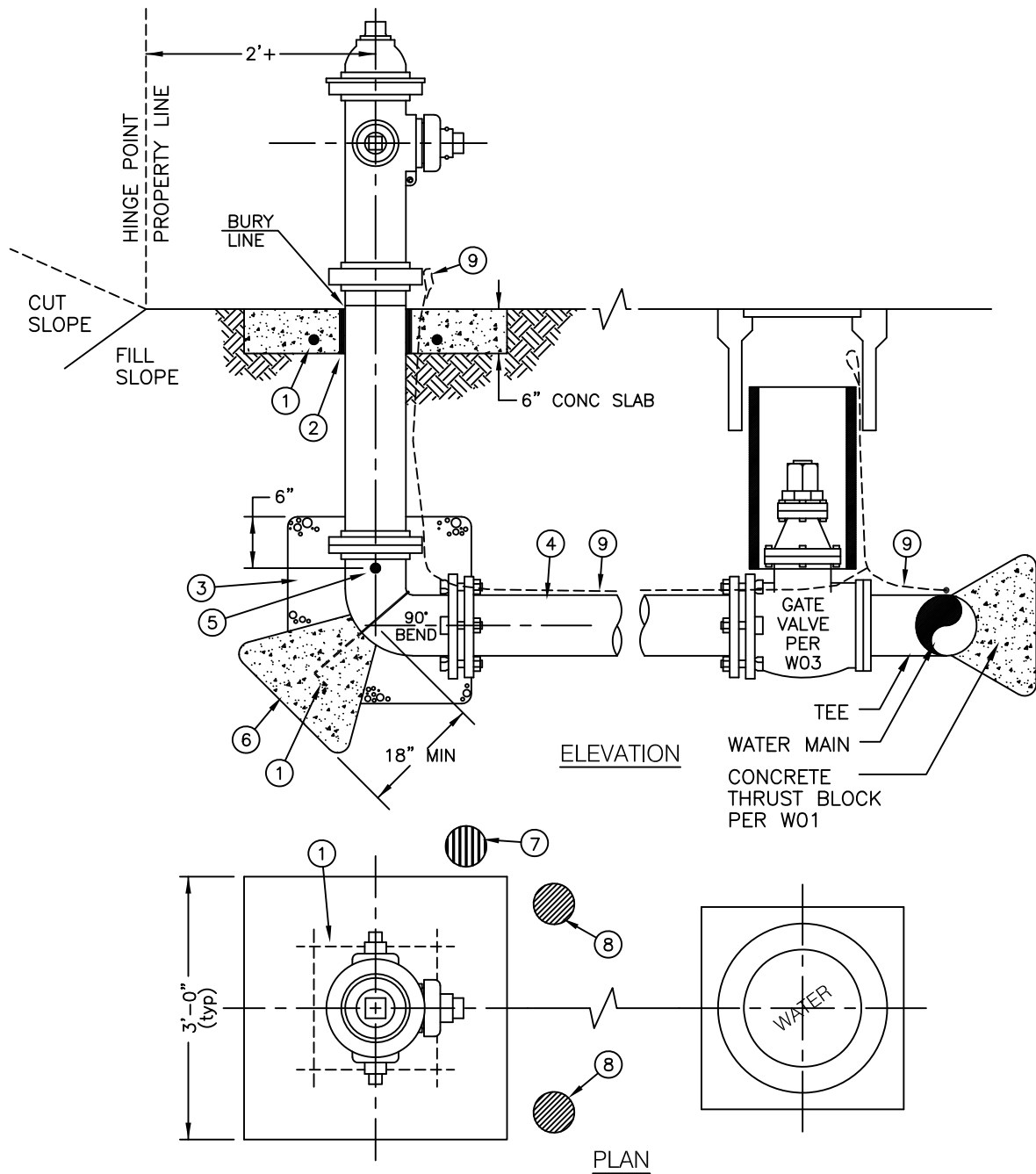
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| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W03 |
| APPROVED BY: CHARLES PALMER | DATE: 09/2021 | |



NOTES:

1. AN EXTENSION SHALL BE REQUIRED WHEN THE TRENCH DEPTH IS 36" (in) OR MORE BELOW THE FINAL SURFACE, OR AS SPECIFIED.
2. WRENCH NUT SHALL BE AS SPECIFIED IN AWWA C500, SECTION 20. PEEN TOP OF SHAFT TO SECURE THE NUT, OR ATTACH BY WELDING.
3. STEADYING PLATE DIAMETER SHALL BE EQUAL TO THE INSIDE DIAMETER OF THE VALVE BOX EXTENSION MINUS 3/4" (in).
4. COAT ENTIRE ASSEMBLY IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.

| | | |
|--|------------------|--|
| CALAVERAS COUNTY WATER DISTRICT | | |
| WATER DETAILS GATE VALVE EXTENSION INSTALLATION | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W03A |
| APPROVED BY: CHARLES PALMER | DATE: 09/2021 | |



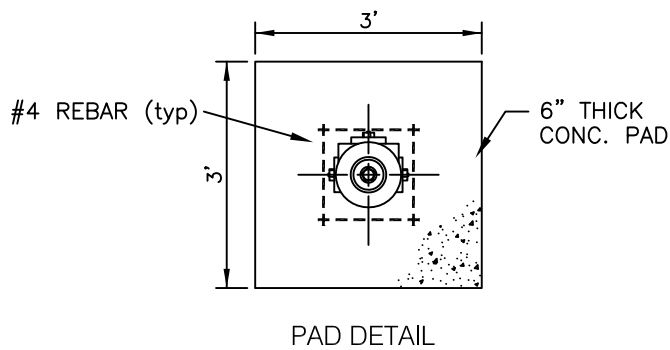
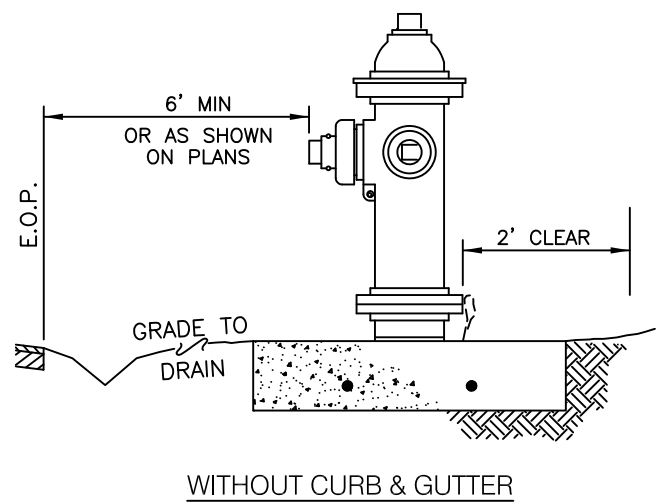
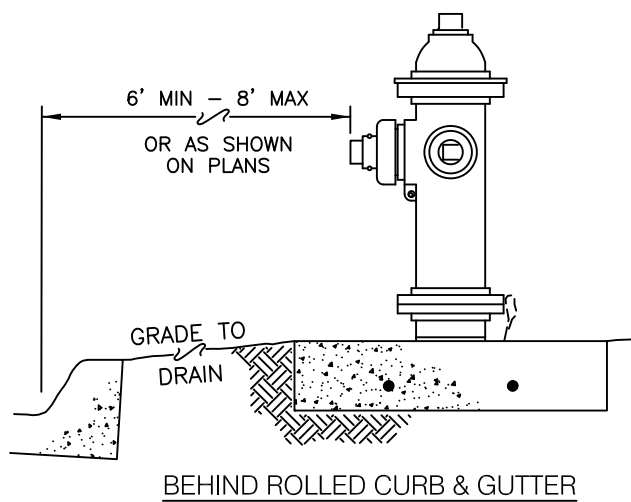
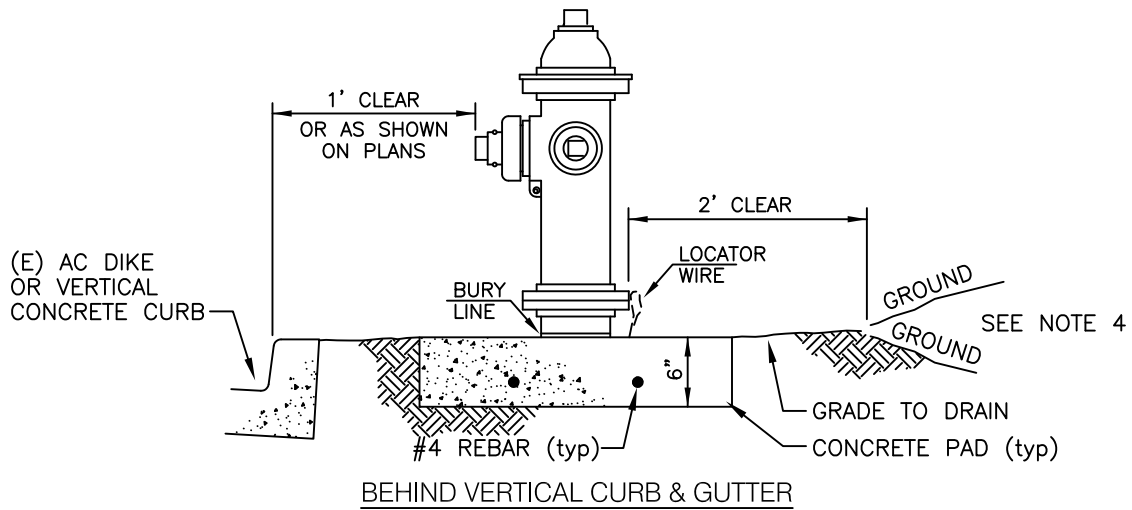
| ITEM # | DESCRIPTION |
|--------|---|
| ① | #4 REBAR |
| ② | PLASTIC WRAP |
| ③ | DRAINAGE PIT, APPROX 2.5' sq, 2.5' DEEP FILLED w/ 3/4" CRUSHED DRAIN ROCK |
| ④ | 6" C-900 P.V.C. |
| ⑤ | HYDRANT DRAIN, REMOVE PLUG WHEN INSTALLING |
| ⑥ | CONCRETE THRUST BLOCK w/#4 REBAR, 6 sqft MIN THRUST AREA |
| ⑦ | PADDLE MARKER W/ SNOW POLE AS REQUIRED ABOVE 2500' |
| ⑧ | GUARD POST AS REQUIRED |
| ⑨ | LOCATOR WIRE FOR ALL INSTALLATIONS (PER DETAIL W02 & W02A) |

NOTES:

1. USE TAPPING SLEEVE AND VALVE ON EXISTING MAINS 8" (in) AND LARGER.
2. INSTALL GUARD POSTS & SNOW POLES AS DIRECTED.
3. SEE STD DWG W04A FOR FIRE HYDRANT LOCATIONS.
4. SET CONCRETE PAD TO FIT/MATCH HYDRANT BURY LINE

| | | |
|--|------------------|---|
| CALAVERAS COUNTY WATER DISTRICT | | |
| WATER DETAILS | | |
| TYPICAL FIRE HYDRANT INSTALLATION | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W05 |
| APPROVED: CHARLES PALMER | DATE: 09/2021 | |

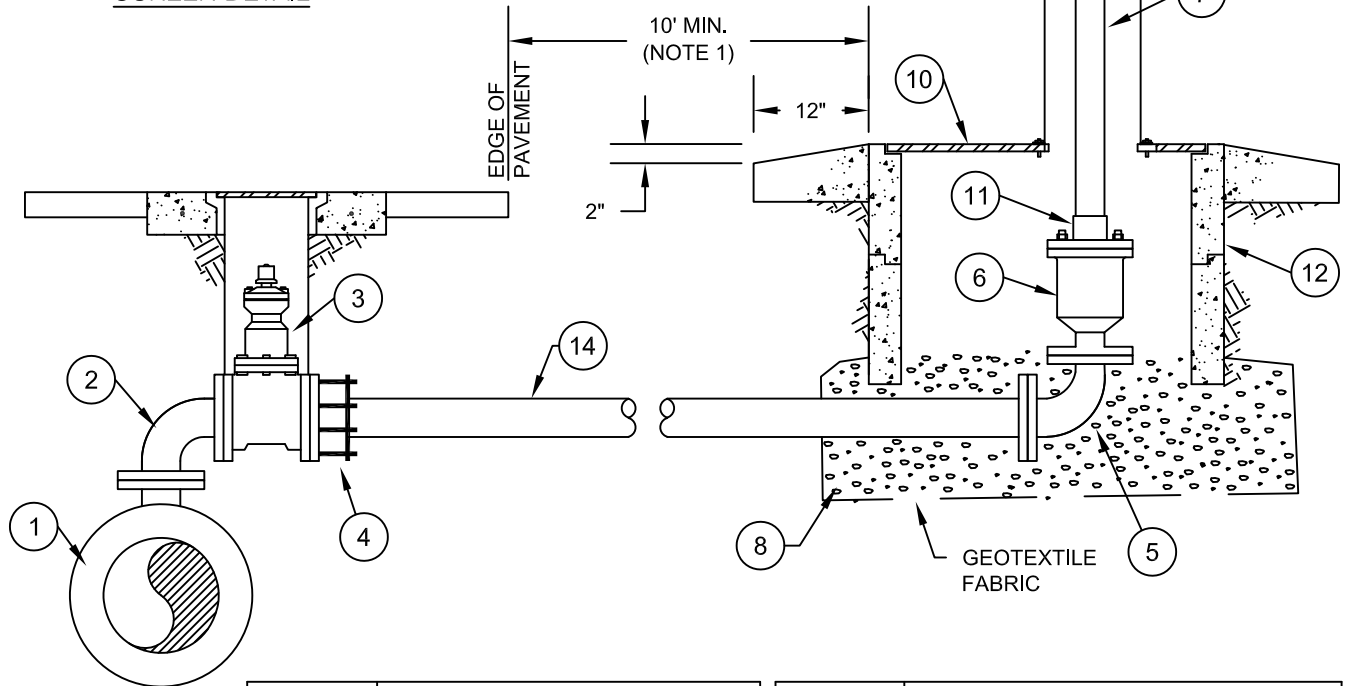
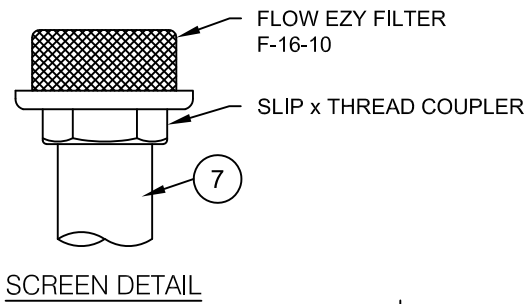
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NOTES:

1. THE FIRE HYDRANT IS TO BE PLACED BEHIND THE DRAINAGE DITCH AND NO FURTHER THAN 8' (ft) FROM DRIVEABLE SHOULDER SURFACE, BACK OF CURB, OR PER AGENCY INVOLVED.
2. ALL VALVE BOXES SET IN THE AC OR CONCRETE TO BE FINISHED GRADE MINUS 1/4" (in).
3. FOR TYPICAL INSTALLATION, SEE DETAIL W05.
4. ALTERNATE LOCATIONS & SLOPES GREATER THAN 2:1 IN ANY INSTANCE MUST HAVE DISTRICT ENGINEER'S APPROVAL PRIOR TO INSTALLATION.

| | | |
|--|------------------|--|
| CALAVERAS COUNTY WATER DISTRICT | | |
| WATER DETAILS TYPICAL FIRE HYDRANT LOCATION | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W04A |
| APPROVED BY: CHARLES PALMER | DATE: 09/2021 | |



| ITEM # | DESCRIPTION | ITEM # | DESCRIPTION |
|--------|--|--------|--|
| 1 | 12" X 4" DUCTILE IRON TEE | 8 | 1/2" CRUSHED ROCK ENCAPSULATED IN GEO-TEXTILE |
| 2 | 4" DUCTILE IRON 90° FLG BEND | 9 | FLOW EZY FILTER SEE SCREEN DETAIL |
| 3 | 4" AWWA GATE VALVE (SEE SPECIFICATIONS) | 10 | 3/16" DIAMOND PLATE 20.25" x 33.25" PLACER WATERWORKS PW/218(1730) |
| 4 | 4" EBAA MEGA FLANGE OR EQUAL | 11 | 3" SCH 80 THREAD X SOLVENT WELD COUPLING |
| 5 | 4" X 3" RED 90° EL. SCH40(FUSION EPOXY COATED) CL300 FLG | 12 | JENSEN PRECAST HT1730 TRAFFIC BOX OR EQUAL |
| 6 | 3" AIR/SURGE/ VAC VALVE (SEE SPECIFICATIONS) | 13 | 8"X8"X18" AIR VENT TUBE, PLACER WATERWORKS AV-18 |
| 7 | 3" SCH80 PVC (NOTE 3) | 14 | 4" DIP SPOOL CLASS 250 FLANGED X PLAIN END |

NOTES:

1. AIR VALVE BOX SHALL NOT BE LOCATED IN DRAINAGE DITCH. FINAL PLACEMENT AND LOCATION SHALL BE APPROVED BY ENGINEER TO SUITE ACTUAL FIELD CONDITIONS, TOPOGRAPHY AND GRADE.
2. PIPING INSTALLED PER STANDARD TRENCH DETAIL WITH POLYETHYLENE ENCASEMENT AND TRACER WIRE.
3. PRE-WELD PIPE TO COUPLING BEFORE THREADING INTO TOP OF AIR VALVE; SOLVENT MAY DAMAGE AIR VALVE.

CALAVERAS COUNTY WATER DISTRICT

**WATER DETAILS
AIR RELEASE VALVE (HIGH PRESSURE)**

DRAWN BY:
CCWD STAFF

SCALE:
NONE

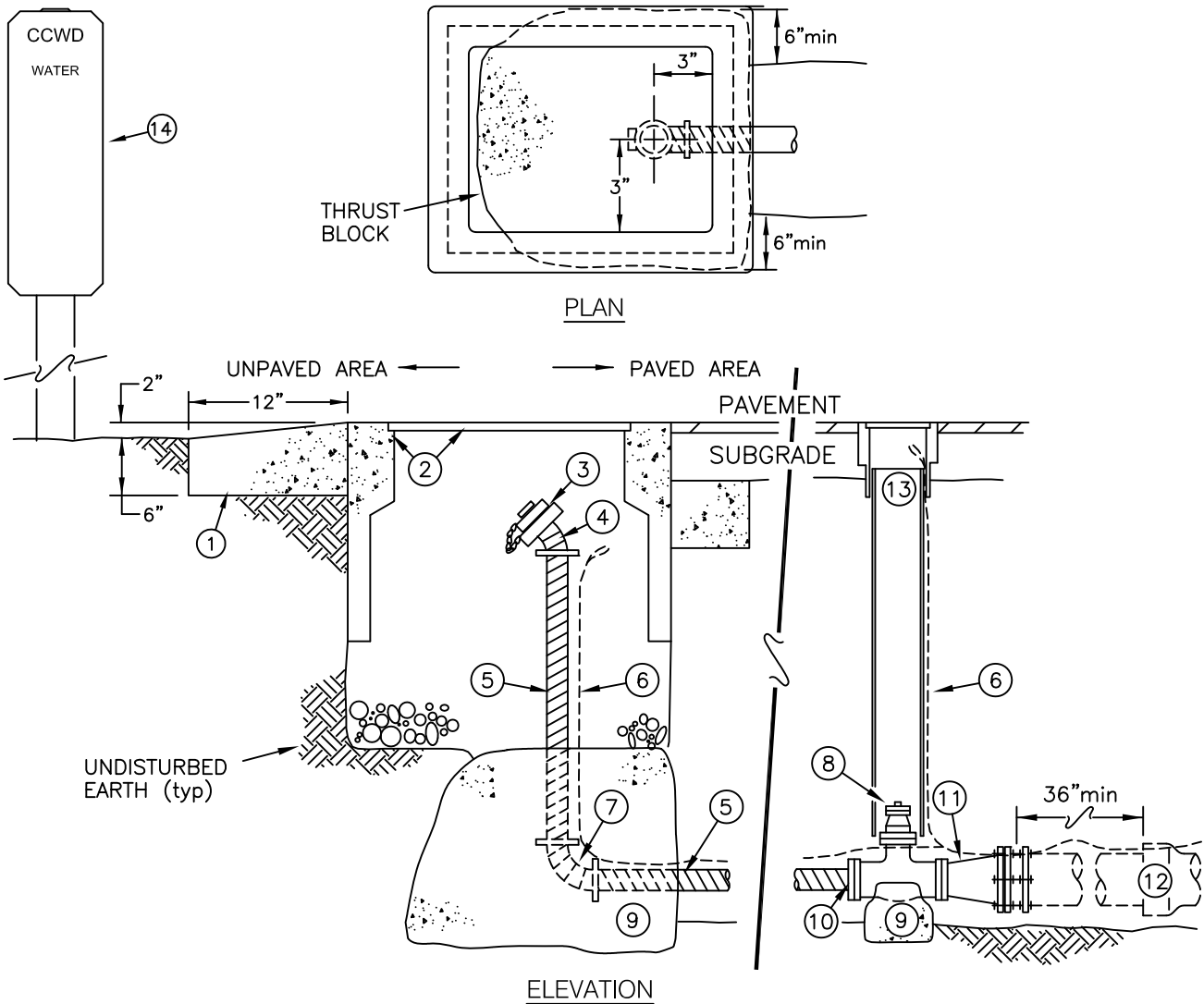
CCWD STANDARD DRAWING NO.

APPROVED:
CHARLES PALMER

DATE:
09/2021

W05

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| ITEM # | DESCRIPTION |
|--------|--|
| ① | 6"x6" CONC COLLAR (PAVED) 6"x12" CONC COLLAR (UNPAVED) |
| ② | CHRISTY PRECAST CONC. BOX B30 OR EQUAL w/STEEL COVER MARKED WATER |
| ③ | 2" NOZZEL CAP, HOSE NOZZEL & CAP CHAIN, MUELLER FAB SERIES OR APPROVED EQUAL |
| ④ | 2" BRASS 45° ELL, FIPxFIP |
| ⑤ | 2" BRASS PIPE |
| ⑥ | LOCATOR WIRE PER W03 & W03A |
| ⑦ | 2" BRASS 90° ELL, FIPxFIP |

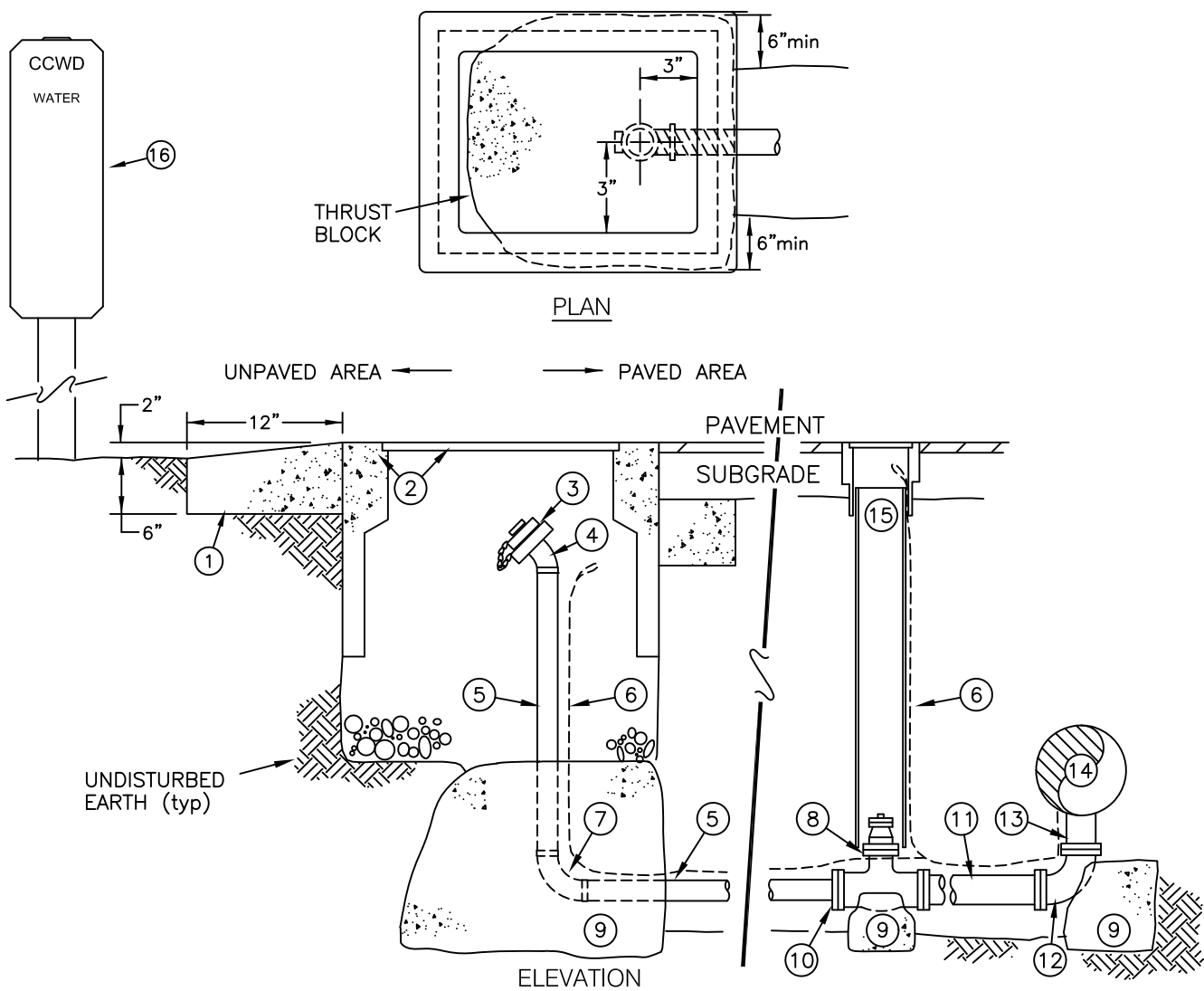
| ITEM # | DESCRIPTION |
|--------|--|
| ⑧ | 4" GATE VALVE, FLxMJ PER W04 & W04A |
| ⑨ | THRUST BLOCKS PER W02 (USE 4" CALC'S) |
| ⑩ | 4"x2" REDUCER FLANGE |
| ⑪ | ___"x 4" REDUCER, MJxFL |
| ⑫ | 8" OR SMALLER MAIN |
| ⑬ | VALVE BOX PER W04 |
| ⑭ | PADDLE MARKER PER G11A |

NOTES:

1. 2" BLOW-OFFS TO BE INSTALLED ON 8" AND SMALLER MAINS.
2. DISTRICT ENGINEER APPROVAL REQUIRED FOR BLOW-OFFS LARGER THAN 2".

| | | |
|--|------------------|---|
| CALAVERAS COUNTY WATER DISTRICT | | |
| WATER DETAILS | | |
| 2" DEAD-END BLOW-OFF VALVE | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W06 |
| APPROVED: CHARLES PALMER | DATE: 09/2021 | |

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| ITEM # | DESCRIPTION |
|--------|--|
| ① | 6"x6" CONC COLLAR (PAVED) 6"x12" CONC COLLAR (UNPAVED) |
| ② | UTILITY BOX w/STEEL COVER MARKED WATER |
| ③ | 2" NOZZEL CAP, HOSE NOZZEL & CAP CHAIN, MUELLER FAB SERIES OR APPROVED EQUAL |
| ④ | 2" BRASS 45° ELL, FIPxFIP |
| ⑤ | 2" BRASS PIPE |
| ⑥ | TRACER WIRE |
| ⑦ | 2" BRASS 90° ELL, FIPxFIP |
| ⑧ | 4" GATE VALVE, FLxFL PER W03 & W03A |

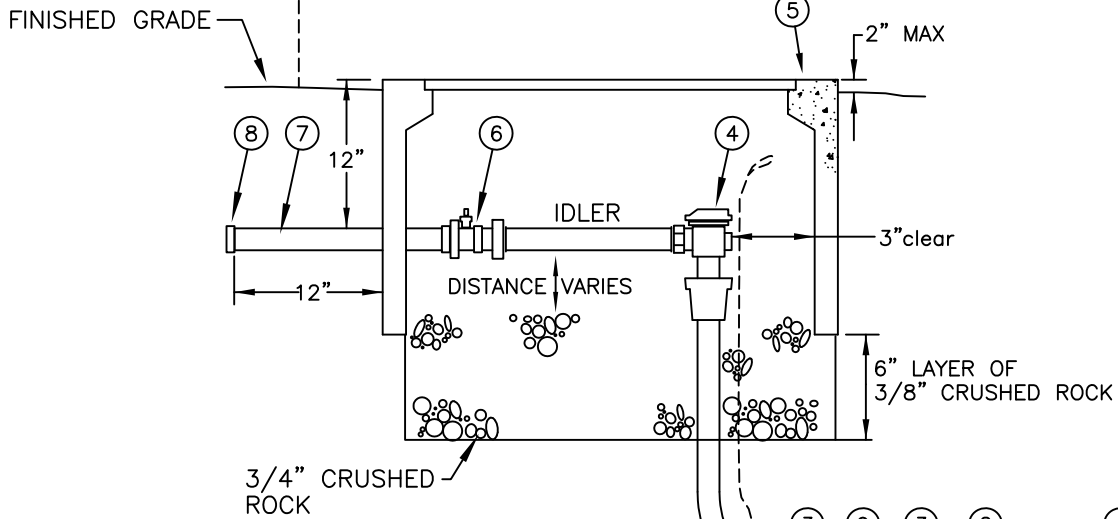
| ITEM # | DESCRIPTION |
|--------|--|
| ⑨ | THRUST BLOCKS PER W02 (USE 4" CALC'S) |
| ⑩ | ___"x 2" FLxFL THREADED REDUCER |
| ⑪ | 4" DIP, FLxFL |
| ⑫ | ___x 4" DIP 90° BEND, FLxFL |
| ⑬ | ___x 4" TEE FLxFL |
| ⑭ | 8" OR SMALLER MAIN |
| ⑮ | VALVE BOX PER W03 |
| ⑯ | PADDLE MARKER PER G12A |

NOTES:

- 2" BLOW-OFFS TO BE INSTALLED ON 8" AND SMALLER MAINS.
- DISTRICT ENGINEER APPROVAL REQUIRED FOR BLOW-OFFS LARGER THAN 2".

| | | |
|--|------------------|--|
| CALAVERAS COUNTY WATER DISTRICT | | |
| WATER DETAILS | | |
| 2" IN-LINE BLOW-OFF VALVE | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W06A |
| APPROVED: CHARLES PALMER | DATE: 09/2021 | |

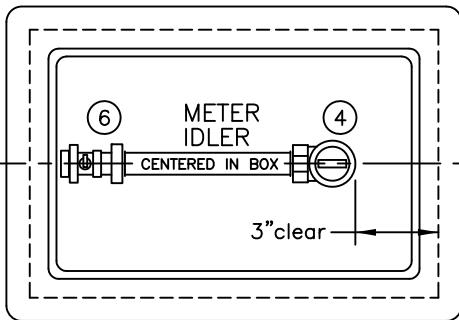
SEE STD DWG W08C & W08D
FOR METER BOX PLACEMENT
AND CUT/FILL SLOPES



ELEVATION

R=24" min
or coil radius

WATER MAIN



PLAN

| ITEM # | DESCRIPTION |
|--------|--|
| ① | SERVICE SADDLE |
| ② | 1" CORPORATION STOP |
| ③ | 1" P.E. CONTINUOUS TUBING, CTS |
| ④ | ANGLE BALL METER VALVE FOR 1" CTS TUBING AND 5/8" X 3/4" METER |
| ⑤ | METER BOX |
| ⑥ | STRAIGHT METER VALVE FOR 1" PVC PIPE AND 5/8" X 3/4" METER |
| ⑦ | 1" SCH 40 PVC PIPE |
| ⑧ | EXTEND/RECONNECT CUSTOMER SERVICE (NOTE 9) |
| ⑨ | TRACER WIRE |

NOTES:

- SERVICE SADDLE SHALL NOT BE INSTALLED WITHIN 18" OF VALVE, JOINT, OR FITTING.
- METER BOXES INSTALLED BY CONTRACTOR PER CCWD STANDARD DETAILS W07C & W07D
- SET TOP OF METER BOX FLUSH WITH SIDE-WALK OR AS SHOWN.
- ALL TAPS SHALL BE MADE WITH MACHINE GUIDE OR PILOT TAP.
- WATER SERVICE SHALL EXTEND PERPENDICULAR TO THE CENTERLINE OF THE STREET FROM THE WATER MAIN TO THE METER STOP.
- P.E. TUBING SHALL BE CONTINUOUS WITH STAINLESS STEEL INSERT STIFFENERS AT ENDS.
- ALL FITTINGS SHALL BE NSF-61 APPROVED BRASS.
- IDLER SIZED TO FIT FUTURE METER.
- AFTER NEW WATER MAINS AND SERVICE LINES ARE TESTED AND DISINFECTED, EXTEND AND CONNECT TRANSFER CUSTOMER SERVICE.
- TRENCH FOR 1" CTS TUBING TO BE MINIMUM 30" DEEP BEFORE METER.

CALAVERAS COUNTY WATER DISTRICT

**WATER DETAILS
1" SERVICE WITH METER BOX**

DRAWN BY:
CCWD STAFF

SCALE:
NONE

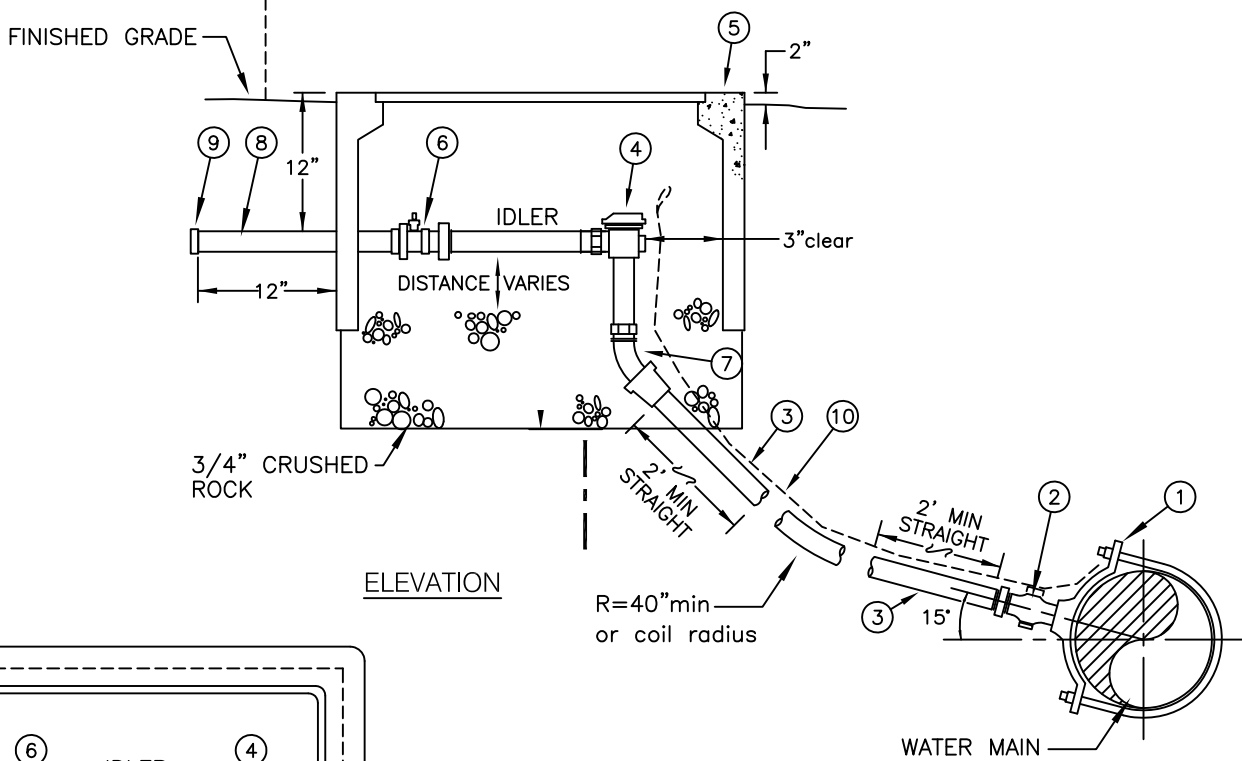
CCWD STANDARD DRAWING NO.

APPROVED:
CHARLES PALMER

DATE:
09/2021

W07

SEE STD DWG W07C & W07D
FOR METER BOX PLACEMENT
AND CUT/FILL SLOPES



ELEVATION

PLAN

NOTES:

1. SERVICE SADDLE SHALL NOT BE INSTALLED WITHIN 18" OF VALVE, JOINT, OR FITTING.
2. METER BOXES INSTALLED BY CONTRACTOR PER CCWD STANDARD DETAILS W07C & W07D
3. SET TOP OF METER BOX FLUSH WITH SIDE-WALK OR AS SHOWN.
4. ALL TAPS SHALL BE MADE WITH MACHINE GUIDE OR PILOT TAP.
5. WATER SERVICE SHALL EXTEND PERPENDICULAR TO THE CENTERLINE OF THE STREET FROM THE WATER MAIN TO THE METER STOP.
6. ALL FITTINGS SHALL BE NSF-61 APPROVED BRASS.
7. IDLER SIZED TO FIT FUTURE METER.
8. AFTER NEW WATER MAIN AND SERVICE LINES ARE TESTED AND DISINFECTED, EXTEND AND CONNECT/ TRANSFER CUSTOMER SERVICE.
9. TRENCH FOR 2" CTS TUBING TO BE MINIMUM 30" DEEP BEFORE METER.

| ITEM # | DESCRIPTION |
|--------|--|
| ① | SERVICE SADDLE |
| ② | 2" CORPORATION STOP |
| ③ | 2" P.E. CONTINUOUS TUBING, CTS |
| ④ | ANGLE BALL METER VALVE FOR 2" CTS TUBING AND METER |
| ⑤ | METER BOX |
| ⑥ | 2" BALL VALVE |
| ⑦ | 2" NSF-61 BRASS 45° CTS PACK JOINT |
| ⑧ | SCH 40 PVC PIPE |
| ⑨ | EXTEND PVC PIPE 12" BEYOND METER BOX CAP PIPE WITH PERMANENT CAP |
| ⑩ | TRACER WIRE |

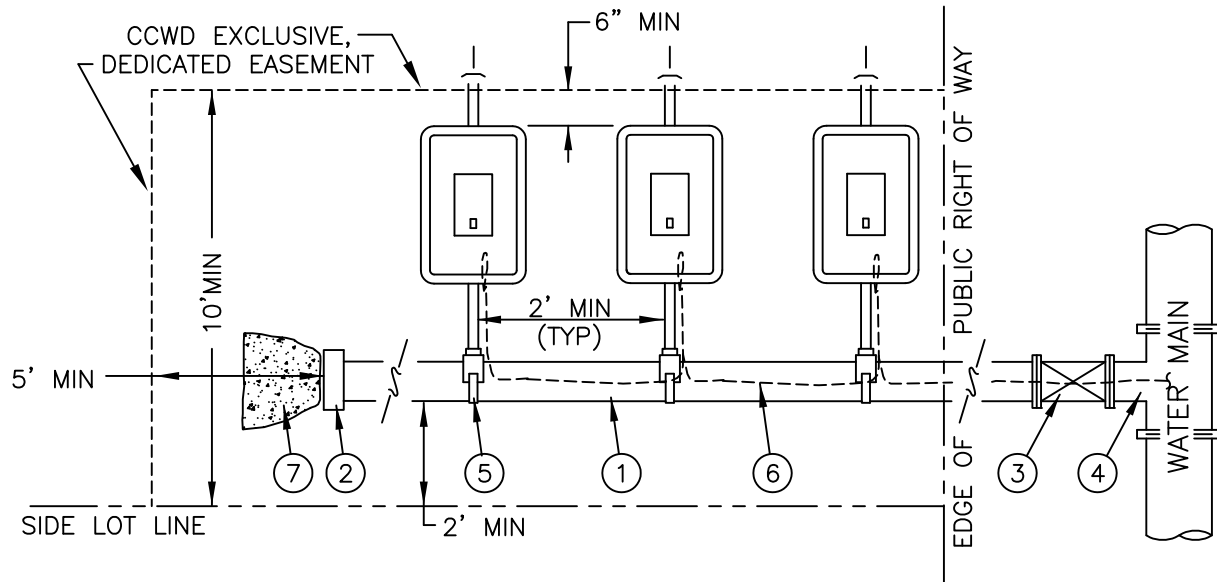
CALAVERAS COUNTY WATER DISTRICT

**WATER DETAILS
2" SERVICE WITH METER BOX**

| | | |
|-----------------------------|------------------|--|
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W07A |
| APPROVED: CHARLES PALMER | DATE: 09/2021 | |

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MULTIPLE SERVICE METERS

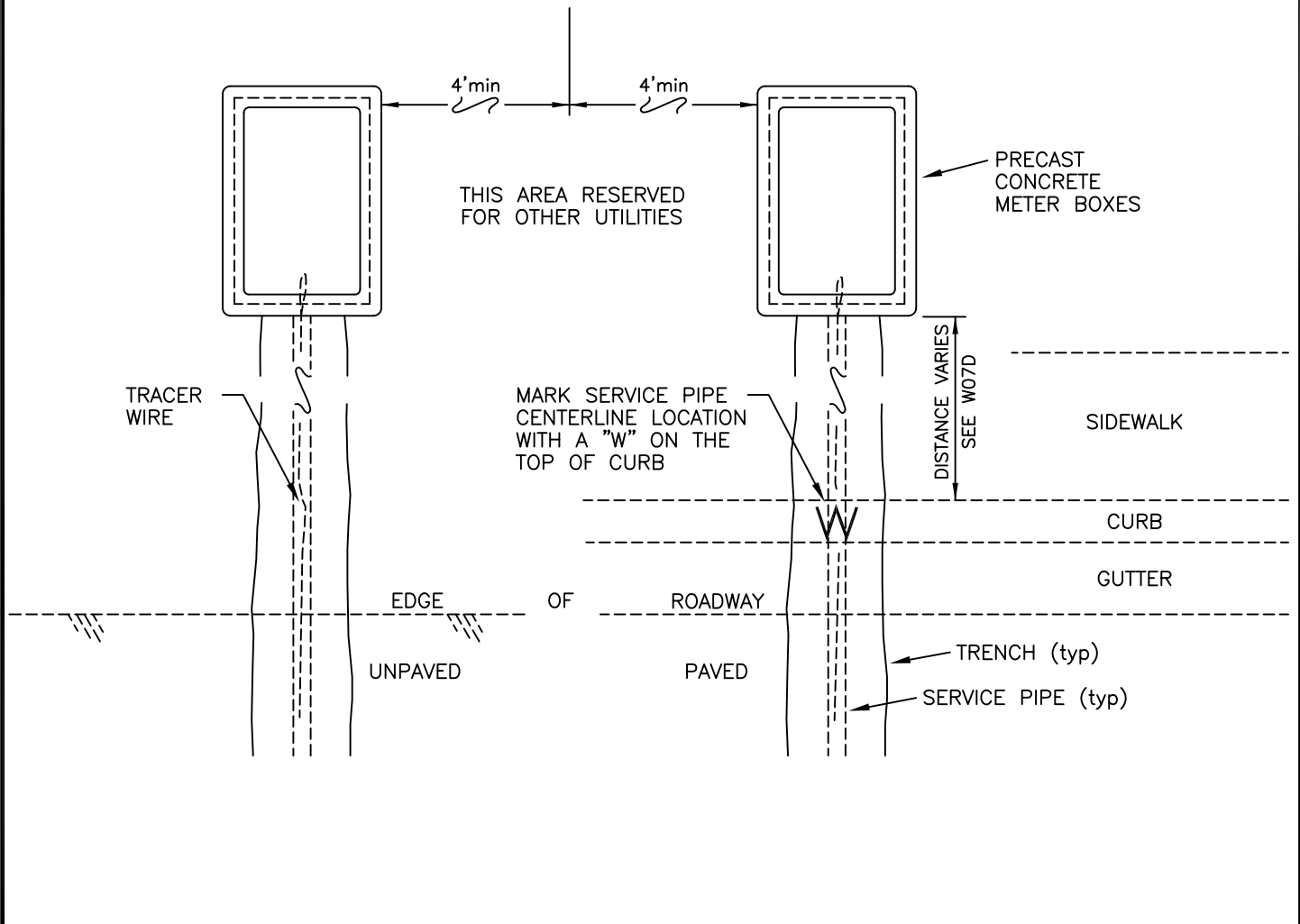
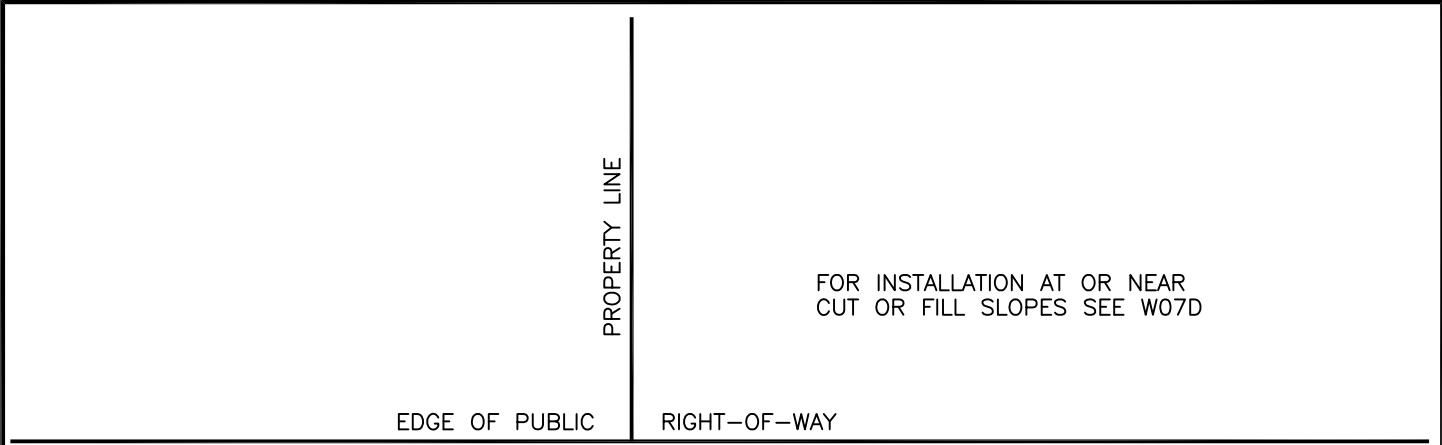
NOTES:

1. MANIFOLD LENGTH SHALL NOT EXCEED 40' EXCEPT BY WRITTEN PERMISSION FROM DISTRICT ENGINEER.
2. NUMBER OF METERS ALLOWED ON MANIFOLD SHALL BE DETERMINED & APPROVED BY DISTRICT ENGINEER.
3. MANIFOLDS EXCEEDING 40' REQUIRE IN-GROUND BLOWOFF.
4. METER BOXES INSTALLED BY CONTRACTOR PER CCWD STANDARD DETAILS W07C & W07D.
5. SET TOP OF METER BOX FLUSH WITH SIDE-WALK OR AS SHOWN ON STANDARD DETAILS W07 & W07A.
6. ALL TAPS SHALL BE MADE WITH MACHINE GUIDE OR PILOT TAP.
7. WATER SERVICE SHALL EXTEND PERPENDICULAR TO THE CENTERLINE OF THE MANIFOLD FROM THE MANIFOLD TO THE METER STOP.
8. ALL FITTINGS SHALL BE NSF-61 APPROVED BRASS.
9. MULTIPLE METERS REQUIRE AN EXCLUSIVE DEDICATED CCWD EASEMENT.
10. CUSTOMER TO CONNECT AFTER NEW SERVICE LINES ARE TESTED AND DISINFECTED.

| ITEM # | DESCRIPTION |
|--------|---|
| ① | C-900 PVC MANIFOLD |
| ② | END CAP |
| ③ | MJ x FLG GATE VALVE |
| ④ | __x__ MJxFL TEE CONNECTION TO MAIN LINE |
| ⑤ | SERVICE CONNECTION |
| ⑥ | TRACER WIRE |
| ⑦ | THRUST BLOCK |

| | | |
|--|------------------|--|
| CALAVERAS COUNTY WATER DISTRICT | | |
| WATER DETAILS | | |
| MULTI-METER MANIFOLD SERVICE | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W07B |
| APPROVED: CHARLES PALMER | DATE: 09/2021 | |

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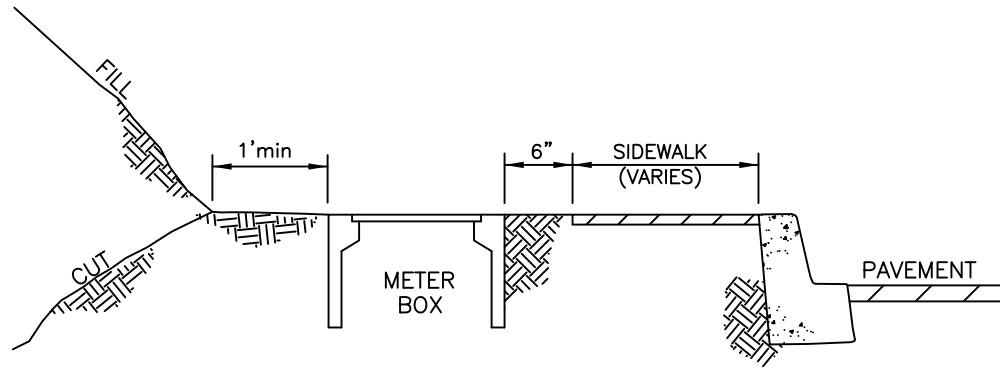


NOTES:

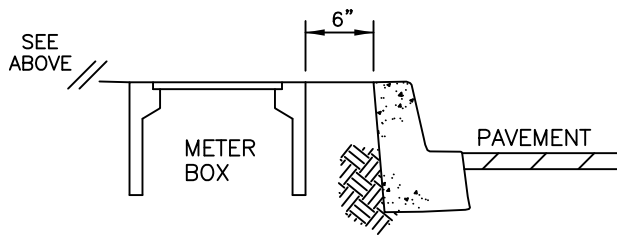
1. METER BOXES SHALL BE INSTALLED OUTSIDE OF PAVEMENT, DRIVEWAY OR SIDEWALK AND WITHIN EXISTING RIGHT OF WAY OR PUBLIC UTILITY EASEMENT.
2. FOR SERVICE & METER INSTALLATION SEE W07, W07A, & W07D.
3. FOR INSTALLATION AT OR NEAR CUT/FILL SLOPES SEE W07D.
4. CUSTOMER RESPONSIBLE FOR INSTALLATION OF P.R.V. &/OR BACKFLOW DEVICE IF REQUIRED.

| | | |
|--|------------------|--|
| CALAVERAS COUNTY WATER DISTRICT | | |
| WATER DETAILS | | |
| METER BOX PLACEMENT - STANDARD | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W07C |
| APPROVED: CHARLES PALMER | DATE: 09/2021 | |

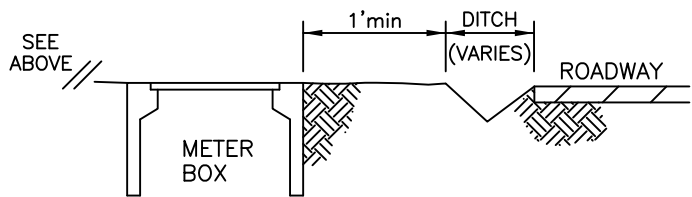
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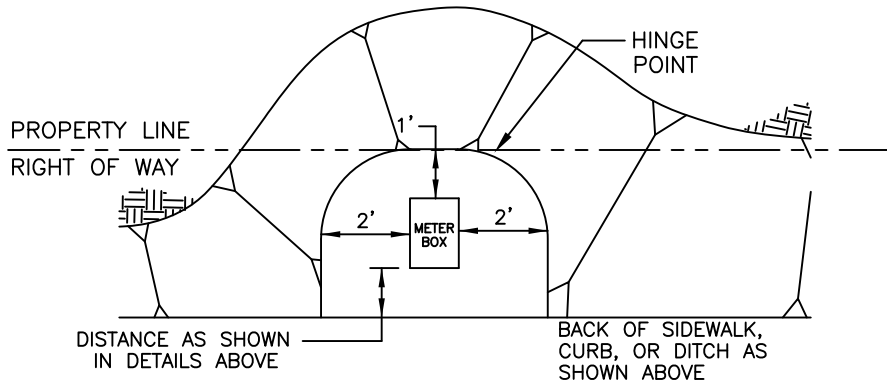
BEHIND SIDEWALK



NO SIDEWALK



ROADSIDE DRAINAGE



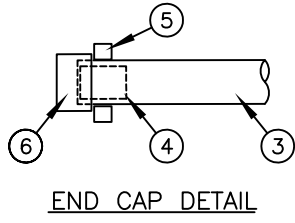
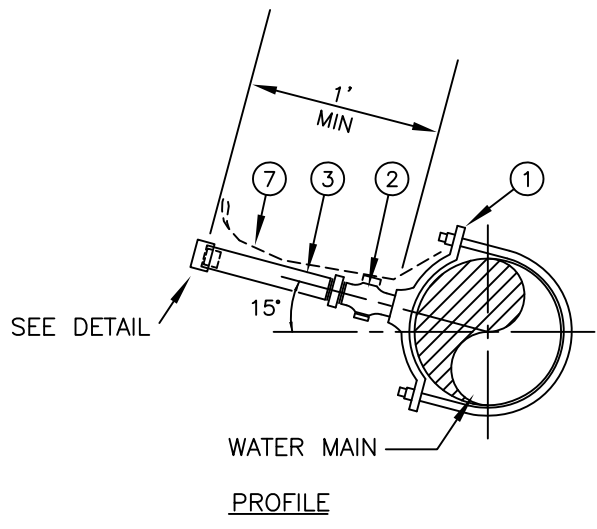
PLAN VIEW

NOTES:

1. METER BOXES ARE TO BE PLACED LENGTHWISE AS SHOWN.
2. FOR SERVICE & METER INSTALLATION SEE W07, W07A, & W07C
3. CUSTOMER RESPONSIBLE FOR INSTALLATION OF P.R.V. &/OR BACKFLOW DEVICE IF REQUIRED.
4. AFTER NEW WATER MAIN AND SERVICE LINES ARE TESTED AND DISINFECTED, CONNECT/TRANSFER CUSTOMER SERVICE.

| | | |
|--|------------------|--|
| CALAVERAS COUNTY WATER DISTRICT | | |
| WATER DETAILS | | |
| METER BOX PLACEMENT - SLOPE | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W07D |
| APPROVED: CHARLES PALMER | DATE: 09/2021 | |

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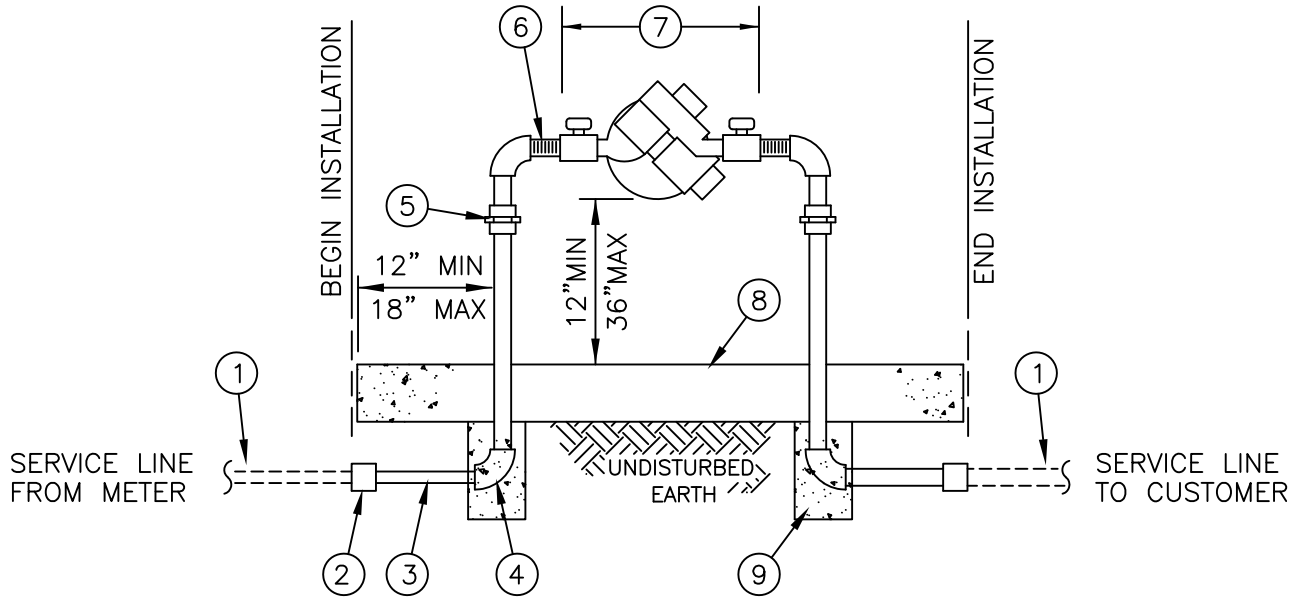
| ITEM # | DESCRIPTION |
|--------|------------------------------------|
| ① | SERVICE SADDLE |
| ② | CORPORATION STOP |
| ③ | 1" P.E. CONTINUOUS TUBING, CTS |
| ④ | 1" INSERT STIFFENER |
| ⑤ | STRAIGHT COUPLING, PACKJOINT x MIP |
| ⑥ | END CAP |
| ⑦ | TRACER WIRE |

NOTES:

1. CLOSE CORPORATION STOP.
2. REMOVE BOX, VALVES & PIPING. BACKFILL WITH NATIVE SOIL.

| | | |
|--|------------------|--|
| CALAVERAS COUNTY WATER DISTRICT | | |
| WATER DETAILS | | |
| SERVICE ABANDONMENT | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W07E |
| APPROVED: CHARLES PALMER | DATE: 09/2021 | |

**BACKFLOW PREVENTION ASSEMBLY
ON CUSTOMER PROPERTY
AFTER METER**



NOTES:

1. REDUCED PRESSURE PRINCIPLE ASSEMBLIES SHALL BE PER CCWD APPROVED LIST AND INSTALLED SO AS TO BE READILY ACCESSIBLE FOR INSPECTION, REPAIR AND TESTING.
2. SERVICE WILL REMAIN LOCKED UNTIL THE DEVICE HAS BEEN INSPECTED, TESTED AND APPROVED BY THE DISTRICT.
3. PIPING AND BACKFLOW DEVICE SHALL BE THE SAME SIZE AS SERVICE METER.
4. DRAINAGE SHALL BE PROVIDED WHEN ENCLOSURE IS INSTALLED.
5. CUSTOMER OWNS AND IS RESPONSIBLE FOR INSTALLATION AND MAINTENANCE OF BACKFLOW DEVICE IF REQUIRED. CCWD RESPONSIBILITY AND/OR MAINTENANCE ENDS AT METER.
6. NO TIE-INS ALLOWED BETWEEN WATER METER AND BACKFLOW DEVICE.
7. FREEZE PROTECTION (HOT BOX) REQUIRED FOR BACKFLOW DEVICE ABOVE 2000 FT. ELEVATION.
8. NO OTHER UTILITIES OR PIPELINES ALLOWED WITHIN BACKFLOW PREVENTER INSTALLATION AREA.
9. ALL BRASS PIPE & FITTINGS SHALL BE NSF-61 APPROVED.

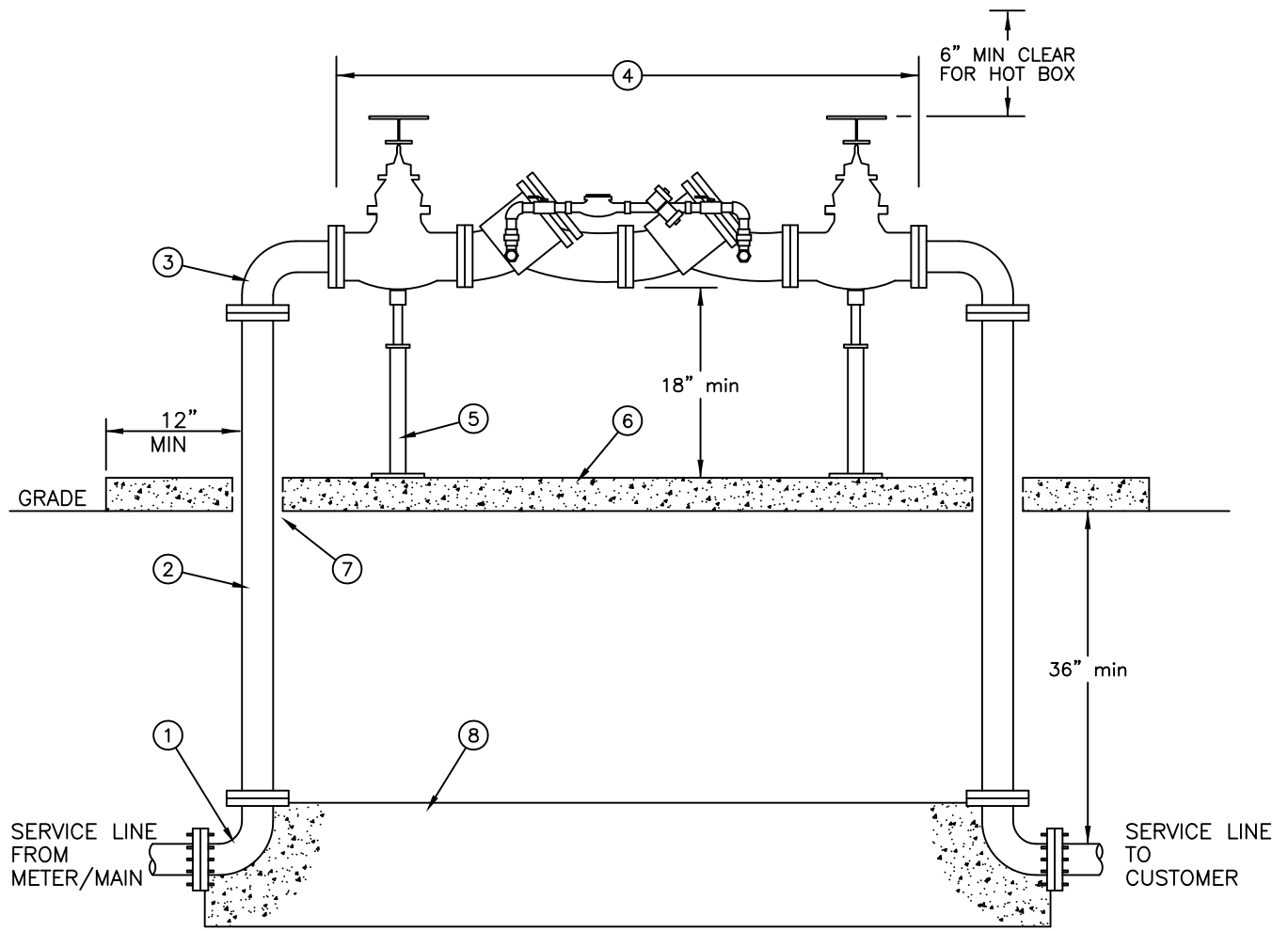
| ITEM # | DESCRIPTION |
|--------|---|
| ① | SERVICE LINE FROM METER & TO CUSTOMERS HOUSE |
| ② | BRASS COUPLING X MALE IPT (TYPICAL ALL) |
| ③ | BRASS PIPE (TYPICAL ALL) |
| ④ | BRASS 90° ELBOW X IPT (TYPICAL ALL) |
| ⑤ | BRASS UNION (TYPICAL ALL) |
| ⑥ | BRASS MALE X MALE IPT NIPPLE (TYPICAL ALL) |
| ⑦ | BACKFLOW PREVENTER ASSEMBLY |
| ⑧ | 18" THICK CONCRETE PAD LENGTH VARIES PER SIZE |
| ⑨ | CONCRETE ANCHOR BLOCK, 1 CUBIC FOOT |

CALAVERAS COUNTY WATER DISTRICT

**WATER DETAILS
BACKFLOW PREVENTION ASSEMBLY - 1" & 2"**

| | | |
|-----------------------------|------------------|---|
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W08 |
| APPROVED: CHARLES PALMER | DATE: 09/2021 | |

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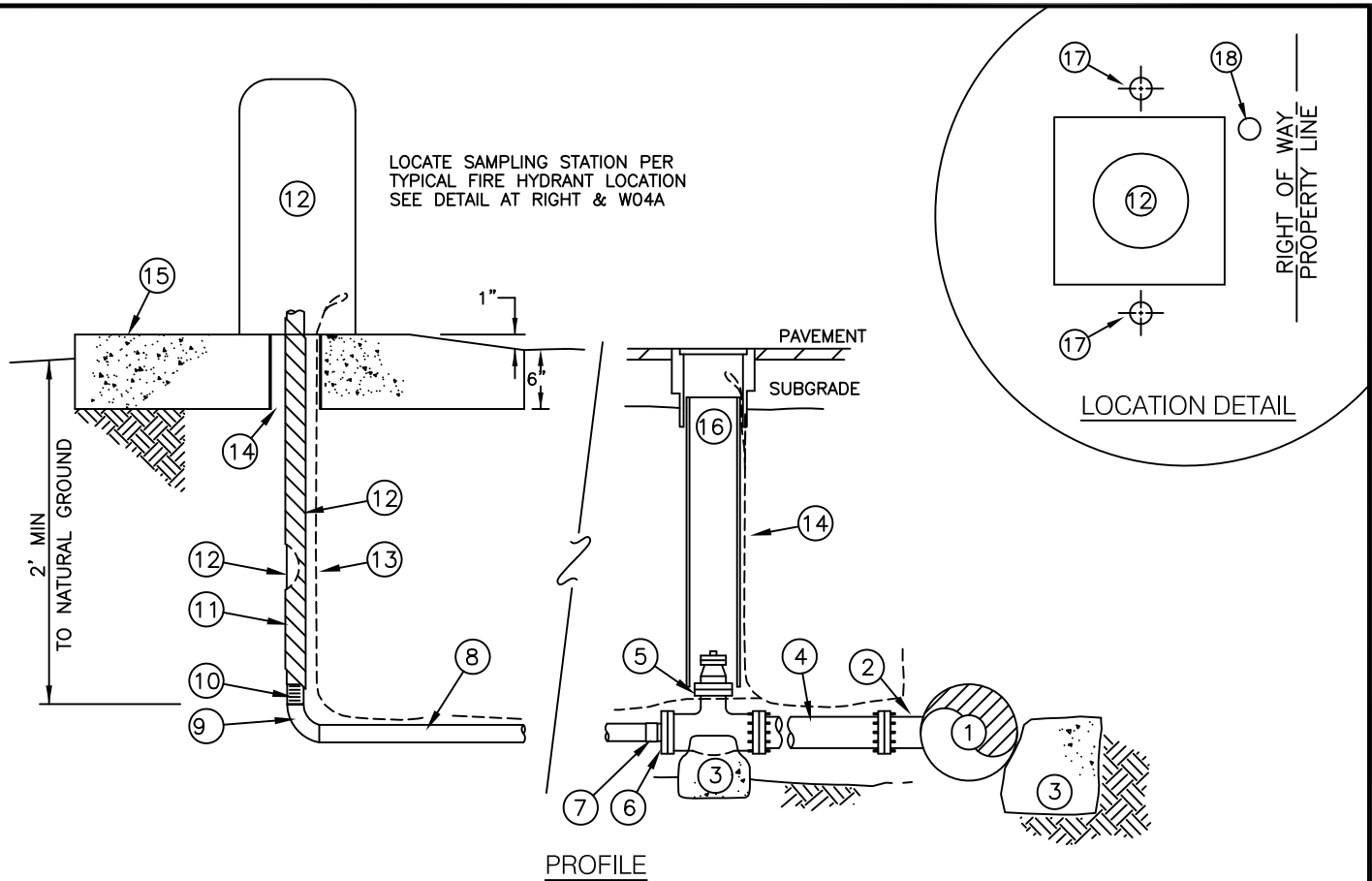
NOTES:

1. REDUCED PRESSURE PRINCIPLE ASSEMBLIES SHALL BE PER CCWD APPROVED LIST AND INSTALLED SO AS TO BE READILY ACCESSIBLE FOR INSPECTION, REPAIR AND TESTING.
2. SERVICE WILL REMAIN LOCKED UNTIL THE DEVICE HAS BEEN INSPECTED, TESTED AND APPROVED BY THE DISTRICT.
3. PIPING AND BACKFLOW DEVICE SHALL BE THE SAME SIZE AS SERVICE LINE.
4. DRAINAGE SHALL BE PROVIDED WHEN ENCLOSURE IS INSTALLED.
5. CUSTOMER OWNS AND IS RESPONSIBLE FOR INSTALLATION AND MAINTENANCE OF BACKFLOW DEVICE IF REQUIRED.
6. NO TIE-INS ALLOWED BETWEEN WATER METER AND BACKFLOW DEVICE.
7. FREEZE PROTECTION (HOT BOX) REQUIRED FOR BACKFLOW DEVICE ABOVE 2000 FT. ELEVATION.
8. NO OTHER UTILITIES OR PIPELINES ALLOWED WITHIN BACKFLOW PREVENTER INSTALLATION AREA.
9. FIELD PAINT ABOVE GROUND PIPING OSHA BLUE.
10. PROVIDE GUARD POSTS (G12) AS DIRECTED.

| ITEM # | DESCRIPTION |
|--------|---|
| ① | 90° BEND, MJxFL (TYPICAL ALL) |
| ② | D.I. PIPING (TYPICAL ALL) |
| ③ | 90° BEND, FL (TYPICAL ALL) |
| ④ | BACKFLOW PREVENTION DEVICE |
| ⑤ | PIPE SUPPORTS (TYPICAL ALL) |
| ⑥ | 4" CONCRETE PAD |
| ⑦ | SLEEVE THROUGH CONCRETE PAD (TYPICAL ALL) |
| ⑧ | THRUST BLOCK |

| | | |
|--|------------------|--|
| CALAVERAS COUNTY WATER DISTRICT | | |
| WATER DETAILS | | |
| BACKFLOW PREVENTION ASSEMBLY - 4" & 10" | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W08A |
| APPROVED: CHARLES PALMER | DATE: 09/2021 | |

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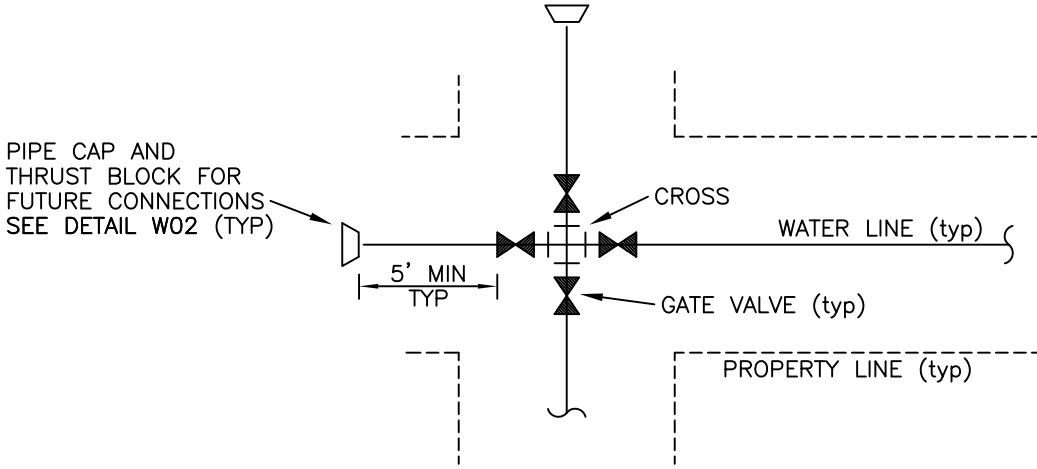


| ITEM # | DESCRIPTION | | |
|--------|--|---|--|
| ① | WATER MAIN | ⑩ | 1" x 3/4" BRASS BUSHING W/ 3/4" NIPPLE |
| ② | ___ X 4" TEE FLxFL | ⑪ | PVC WRAPPING TAPE |
| ③ | THRUST BLOCKS PER W01 (USE 4" CALC'S) | ⑫ | SAMPLING STATION |
| ④ | 4" DIP | ⑬ | TRACER WIRE |
| ⑤ | 4" GATE VALVE, MJxFL PER W03 & W03A | ⑭ | 3" P.V.C. SLEEVE |
| ⑥ | ___"x 2" FLxFIP THREADED REDUCER | ⑮ | 4'x4'x4" CONCRETE PAD PLACED AT OR ABOVE GRADE |
| ⑦ | COMPRESSION COUPLING CTS x MIP | ⑯ | VALVE BOX PER W03 |
| ⑧ | 1" P.E. TUBING, CTS | ⑰ | GUARD POST PER G12 |
| ⑨ | 1-1/4" BEND COMPRESSION COUPLING, CTS X FIP | ⑱ | PADDLE MARKER, PER G12A ABOVE 2000 FEET ELEVATION |

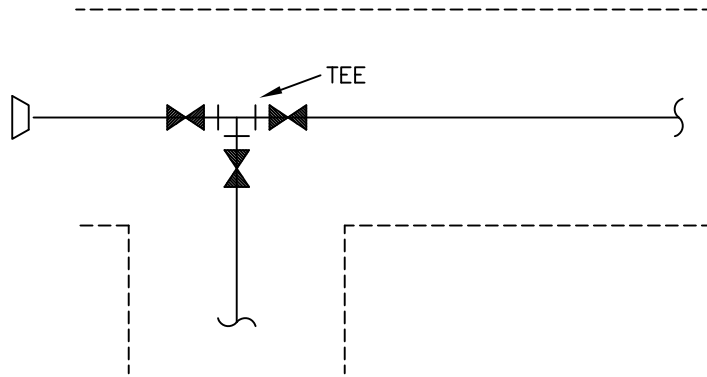
NOTES:

- ALL BACKFILL SHALL BE PER STANDARD TRENCH DETAIL G05.
- SOLID STAINLESS STEEL INSERTS REQUIRED AT ALL P.E. TUBING AND FITTINGS.
- SAMPLING STATION TO BE LOCATED WITHIN RIGHT-OF-WAY OR EASEMENT.

| | | |
|---|------------------|---|
| CALAVERAS COUNTY WATER DISTRICT | | |
| WATER DETAILS WATER QUALITY SAMPLING STATION | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W09 |
| APPROVED: CHARLES PALMER | DATE: 09/2021 | |



FOUR-WAY INTERSECTION WITH CROSS



THREE-WAY INTERSECTION WITH TEE

NOTE:

1. DISTANCES GREATER THAN 40' BETWEEN VALVE & END-CAP REQUIRE IN-GROUND BLOW-OFF PER W08.
2. PIPE CAP AND THRUST BLOCK TO BE PLACED 5' MINIMUM BEYOND GATE VALVE OR 3' BEYOND EDGE OF PAVEMENT.

CALAVERAS COUNTY WATER DISTRICT

**WATER DETAILS
FUTURE INSTALLATION STUB-OUTS**

DRAWN BY:
CCWD STAFF

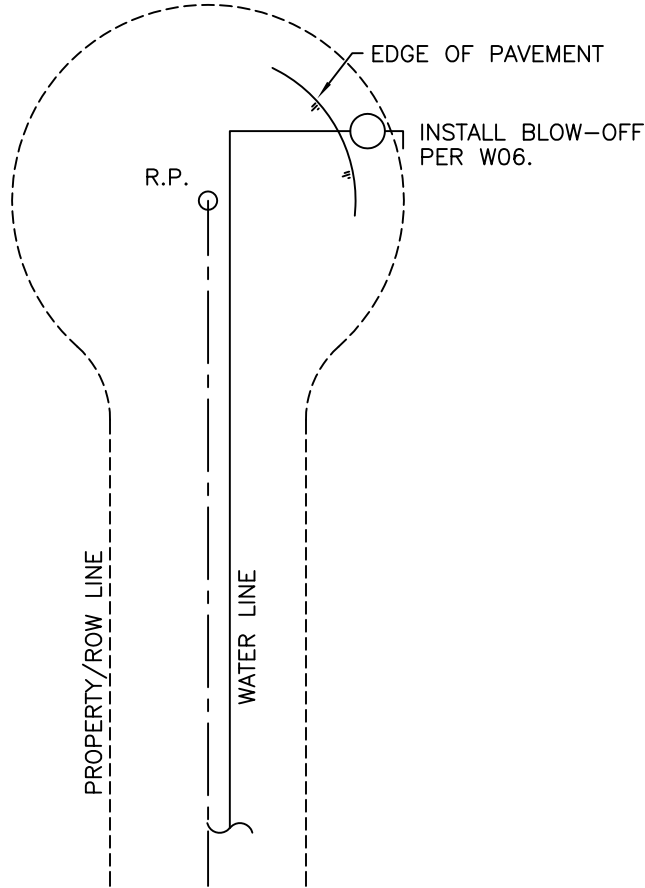
SCALE:
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CCWD STANDARD DRAWING NO.

APPROVED:
CHARLES PALMER

DATE:
09/2021

W10



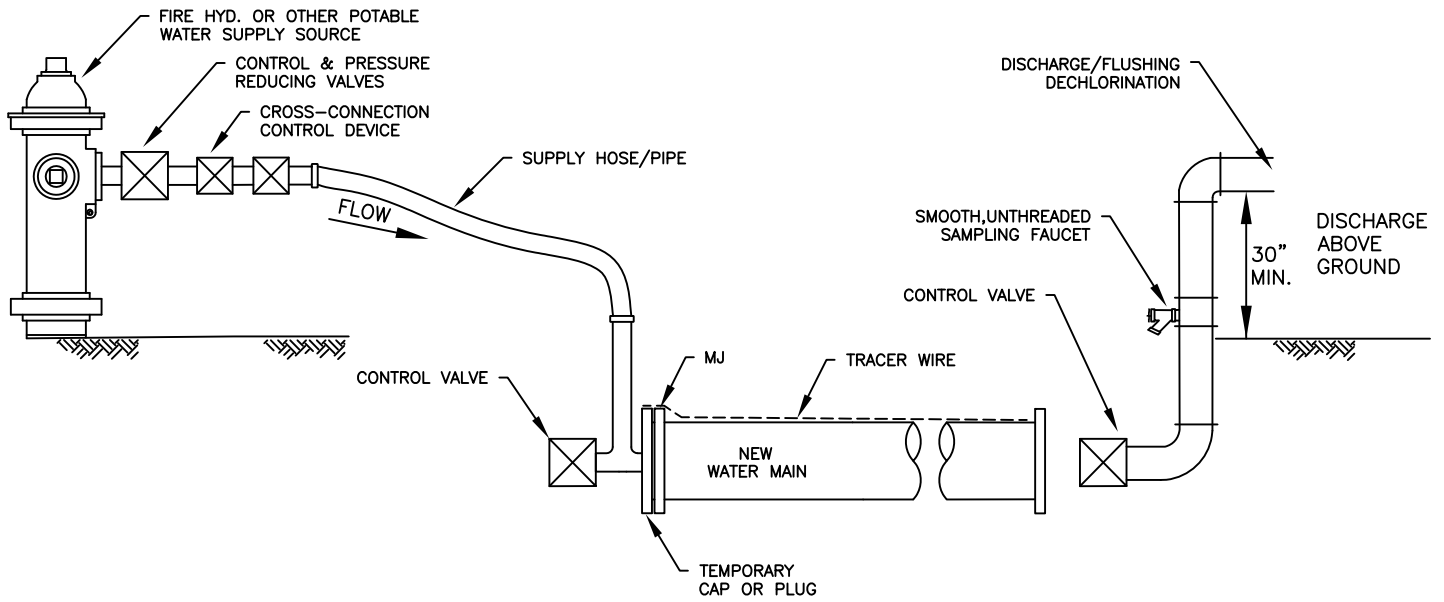
TYPICAL CUL-DE-SAC

NOTES:

1. LAY PIPE TO 18' BEYOND THE CENTER (RADIUS POINT) OF CUL-DE-SAC.
2. INSTALL IN-GROUND BLOW-OFF.

| | | |
|--|------------------|---|
| CALAVERAS COUNTY WATER DISTRICT | | |
| WATER DETAILS CUL-DE-SAC BLOW-OFF | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W11 |
| APPROVED: CHARLES PALMER | DATE: 09/2021 | |

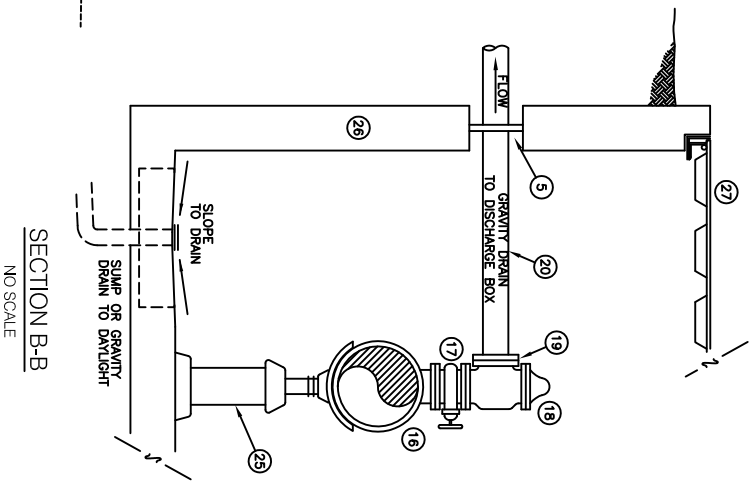
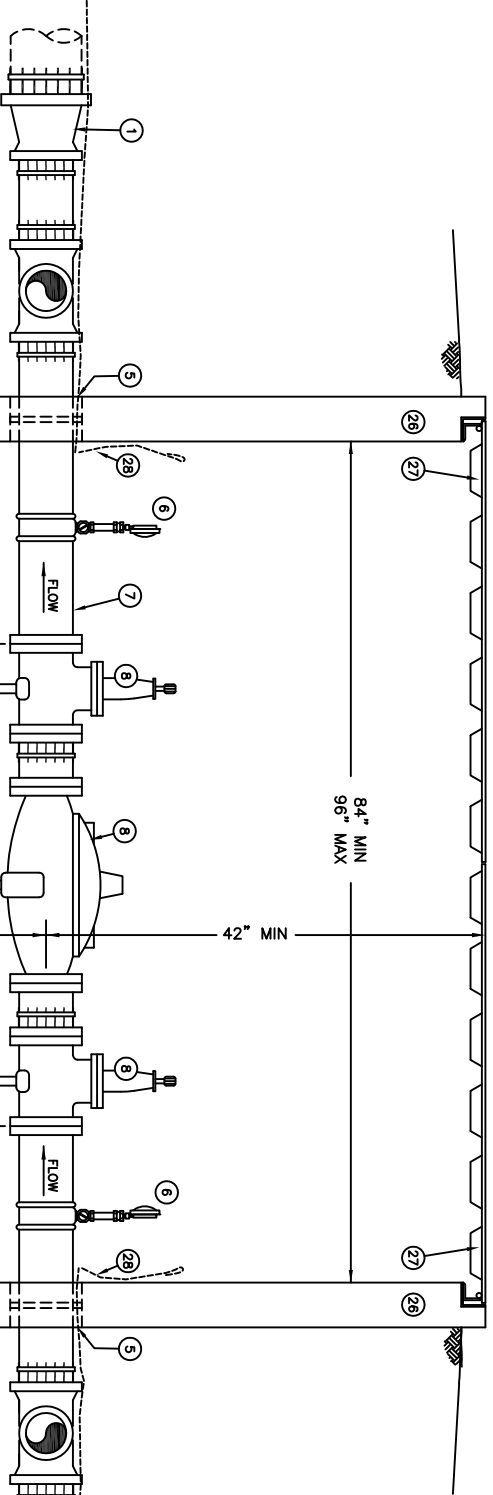
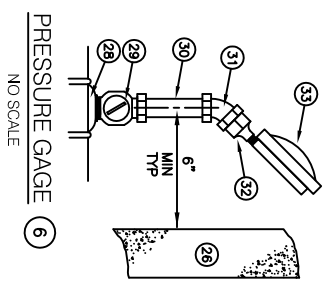
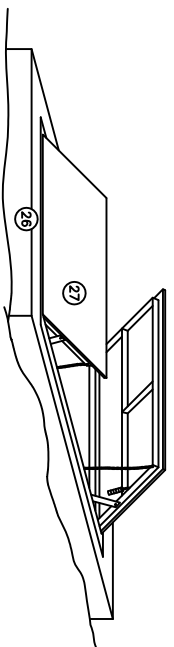
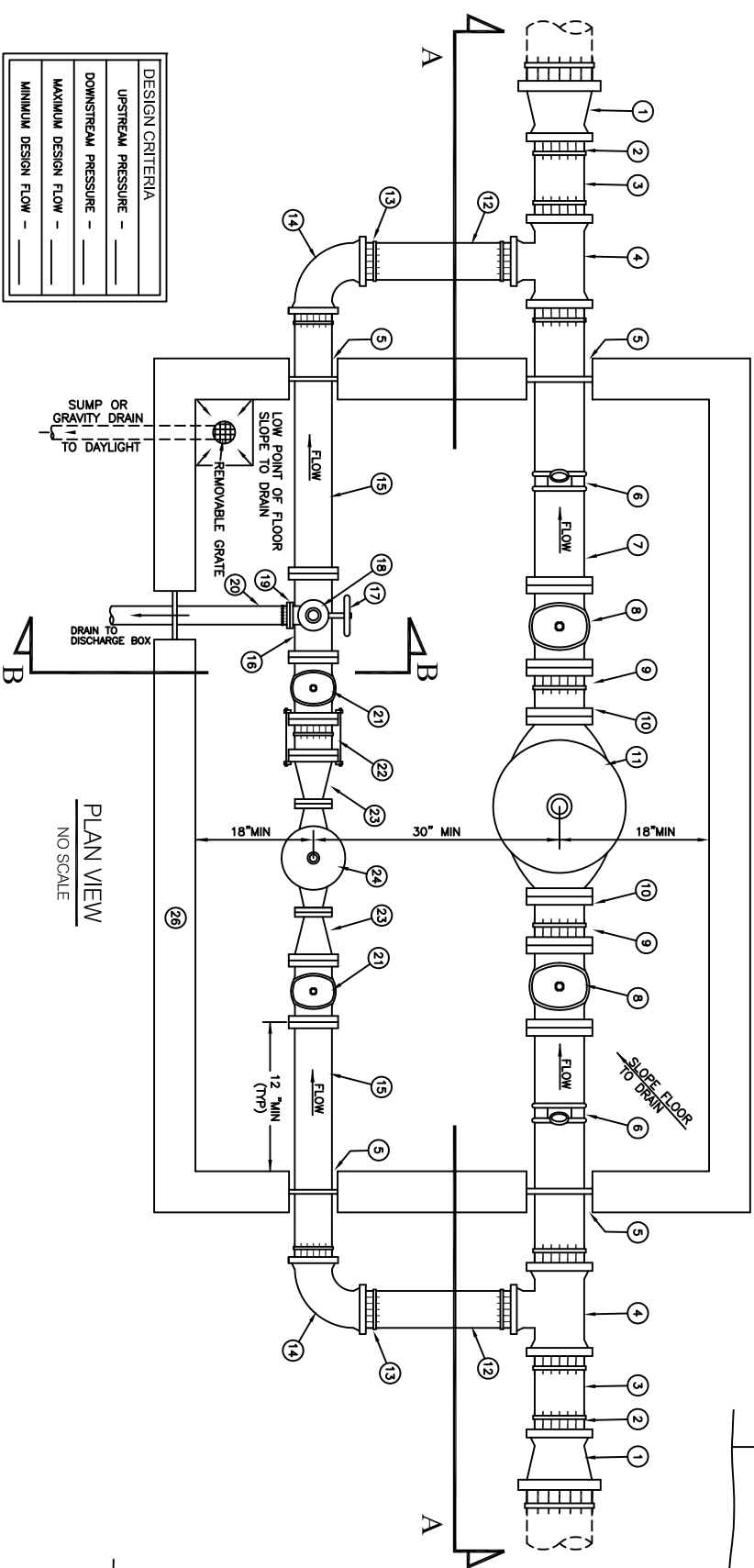
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ELEVATION

| REQUIRED FLOW AND OPENINGS TO FLUSH PIPELINES | | | | |
|---|---|---------------------------|---------------------------|-----------|
| PIPE DIAMETER (IN) | FLOW REQUIRED TO PRODUCE 2.5 ft/sec (APPROX.) IN MAIN (GPM) | NUMBER OF 2" TAPS ON PIPE | NUMBER OF HYDRANT OUTLETS | |
| | | | 2 1/2-IN | 4 1/2 -IN |
| 4-8 | 100-400 | 1 | 1 | 1 |
| 12 | 900 | 2 | 2 | 1 |

| | | |
|---|------------------|---|
| CALAVERAS COUNTY WATER DISTRICT | | |
| WATER DETAILS JUMPER PIPE INSTALLATION | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W12 |
| APPROVED: CHARLES PALMER | DATE: 09/2021 | |



| DESIGN CRITERIA | |
|-----------------------|--|
| UPSTREAM PRESSURE - | |
| DOWNSTREAM PRESSURE - | |
| MAXIMUM DESIGN FLOW - | |
| MINIMUM DESIGN FLOW - | |

NOTES:

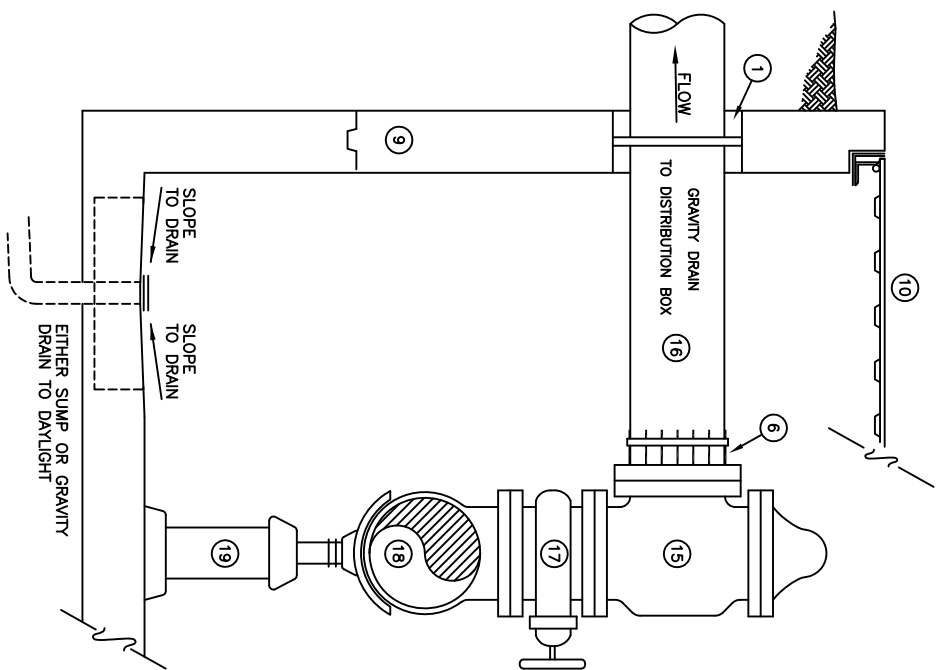
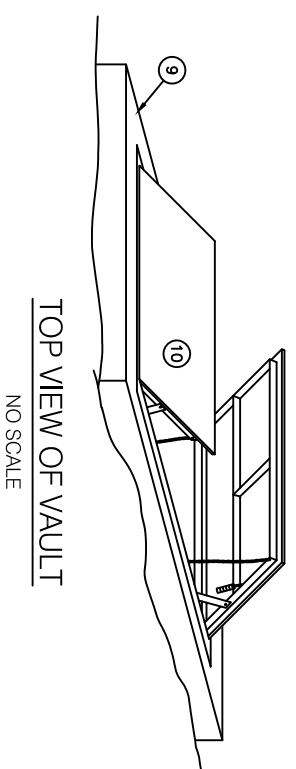
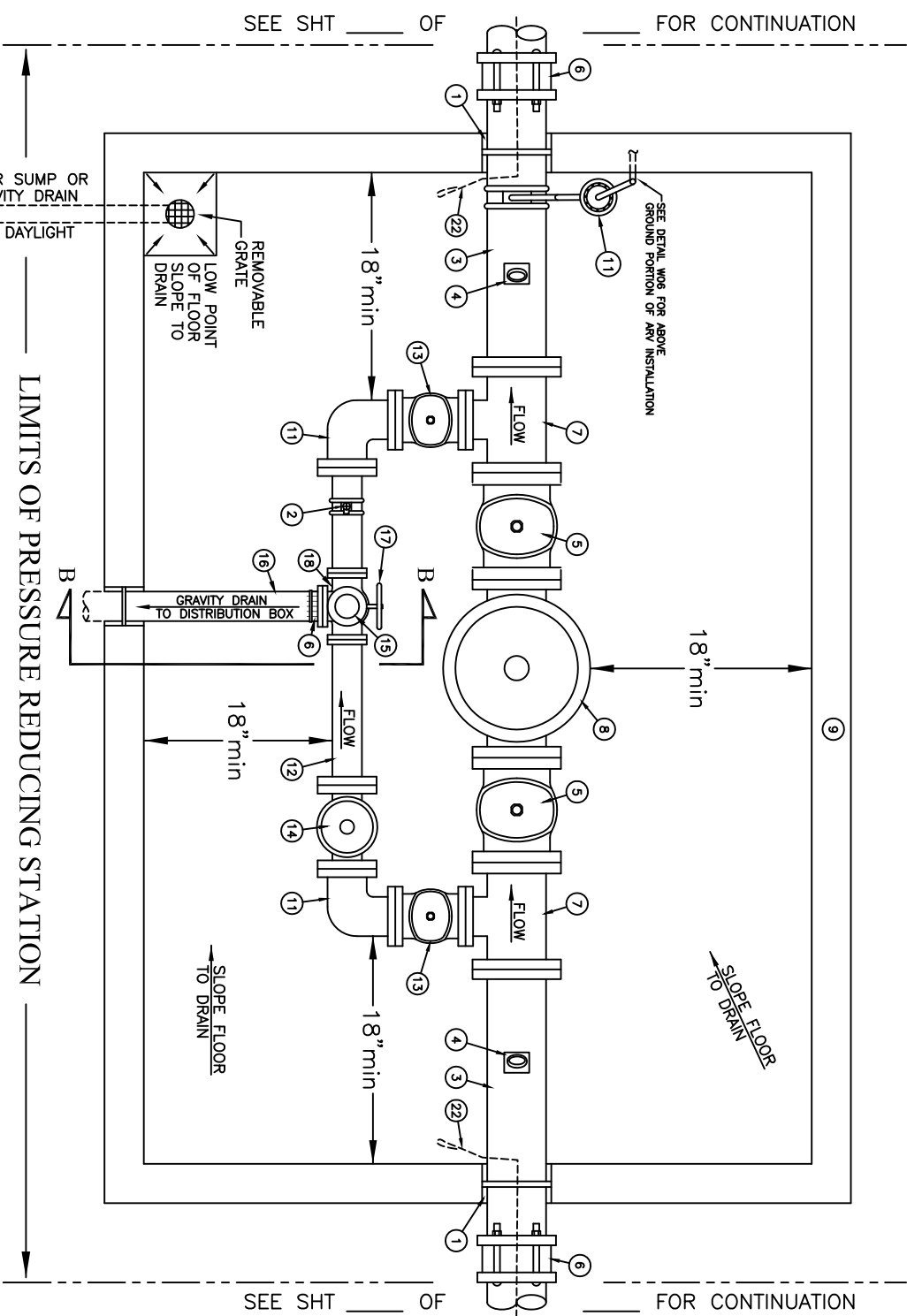
- COMPONENTS, FITTINGS AND OTHER DETAILS SHOWN HEREON, HAVE BEEN DRAWN TO APPROXIMATE DIMENSIONS. SHOP DRAWINGS SHALL BE SUBMITTED TO THE DISTRICT FOR APPROVAL PRIOR TO CONSTRUCTION. SHOP DRAWINGS SHALL SHOW COMPLETE DETAILS OF THE INSTALLATION INCLUDING SIZE, LOCATION, MANUFACTURER'S NAME, MODEL AND DIMENSIONAL AND ENGINEERING DATA OF ALL COMPONENTS.
- SEE SITE PLAN FOR LOCATION OF ALIGNMENTS AND OUTLETS.
- PRESSURE REDUCING VALVES AND ALL UPSTREAM PIPES, FITTINGS, AND VALVES AND OTHER APPURTENANCES SHALL HAVE WORKING PRESSURE RATING OF NOT LESS THAN 350 P.S.I. EXCEPT AS OTHERWISE NOTED.

| ITEM | DESCRIPTION |
|------|--|
| 1 | 6" DUCTILE IRON REDUCER, M.I. X M.I. (IF REQUIRED) |
| 2 | MECHANICAL RESTRAINT GLAND (ROMAC GRIP RING, 350-PSI) |
| 3 | 6" D.I.P. SPOOL, PLAIN ENDS |
| 4 | 6" x 6" x 4" DUCTILE IRON TEE, M.I. X M.I. |
| 5 | CONE DRILL OR FORMED HOLES: FILL ANNUAL VOID WITH NON-SHRINK CONSTRUCTION SPOUT, SAKRETE, SAKRETE/IT, FIVE STRAK, OR EQUAL |
| 6 | SADDLE, CORP STOP, PRESSURE GAGE ASSEMBLY (SEE DETAIL THIS SHEET) |
| 7 | 6" D.I.P. SPOOL, FLANGE X PLAIN END, THICKNESS CLASS 53 |
| 8 | 6" AMWA C515 GATE VALVE, FL X FL, AMWA NUT OPERATORS, 350-PSI WORKING PRESSURE RATED, (MUELLER 350 A-2361) |
| 9 | 6" RESTRAINED FLANGE ADAPTOR (EBMA 2100 MEGFLANGE, 350-PSI) |
| 10 | 6" D.I.P. SPOOL, CLASS 250 FLANGED END X PLAIN END |
| 11 | 6" PRESSURE REDUCING VALVE, FL X FL (CLASS 300), CLA-WAL SERIES 90 |
| 12 | 4" D.I.P. SPOOL, PLAIN ENDS |
| 13 | MECHANICAL RESTRAINT GLAND (ROMAC GRIP RING, 350-PSI) |
| 14 | 4" 90-DEGREE BEND, M.I. X M.I. |
| 15 | 4" D.I.P. SPOOL, FLANGE X PLAIN ENDS, THICKNESS CLASS 53 |
| 16 | 4" x 4" x 2" DUCTILE IRON TEE, FLANGED ENDS |
| 17 | 2" AMWA C515 GATE VALVE, FLANGED, 250-PSI UL/FM RATED WORKING PRESSURE, 375-PSI SEAT TEST, 500-PSI SHELL TEST, HANDHELD OPERATOR |
| 18 | 2" PRESSURE RELIEF VALVE, FL X FL (CLASS 150), CLA-WAL SERIES 50 |
| 19 | 2" CLASS 150, ANSI B16.5, THREADED FLANGE, EPOXY COATED |
| 20 | 2" SCH 40 STEEL PIPE, EXPOSED, PIPE IN VAULT EPOXY PAINTED, PRIOR TO INSTALLING WRAP BURIED PIPE WITH CHASE TAPERGAD TR-EQUAL OR EQUAL |
| 21 | 4" AMWA C515 GATE VALVE, FL X FL, AMWA NUT OPERATOR, 350-PSI WORKING PRESSURE RATED (MUELLER 350 A-2361) |
| 22 | 4" DISMANTLING JOINT, FL X FL (AMWA CLASS E), ROMAC D1400 (275-PSI) |
| 23 | 2"x4" FABRICATED FLANGED REDUCER, BUTT WELD FITTING, CARBON STEEL, CLASS 150 X CLASS 300 RATED FUSION EPOXY COATED PER AMWA C213 |
| 24 | 4" PRESSURE REDUCING VALVE, FL X FL (CLASS 300), CLA-WAL SERIES 90 |
| 25 | PIPE SUPPORT, HOT DIP GALVANIZED, PLUGGER WATERWORKS (PW/PS) WITH STANDARD (PW/SOL-S) AND EXTRA LARGE (PW/SOL-X) SADDLES |
| 26 | PRECAST CONCRETE VAULT, MINIMUM 6'-0" I.D. X 8'-0" I.D., H20 TRAFFIC |
| 27 | MINIMUM 72"x84" DOUBLE LEAF HATCH, HOT DIP GALVANIZED, 1/4" STEEL 2-BAR FRAME, 1/4" STEEL DIAMOND PLATE, STAINLESS STEEL HARDWARE AND SAFETY ARMS, TORSION ASSIST, FOUR 1/2" SECURITY BOLTS, H20 TRAFFIC RATED (OFF STREET) AND H25 TRAFFIC RATED (ON STREET) LOCATIONS. |
| 28 | SERVICE SADDLE (MUELLER DR2A, NYLON DUCTILE IRON, DOUBLE STRAP) |
| 29 | 3/4" CORP. STOP BALL VALVE (MUELLER 300-PSI, F.I.P. OUTLET, AMWA C800) |
| 30 | 3/4" THREADED PIPE NIPPLE (RED BRASS ASTM B43, SCHEDULE 40) |
| 31 | 3/4" 45-DEGREE BRASS COUPLING, LEAD FREE, CLASS 250 (MINIMUM) |
| 32 | BRASS REDUCER BUSHING, 3/4" MALE TO 1/4" FEMALE NPT REDUCING BUSHINGS (SWAGelok 12-RB-4 OR EQUAL) |
| 33 | BOURDON TUBE PRES. GAGES (MIKA TYPE 213.530W, LIQUID FILLED), DOWNSTREAM 0-300 PSI / UPSTREAM 0-400 PSI SCALE |

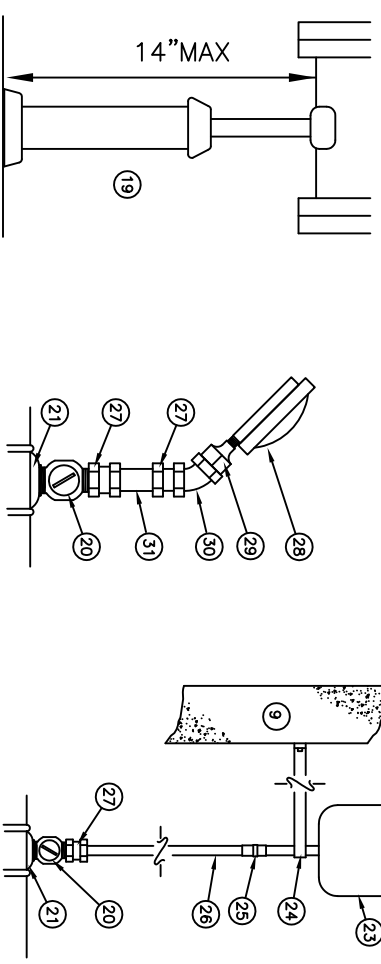
CALAVERAS COUNTY WATER DISTRICT

PRESSURE REDUCING STATION
6" MAIN / 4" X 2" BYPASS (PRESSURE CLASS 250/300)

| | | | |
|-----------|----------------|--------|---------------------------|
| DRAWN BY: | CCWD STAFF | SCALE: | CCWD STANDARD DRAWING NO. |
| APPROVED: | CHARLES PALMER | DATE: | 09/2021 |
| | | | W13 |



| DESIGN CRITERIA | |
|-----------------------|-------|
| UPSTREAM PRESSURE - | _____ |
| DOWNSTREAM PRESSURE - | _____ |
| MAXIMUM DESIGN FLOW - | _____ |
| MINIMUM DESIGN FLOW - | _____ |



- NOTES:
- COMPONENTS, FITTINGS AND OTHER DETAILS SHOWN HEREON, HAVE BEEN DRAWN TO APPROXIMATE DIMENSIONS. SHOP DRAWINGS SHALL BE SUBMITTED TO THE DISTRICT FOR APPROVAL PRIOR TO CONSTRUCTION. SHOP DRAWINGS SHALL SHOW COMPLETE DETAILS OF THE INSTALLATION INCLUDING SIZE, LOCATION, MANUFACTURERS NAME, MODEL, DIMENSIONAL AND ENGINEERING DATA OF ALL COMPONENTS.
 - UNLESS OTHERWISE NOTED, ALL PIPE AND PIPE FITTINGS SHALL BE DUCTILE IRON PIPE.
 - SEE SITE PLAN FOR LOCATION OF ALIGNMENTS AND OUTLETS.
 - ALL PIPES, FITTINGS, VALVES AND OTHER APPURTENANCES ON UPSTREAM SIDE OF PRESSURE REDUCING VALVES SHALL HAVE A WORKING PRESSURE RATING OF NOT LESS THAN 250 P.S.I. EXCEPT AS NOTED, ALL END CONNECTIONS TO BE 125# EXCEPT AS NOTED.

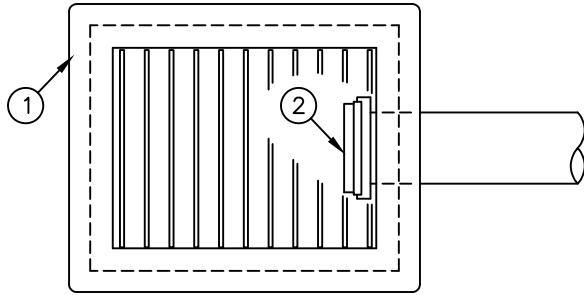
| ITEM # | DESCRIPTION |
|--------------------------|--|
| 1 | ALL WALL PENETRATIONS PER DETAIL G05 |
| 2 | HOSE BIB ON LOW PRESSURE SIDE |
| 3 | " FLANGED SPOOL |
| 4 | PRESSURE GAGE ASSEMBLY (SEE DETAIL, LEFT) |
| 5 | " GATE VALVE |
| 6 | " FLANGED COUPLING ADAPTER |
| 7 | " X " X " FLANGED TEE, W/ PIPE SUPPORT |
| 8 | " PRESSURE REDUCING VALVE, W/ PIPE SUPPORT |
| 9 | " X " CONCRETE VAULT, JENSEN PRECAST OR EQUAL |
| 10 | DOUBLE-LEAF ACCESS HATCH W/ RECESSED PADLOCKS HASPS, HOLD-OPEN ARM, AS APPROVED BY DISTRICT ENGINEER |
| 11 | " FLANGED 90° |
| 12 | " FLANGED SPOOL |
| 13 | " GATE VALVE |
| 14 | " PRESSURE REDUCING VALVE |
| 15 | " PRESSURE RELIEF VALVE, W/ PIPE SUPPORT |
| 16 | " FLANGED X PE SPOOL |
| 17 | " GATE VALVE |
| 18 | " X " X " FLANGED TEE |
| 19 | ADJUSTABLE PIPE SUPPORT |
| 20 | 1" BRASS CORP STOP, F.I.P. OUTLET |
| 21 | — x 1" TAPPING SADDLE |
| 22 | LOCATING WIRE PER DETAIL W03 & W03A |
| AIR RELEASE VALVE DETAIL | |
| 23 | COMBINATION AIR RELEASE VALVE |
| 24 | ARY SUPPORT BRACKET FASTENED TO WALL |
| 25 | BRASS UNION |
| 26 | BRASS PIPE AND FITTINGS AS REQUIRED |
| 27 | 1" BRASS COUPLING, PACKING JOINT x M.I.B. |
| PRESSURE GAGE DETAIL | |
| 28 | PRESSURE GAGE - BRASS STEM MOUNTING |
| 29 | DOWNSTREAM GAGE 0-150 PSI - UPSTREAM GAGE 0-300 PSI SCALE |
| 30 | 1" BRASS NIPPLE, M.I.B. x M.I.B. |
| 30 | 1" BRASS 1/8 BEND, M.I.B. x F.I.B. |
| 31 | 1" BRASS COUPLING, PACKING JOINT x M.I.B. |
| 32 | 1" BRASS PIPE, FIELD DETERMINED LENGTH |

CALAVERAS COUNTY WATER DISTRICT

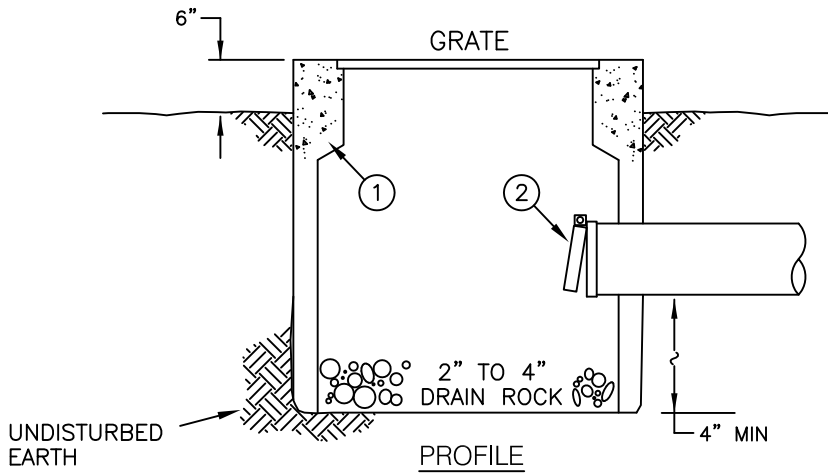
WATER DETAILS
PRESSURE REDUCING STATION - BYPASS 2" OR LESS

CCWD STANDARD DRAWING NO. **W13A**

| | | |
|-----------------------------|-------------------|--|
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. W13A |
| APPROVED: CHARLES PALMER | DATE: 09/20/21 | |



PLAN



| ITEM # | DESCRIPTION |
|--------|---|
| ① | 2'x2' DRAINAGE INLET BOX W/ FRAME AND GRATE |
| ② | FLAP VALVE |

CALAVERAS COUNTY WATER DISTRICT

WATER DETAILS
DISCHARGE BOX

DRAWN BY:
CCWD STAFF

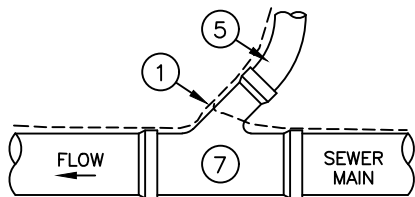
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CCWD STANDARD DRAWING NO.

APPROVED:
CHARLES PALMER

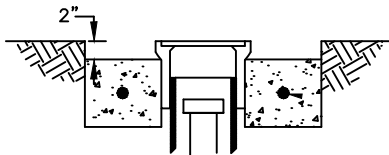
DATE:
09/2021

W14

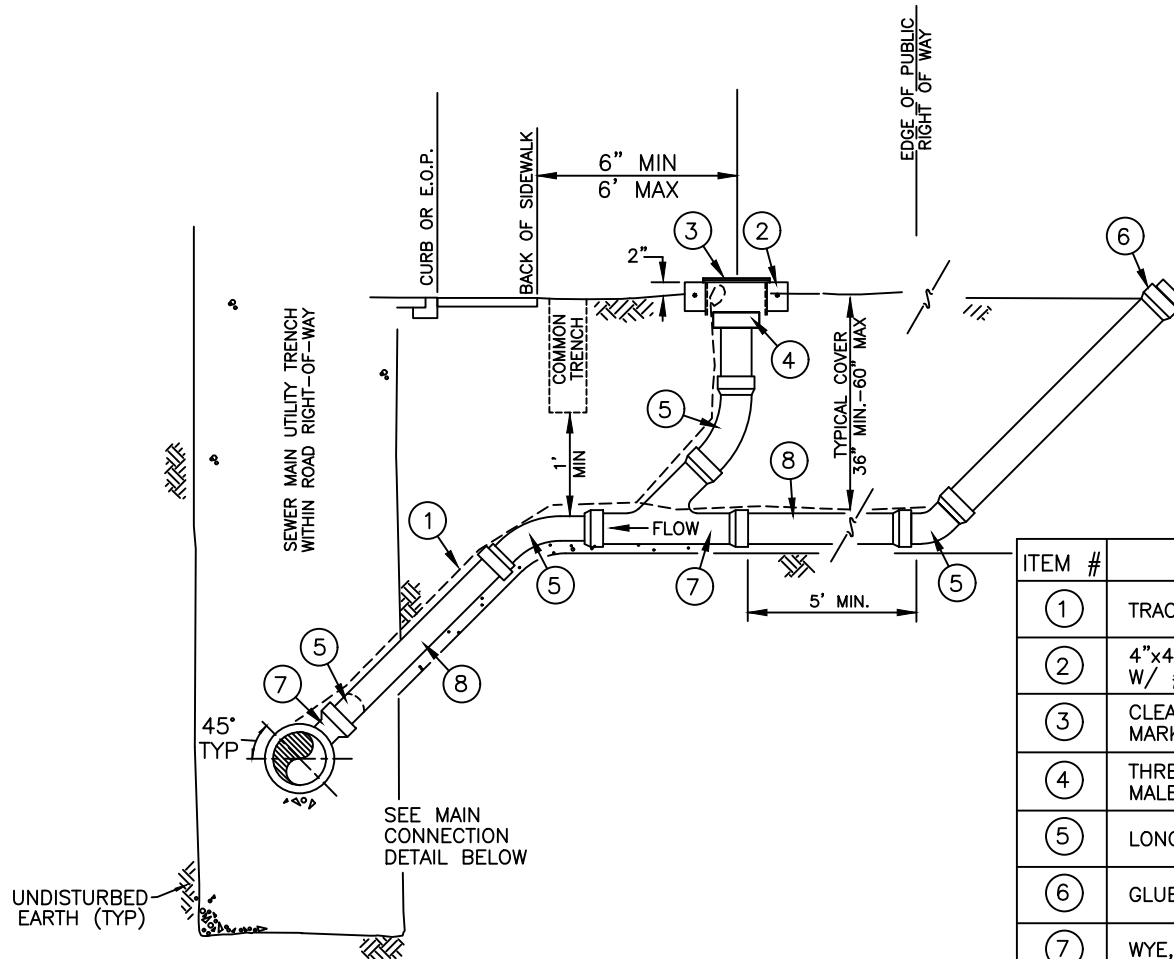


SEWER MAIN CONNECTION DETAIL

* FOR EXISTING MAINS USE A TAP SADDLE



CLEANOUT BOX INSTALLATION IN LANDSCAPING



| ITEM # | DESCRIPTION |
|--------|--|
| ① | TRACER WIRE |
| ② | 4"x4" CONCRETE RING AROUND BOX W/ #4 REBAR REINFORCEMENT |
| ③ | CLEAN-OUT BOX W/TRAFFIC LID, MARKED "SEWER" PER W04 |
| ④ | THREADED PVC CAP W/ MALE ADAPTOR |
| ⑤ | LONG-RADIUS SWEEPS OR 45 DEG BEND |
| ⑥ | GLUED CAP |
| ⑦ | WYE, MINIMUM 4" |
| ⑧ | 4" MINIMUM DIAMETER PIPE |

NOTES:

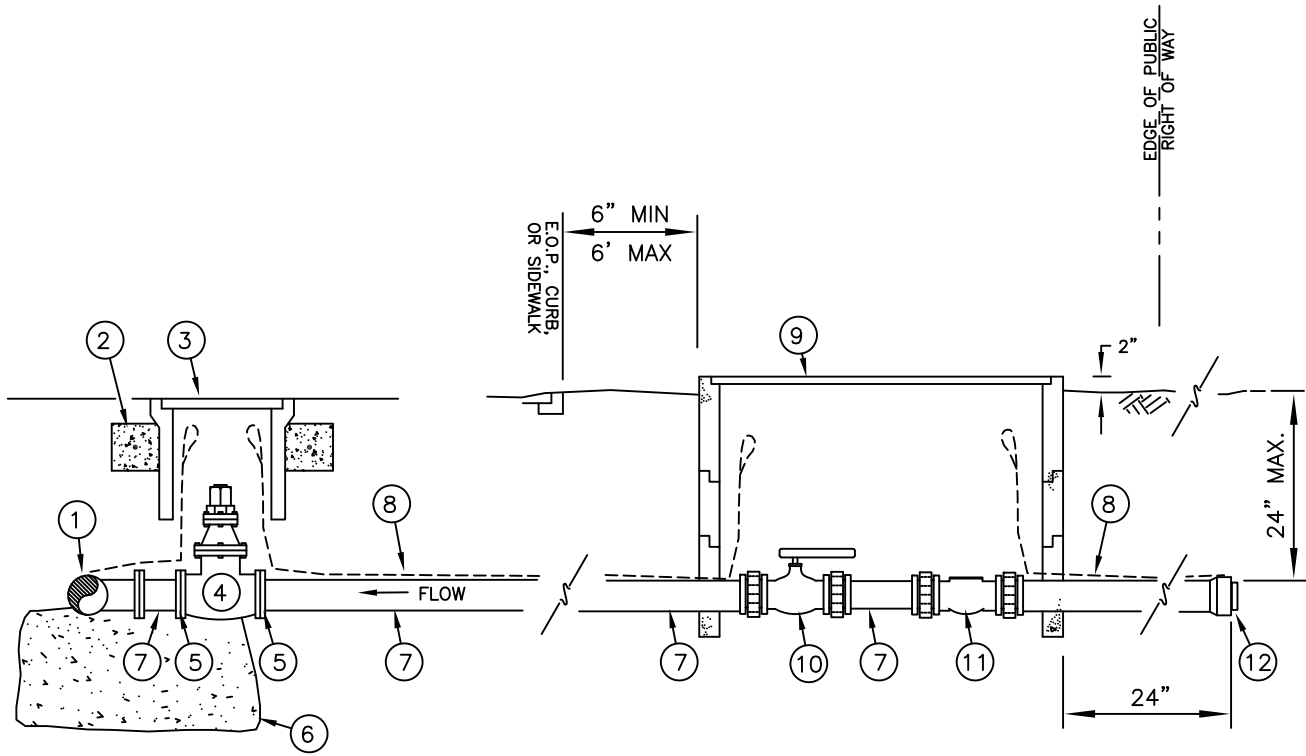
1. ALL PIPING AND CONNECTIONS SHALL BE SDR 35, UNLESS OTHERWISE NOTED.
2. MINIMUM GRADE OF SEWER SERVICE LATERALS SHALL BE 2% THROUGHOUT.
3. ALL SEWER LATERALS SHALL PASS UNDER WATER LINES AT A MINIMUM OF ONE FOOT (1') DEPTH.
4. ALL SEWER LATERALS SHALL PASS UNDER COMMON UTILITY TRENCH, WHEN PRESENT, AT A MINIMUM OF ONE FOOT (1') DEPTH.

GRAVITY SEWER LATERAL & CLEANOUT AT PROPERTY LINE

CALAVERAS COUNTY WATER DISTRICT

**SEWER DETAILS
GRAVITY SEWER SERVICE CONNECTION**

| | | |
|-----------------------------|-------------------|---|
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. S01 |
| APPROVED: CHARLES PALMER | DATE: FEB 2022 | |

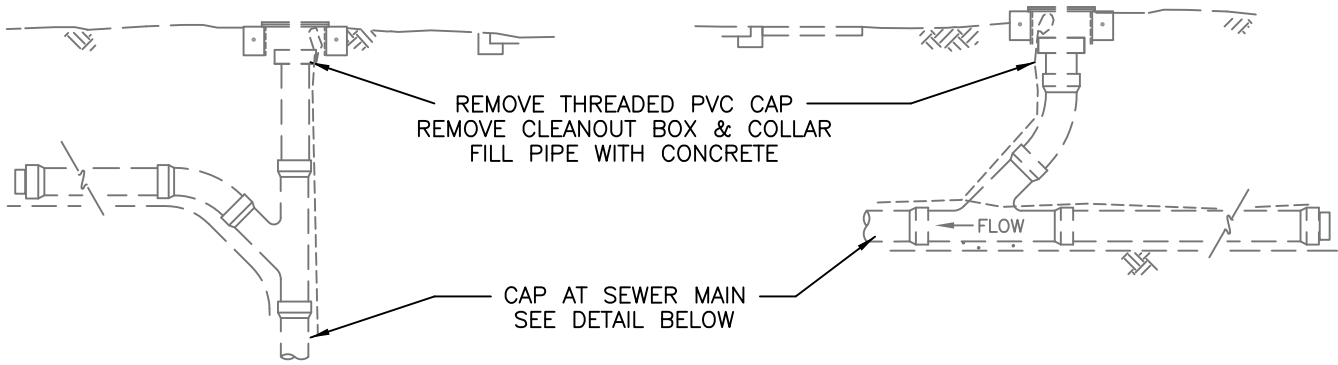


PROFILE VIEW

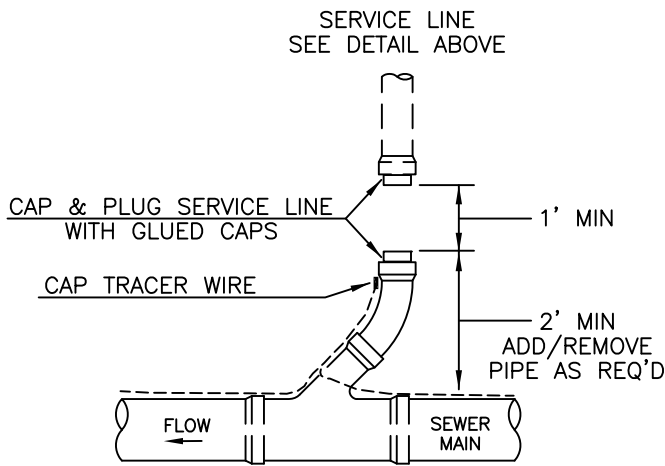
| ITEM # | DESCRIPTION |
|--------|---|
| ① | 2" TEE SOCKET - NEW MAIN 2" SERVICE SADDLE - EXISTING MAIN |
| ② | 4"x4" CONCRETE RING AROUND BOX W/ #4 REBAR REINFORCEMENT |
| ③ | UTILITY BOX W/ LID MARKED "SEWER" |
| ④ | 2" RESILIENT SEAT GATE VALVE, FLxFL INSTALLED PER W03 |
| ⑤ | 2" FLANGE SOCKET |
| ⑥ | THRUST BLOCK, PER W01 (USE 4") |
| ⑦ | 2" PIPE, SCH 80 |

| ITEM # | DESCRIPTION |
|--------|-----------------------------------|
| ⑧ | TRACER WIRE |
| ⑨ | UTILITY BOX W/ LID MARKED "SEWER" |
| ⑩ | 2" PVC BALL VALVE W/ UNION |
| ⑪ | TRUE UNION SWING CHECK VALVE, PVC |
| ⑫ | GLUED CAP |

| | | |
|--|--------------------|--|
| CALAVERAS COUNTY WATER DISTRICT | | |
| SEWER DETAILS PRESSURE SEWER SERVICE CONNECTION | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. S01A |
| APPROVED: CHARLES PALMER | DATE: FEB. 2022 | |



GRAVITY SEWER LATERAL & CLEANOUT
ABANDONMENT AT PROPERTY LINE



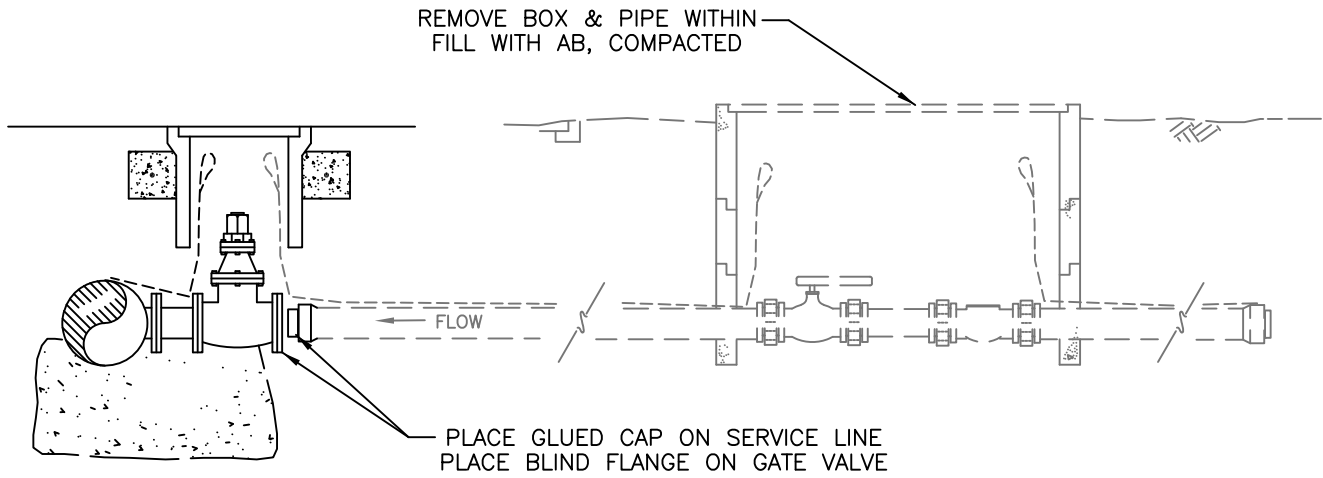
SEWER MAIN/SERVICE LINE
DISCONNECTION DETAIL

NOTES:

1. CAP LINE AT MAIN PRIOR TO REMOVAL OF CLEANOUT BOX AND CONCRETE COLLAR, AND FILLING SERVICE LINE WITH CONCRETE.

| | | |
|--|-------------------|--|
| CALAVERAS COUNTY WATER DISTRICT | | |
| SEWER DETAILS GRAVITY SEWER SERVICE ABANDONMENT | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. S01B |
| APPROVED: CHARLES PALMER | DATE: FEB 2022 | |

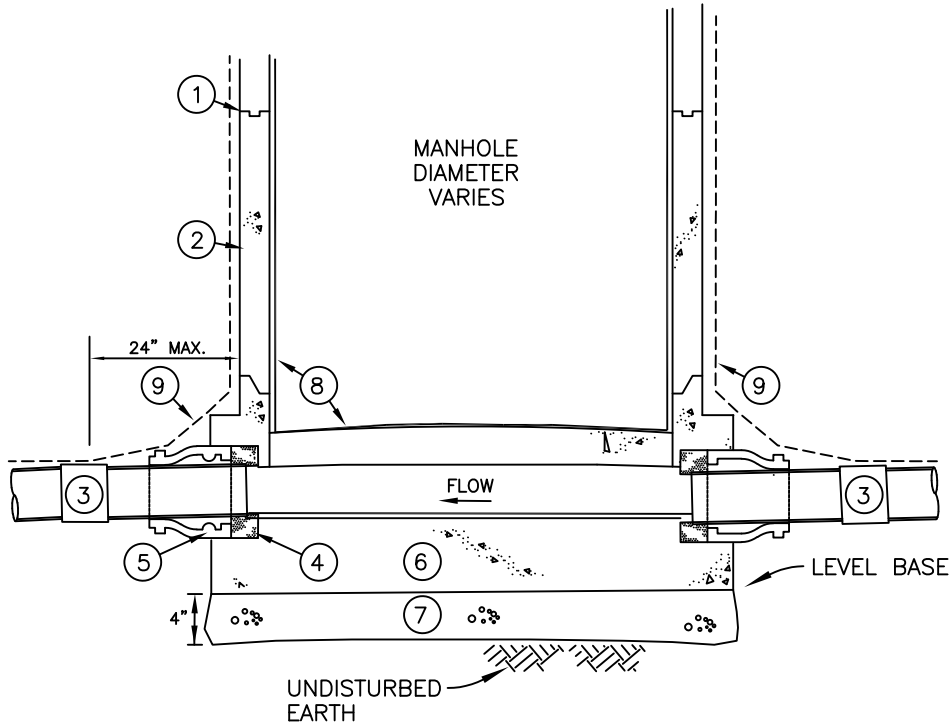
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PROFILE VIEW

| | | |
|---|-------------------|--|
| CALAVERAS COUNTY WATER DISTRICT | | |
| SEWER DETAILS PRESSURE SEWER SERVICE ABANDONMENT | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. S01C |
| APPROVED: CHARLES PALMER | DATE: FEB 2022 | |

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MANHOLE BASE PLAN VIEW

| ITEM # | DESCRIPTION |
|--------|----------------------|
| ① | JOINT GASKET |
| ② | BARREL SECTION |
| ③ | PVC COUPLING, SDR 26 |
| ④ | MORTAR SEAL |

| ITEM # | DESCRIPTION |
|--------|---------------------------------|
| ⑤ | PIPE-TO-MANHOLE CONNECTING BOOT |
| ⑥ | MANHOLE BASE, PRECAST |
| ⑦ | 3/4" DRAIN ROCK |
| ⑧ | LINING, AS DIRECTED |
| ⑨ | TRACER WIRE |

NOTES

1. GROUT ALL JOINTS, INTERIOR AND EXTERIOR WITH MORTAR SEAL.
2. LINING IS REQUIRED WHEN FORCE MAINS TERMINATE AT MANHOLES, AT ALL DROP MANHOLES, AND AS SHOWN ON THE PLANS.
3. FOR SEWERS 10" IN DIAMETER OR LARGER, SPECIAL CHANNEL CONSTRUCTION IS REQUIRED, PER S02D.
4. ALL 90° BASES SHALL HAVE A CAMERA CHANNEL.

CALAVERAS COUNTY WATER DISTRICT

PRECAST
MANHOLE BASE

DRAWN BY:
CCWD STAFF

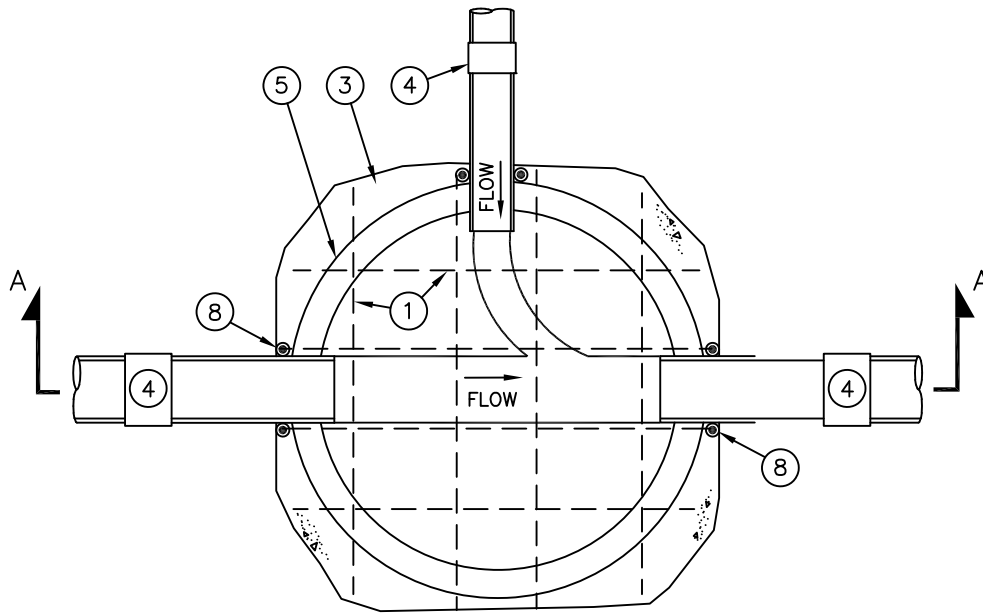
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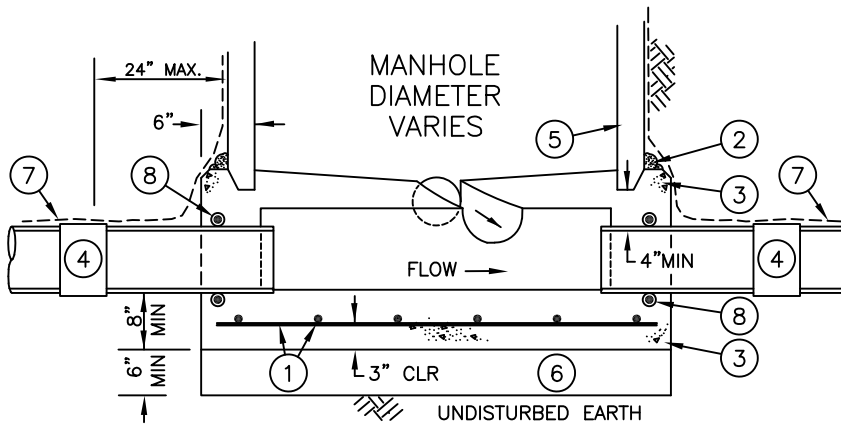
APPROVED:
CHARLES PALMER

DATE:
FEB 2022

S02



PLAN VIEW



SECTION A-A

| ITEM # | DESCRIPTION |
|--------|---------------------|
| ① | #4 REBAR @ 12" GRID |
| ② | MORTAR SEAL |
| ③ | CLASS A CONCRETE |
| ④ | PVC COUPLING |

| ITEM # | DESCRIPTION |
|--------|------------------|
| ⑤ | BARREL SECTION |
| ⑥ | CLEAN DRAIN ROCK |
| ⑦ | TRACER WIRE |
| ⑧ | RUBBER O-RING |

NOTES

1. SLOPE SHELVES 1" PER 1'
2. FORM RECESS IN BASE WITH FORMING RING TO PLACE BARREL SECTION. INSTALL PLASTIC SEALING GASKET IN JOINT PER MANUFACTURERS SPECIFICATIONS.

CALAVERAS COUNTY WATER DISTRICT

**MANHOLE
POURED-IN-PLACE BASE**

DRAWN BY:
CCWD STAFF

SCALE:
NONE

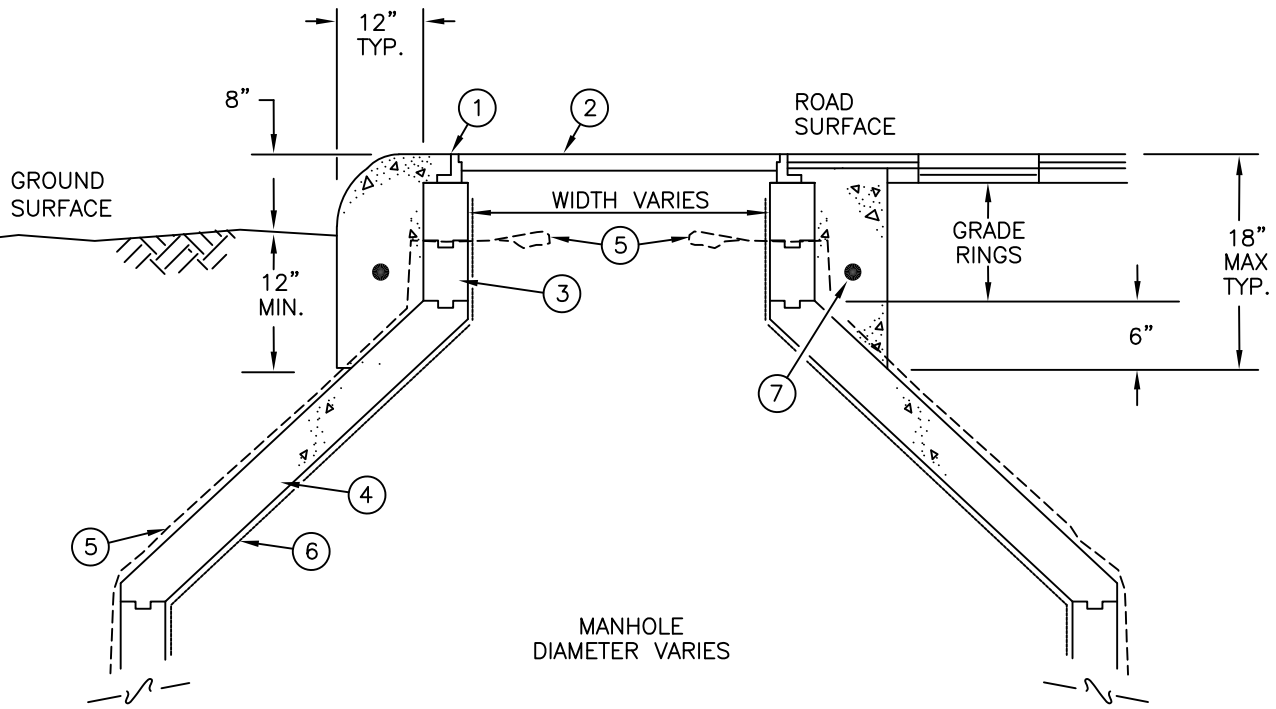
CCWD STANDARD DRAWING NO.

APPROVED:
CHARLES PALMER

DATE:
FEB 2022

S02A

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MANHOLE DIAMETER VARIES

| ITEM # | DESCRIPTION |
|--------|---|
| ① | CLASS A CONCRETE COLLAR, EXTEND 6" BELOW GRADE RING |
| ② | FRAME & COVER, MARKED "SEWER" NOTE 3 |
| ③ | GRADE RINGS, 12" TOTAL |
| ④ | CONCENTRIC CONE |
| ⑤ | TRACER WIRE SEE NOTE 1 THIS SHEET |
| ⑥ | LINING, AS DIRECTED |
| ⑦ | #4 REBAR RING |

NOTES

1. TRACER WIRE FOR EACH INFLOW/OUTFLOW PIPE TO BE TERMINATED BY GOING UP OUTSIDE OF MANHOLE TO LAST RING JOINT LEAVING 12" MINIMUM LEAD INSIDE.
2. AT AREAS ABOVE 2500 FEET ELEVATION, ALL CASTING OR CONCRETE COLLARS IN ROADWAY DEPRESSED 1/4 INCH FOR SNOWPLOWING.
3. COVER SHALL HAVE CONCEALED PICK HOLE AND GASKET BOLTED TO FRAME

CALAVERAS COUNTY WATER DISTRICT

**MANHOLE
CONE SECTION**

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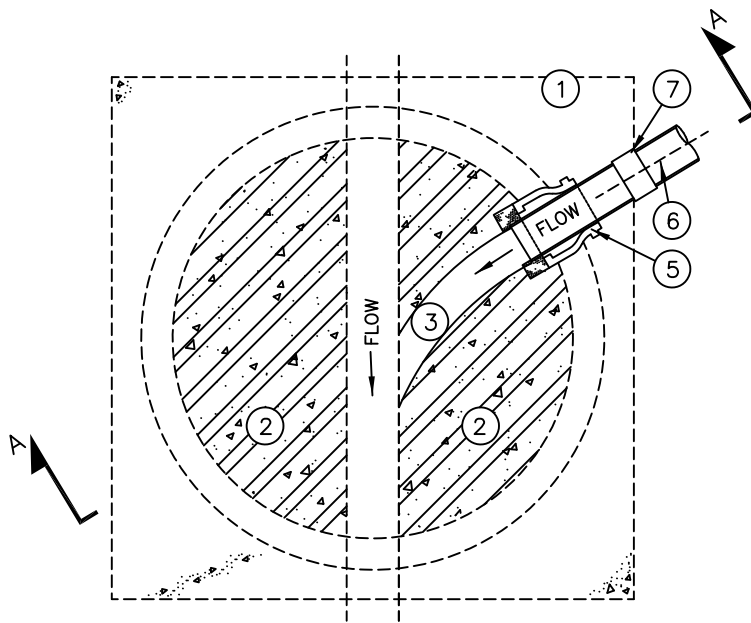
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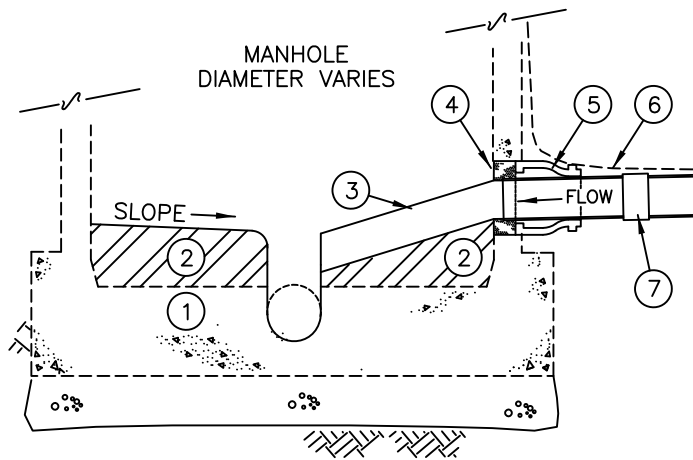
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CHARLES PALMER

DATE:
FEB 2022

S02B



PLAN VIEW



SECTION A-A

| ITEM # | DESCRIPTION |
|--------|----------------------------|
| ① | EXISTING MANHOLE BASE |
| ② | NEW CLASS A CONCRETE BENCH |
| ③ | FORMED CHANNEL |

| ITEM # | DESCRIPTION |
|--------|----------------------------|
| ④ | FILL VOID WITH MORTAR SEAL |
| ⑤ | PIPE-TO-MANHOLE CONNECTOR |
| ⑥ | TRACER WIRE |
| ⑦ | PVC COUPLING |

NOTES

1. CORE DRILL ALL OPENINGS TO THE PIPE CONNECTOR MANUFACTURERS SPECIFICATIONS.
2. POUR NEW BENCH TO TOP OF NEW PIPE

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**MANHOLE
BREAK-IN CONNECTION**

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SCALE:
NONE

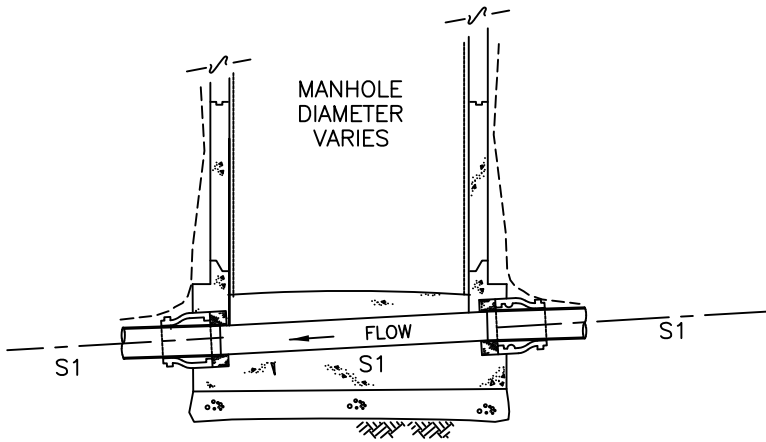
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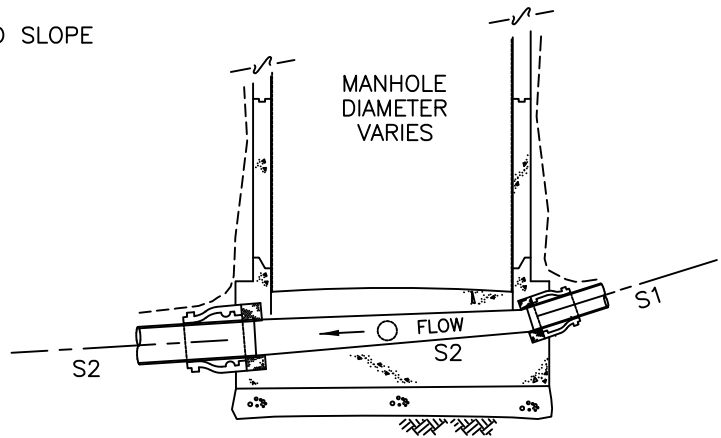
DATE:
FEB 2022

S02C

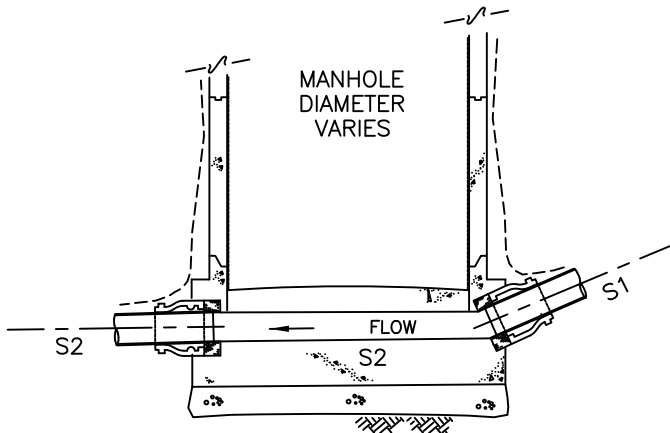
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FOR : INLET/OUTLET OF UNIFORM SIZE AND SLOPE
 MAINTAIN SLOPE THROUGH MANHOLE



FOR : INLET/OUTLET OF DIFFERING SIZE AND SLOPE
 MATCH PIPE CROWNS



FOR : INLET/OUTLET OF UNIFORM SIZE, DIFFERING SLOPES
 MAINTAIN DOWNSTREAM SLOPE THROUGH MANHOLE.
 DOWNSTREAM SLOPE TO BE EVALUATED TO AVOID
 BACKWATER EFFECTS.

CALAVERAS COUNTY WATER DISTRICT

MANHOLE CHANNEL 10" OR GREATER

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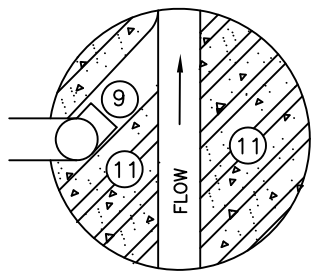
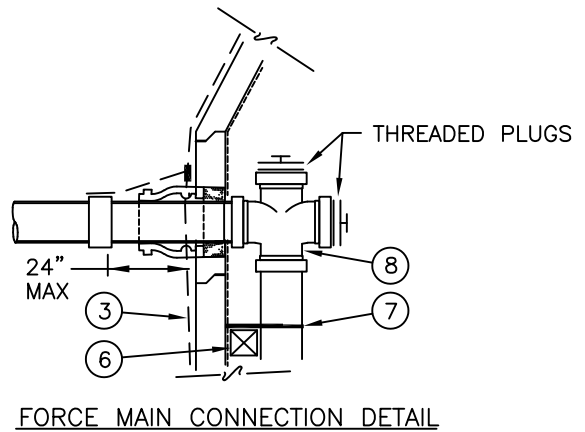
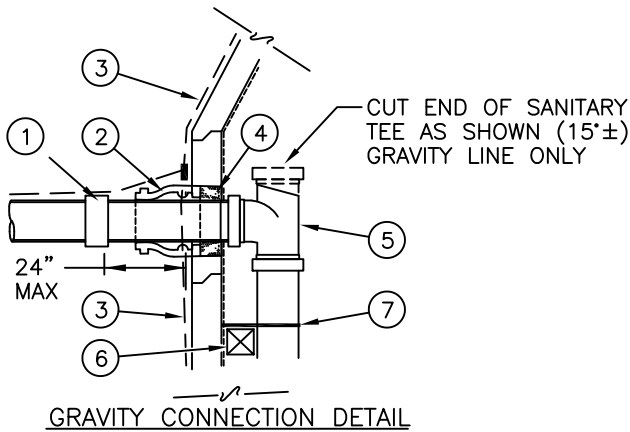
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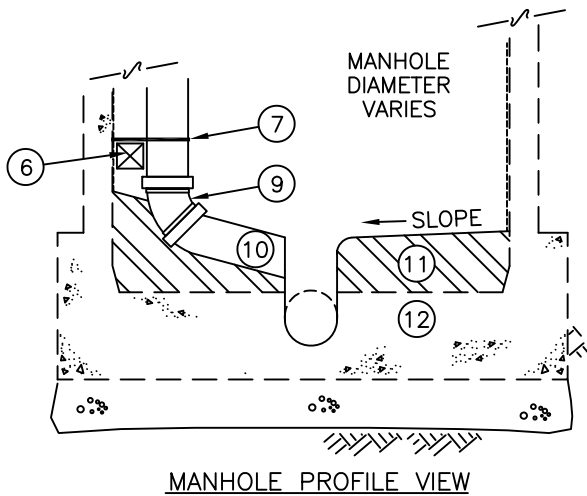
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 CHARLES PALMER

DATE:
 FEB 2022

S02D



DROP MANHOLE REQUIRED FOR ALL DROPS 2' OR GREATER



| ITEM # | DESCRIPTION |
|--------|---|
| ① | PVC COUPLING |
| ② | PIPE-TO-MANHOLE CONNECTOR |
| ③ | TRACER WIRE |
| ④ | FILL VOID WITH MORTAR SEAL |
| ⑤ | PVC TEE, CUT AS SHOWN GRAVITY LINE ONLY |
| ⑥ | SPACER MIDWAY BETWEEN CLAMPS, PLASTIC BLOCK |
| ⑦ | STAINLESS STEEL STRAPS SEE NOTES 5 & 6 |
| ⑧ | PVC CROSS, SDR 35, W/ THREADED PLUGS, FORCE MAIN ONLY |
| ⑨ | 45° EMBEDDED IN CONCRETE |
| ⑩ | FORMED CHANNEL |
| ⑪ | NEW CLASS A CONCRETE BENCH |
| ⑫ | EXISTING MANHOLE BASE |

NOTES:

- ALL INSIDE DROP PIPING SHALL BE PVC, SOLVENT WELD SEAL.
- DROP CONNECTION PIPE AND FITTINGS TO BE THE SAME SIZE AS ENTERING PIPE.
- DROP MANHOLES SHALL BE LINED.
- INTERIOR PIPING SHALL BE PLACED AS CLOSE AS POSSIBLE TO MANHOLE WALL & SECURED WITH STAINLESS STEEL ANCHOR BOLTS & STRAPS, TWO (2) STRAPS MINIMUM.
- SPACING OF STRAPS:
6" FOR FM - 18" FOR GRAVITY.
ATTACH WITH 3/8" SS. BOLTS IN NON-CORROSIVE SHIELDS.

CALAVERAS COUNTY WATER DISTRICT

**MANHOLE
INSIDE DROP**

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CCWD STAFF

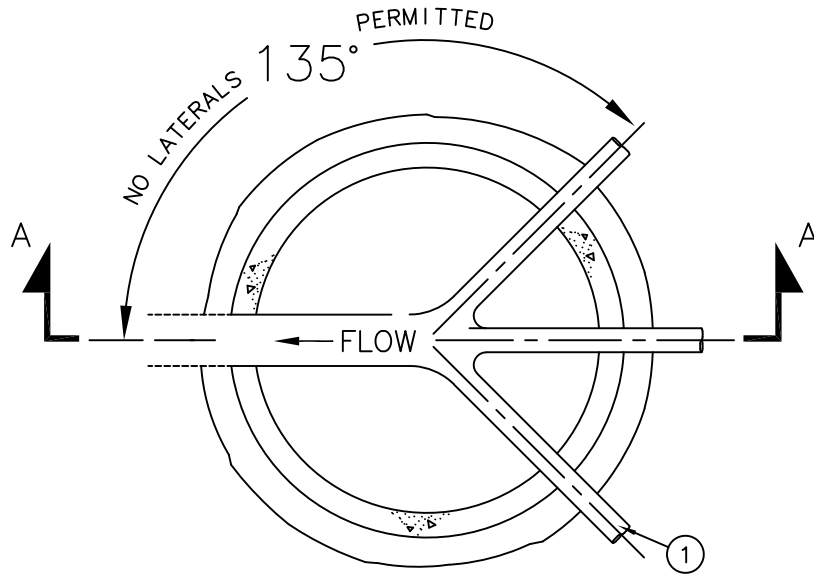
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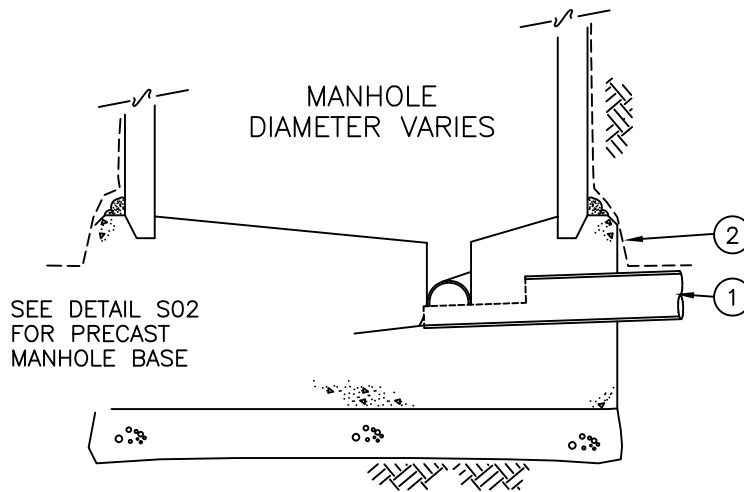
APPROVED:
S.HUTCHINGS

DATE:
DEC 2008

S02E



PLAN VIEW



SECTION A-A

| ITEM # | DESCRIPTION |
|--------|---------------|
| ① | HOUSE LATERAL |
| ② | TRACER WIRE |

NOTES:

1. SEPARATION BETWEEN LATERALS NO LESS THAN 45' MINIMUM.
2. THE MAXIMUM NUMBER OF HOUSE LATERALS ALLOWED IS 3.
3. CROWN OF LATERALS SHALL MATCH CROWN OF OUTLET PIPE

CALAVERAS COUNTY WATER DISTRICT

**MANHOLE
CUL-DE-SAC LATERAL CONNECTION**

DRAWN BY:
CCWD STAFF

SCALE:
NONE

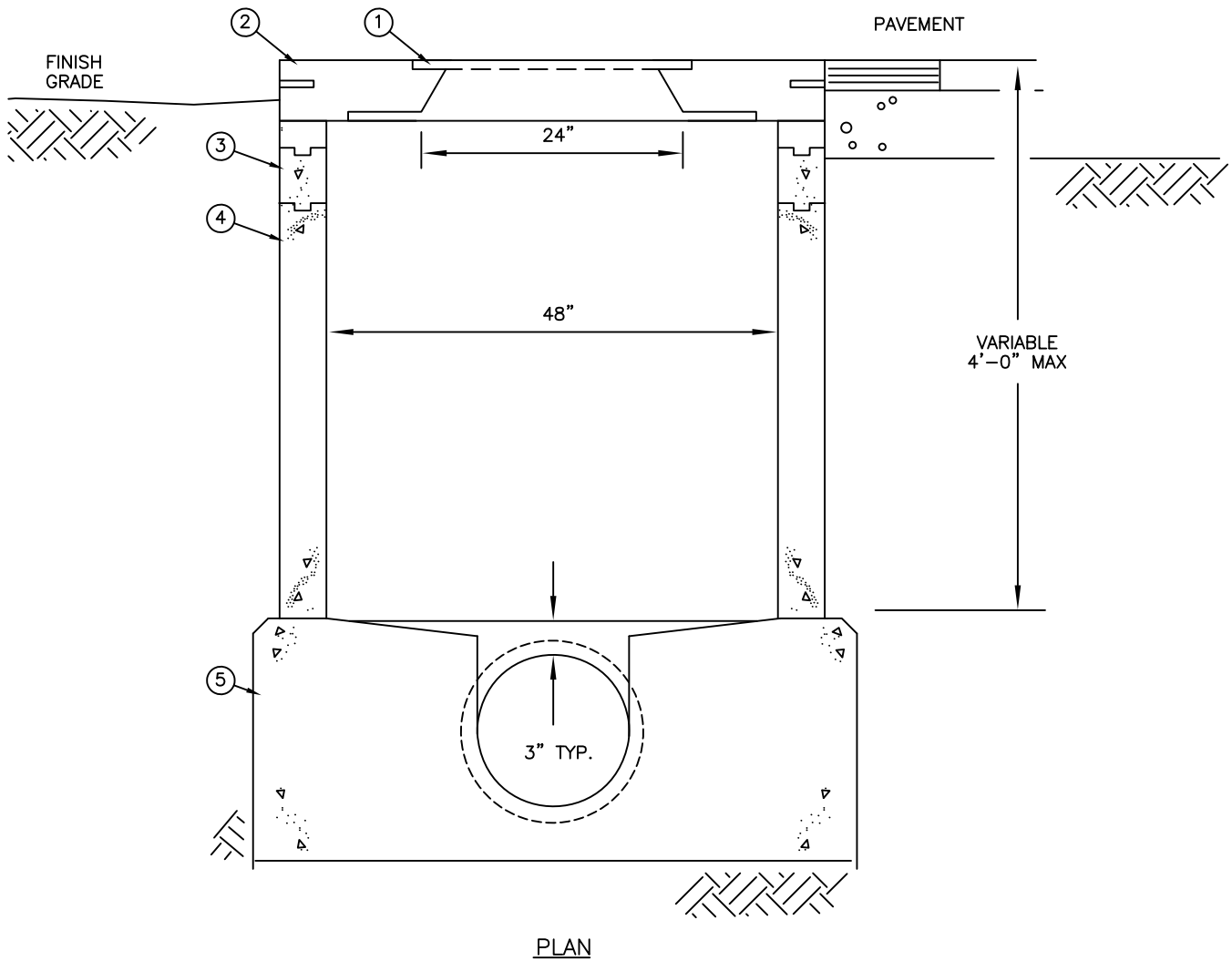
CCWD STANDARD DRAWING NO.

APPROVED:
CHARLES PALMER

DATE:
FEB 2022

S02F

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| ITEM # | DESCRIPTION |
|--------|--------------------------------------|
| ① | FRAME & COVER |
| ② | FLAT TOP LID WITH CONCENTRIC OPENING |
| ③ | GRADE RINGS, PER S02C |
| ④ | MH BARREL SECTION |
| ⑤ | CONCENTRIC CONE |

NOTES:

1. SHALLOW MANHOLES ARE TO BE INSTALLED FOR DEPTHS AT NO GREATER THAN 4 FEET FROM FINISHED GRADE TO TOP OF PIPE.

CALAVERAS COUNTY WATER DISTRICT

**MANHOLE
SHALLOW MANHOLE**

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CCWD STAFF

SCALE:
NONE

CCWD STANDARD DRAWING NO.

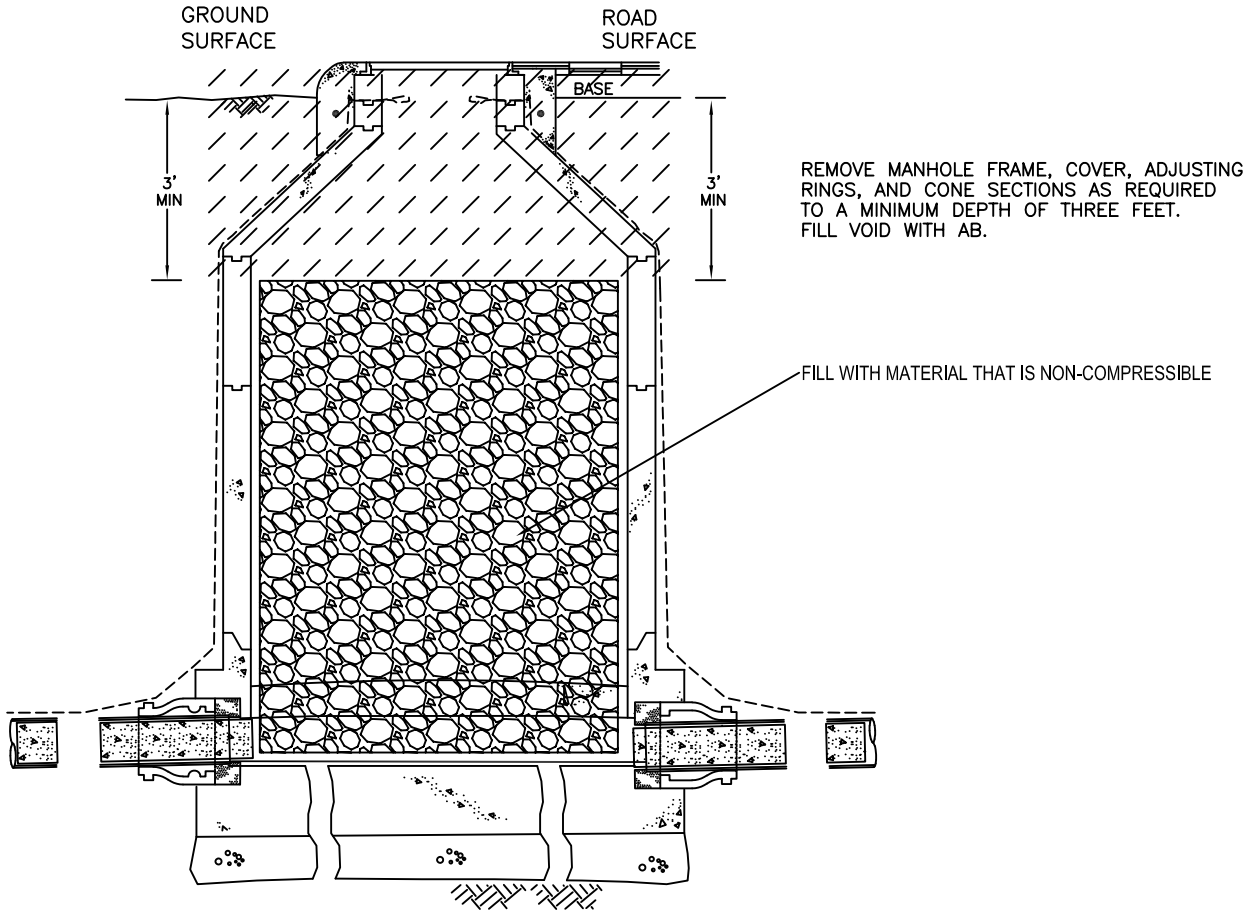
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CHARLES PALMER

DATE:
FEB 2022

S02G

WHERE MANHOLE IS LOCATED IN PAVEMENT, PUBLIC STREET OR OTHERWISE, PAVEMENT SHALL BE RESTORED IN ACCORDANCE WITH DOT STANDARDS.

FOR MANHOLES NOT LOCATED IN PAVEMENT, AREA WILL BE GRADED AND RESTORED SIMILAR TO SURROUNDING CONDITIONS.



MANHOLE ABANDONMENT PROCEDURE

MANHOLES WHICH ARE TO BE ABANDONED WILL HAVE BOTH INFLUENT AND EFFLUENT LINES TERMINATED AT RIGID COUPLINGS, IF PRESENT. IF NOT PRESENT, CUT NO MORE THAN 24" FROM MANHOLE, PLUGGED INSIDE THE MANHOLE WITH A PREMIXED, FAST SETTING, VOLUME STABLE, WATERPROOF CEMENT. THE MANHOLE WILL THEN BE FILLED WITH INCOMPRESSIBLE MATERIAL (CRUSHED STONE OR AS APPROVED), TO A POINT 3- FEET BELOW THE FINISH GRADE. THE REMAINDER OF THE MANHOLE SHALL BE BROKEN DOWN AND REMOVED. THEN THE EXCAVATION SHALL BE BACKFILLED TO FINISH GRADE WITH AB.

CALAVERAS COUNTY WATER DISTRICT

MANHOLE ABANDONMENT

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CCWD STAFF'

SCALE:
NONE

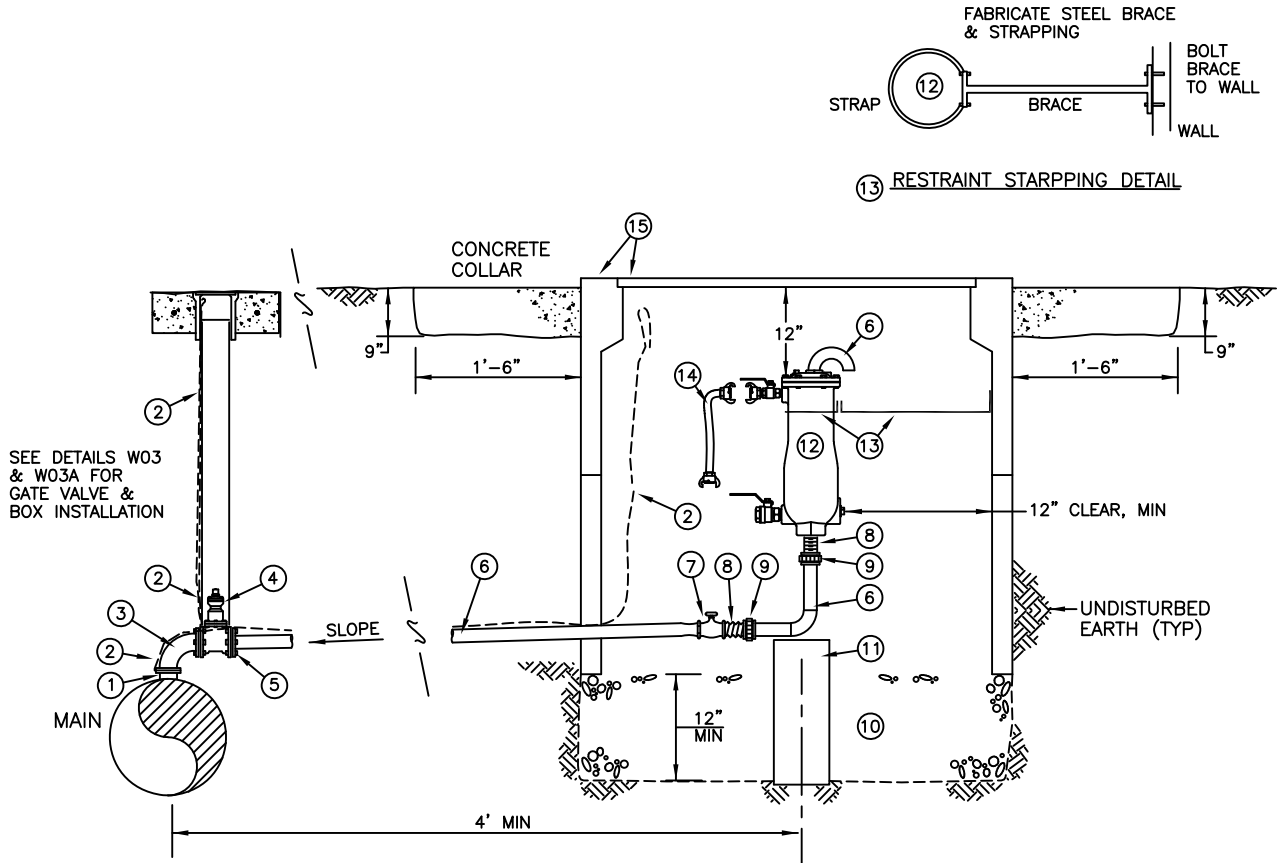
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CHARLES PALMER

DATE:
FEB 2022

S02H

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SEE DETAILS W03 & W03A FOR GATE VALVE & BOX INSTALLATION

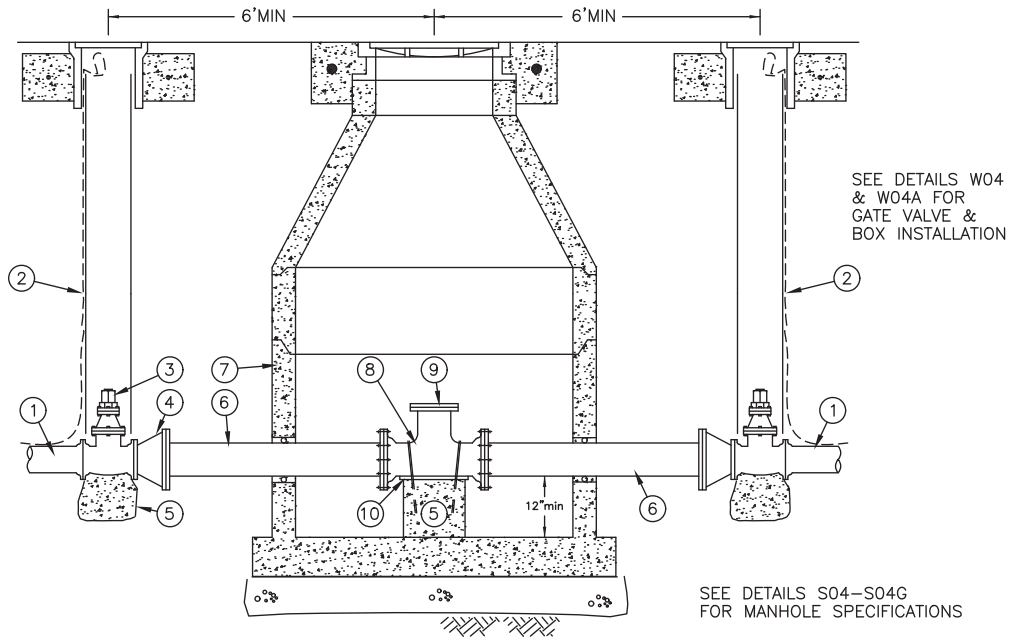
| ITEM # | DESCRIPTION |
|--------|---|
| ① | ___ X 4" TEE, FL |
| ② | TRACER WIRE |
| ③ | 4" BEND, FL |
| ④ | 4" GATE VALVE, FL, INSTALLED PER DETAIL W03& W03A |
| ⑤ | 4"x2" FL THREADED REDUCER |
| ⑥ | 2" BRASS PIPE & FITTINGS |
| ⑦ | BRASS BALL VALVE FIP x FIP |
| ⑧ | 2" BRASS THREADED NIPPLE |

| ITEM # | DESCRIPTION |
|--------|---|
| ⑨ | BRASS UNION |
| ⑩ | 3/4" CLEAN DRAIN ROCK |
| ⑪ | CONCRETE SUPPORT BLOCK TO NATIVE SOIL |
| ⑫ | SEWAGE COMBINATION AIR VALVE |
| ⑬ | RESTRAINT STRAPPING SEE DETAIL ABOVE |
| ⑭ | FLUSING HOSE W/ QUICK DISCONNECT COUPLING ON EACH END |
| ⑮ | UTILITY BOX, B40 |

NOTES:

1. ENGINEER TO SPECIFY SIZE OF VALVE.
2. AIR VALVES LARGER THAT 2" (in) SHALL BE BY SPECIAL DESIGN.
3. AIR VALVE SHALL BE PLACED OUTSIDE OF TRAFFIC AREAS.
4. CENTER VALVE IN BOX.

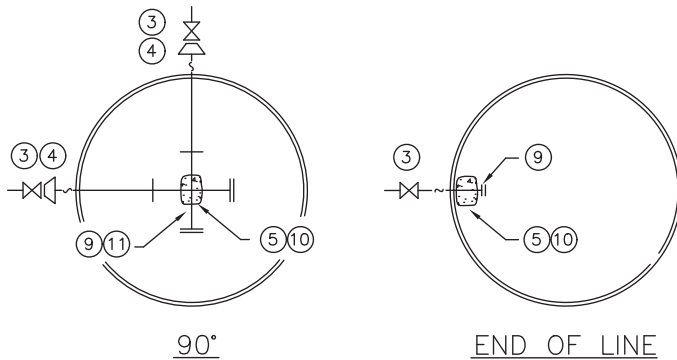
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| CALAVERAS COUNTY WATER DISTRICT | | |
| SEWER FORCE MAIN COMBINATION AIR VALVE ASSEMBLY | | |
| DRAWN BY: CCWD STAFF | SCALE: NONE | CCWD STANDARD DRAWING NO. S03 |
| APPROVED: CHARLES PALMER | DATE: FEB 2022 | |



SEE DETAILS W04 & W04A FOR GATE VALVE & BOX INSTALLATION

SEE DETAILS S04-S04G FOR MANHOLE SPECIFICATIONS

PROFILE



| ITEM # | DESCRIPTION |
|--------|---|
| (1) | 4" MINIMUM FORCE MAIN |
| (2) | TRACER WIRE |
| (3) | 4" MIN RESILIENT SEAT GATE VALVE MJ x FL, W/ VALVE EXTENDER, W03A |
| (4) | 8" REDUCER, FL x MJ |
| (5) | CONCRETE BLOCK |
| (6) | 8" FORCE MAIN |
| (7) | MANHOLE (PER DETAIL S02) SEE NOTE 5 FOR DIAMETER |
| (8) | 8" TEE, MJ |
| (9) | BLIND FLANGE |
| (10) | 30lb FELT PAD |
| (11) | 8" CROSS |

NOTES:

- ALL FITTINGS TO BE FUSION EPOXY COATED. MJ TO BE RESTRAINED TYPE.
- CLEANOUTS TO BE INSTALLED AT A MINIMUM OF 300' INTERVALS.
- VALVE COVERS TO BE MARKED SEWER.
- ALL PIPE SHALL BE DUCTILE IRON.
- FOR IN-LINE AND UPSTREAM CLEANOUT USE STANDARD 48" MANHOLE. FOR 90° CLEANOUT USE STANDARD 60" MANHOLE.
- RESTRAIN ALL JOINTS A MINIMUM OF TWO PIPE LENGTHS BEYOND GATE VALVES.

CALAVERAS COUNTY WATER DISTRICT

SEWER FORCE MAIN
IN-LINE CLEAN OUT

DRAWN BY:
CCWD STAFF'

SCALE:
NONE

CCWD STANDARD DRAWING NO.

APPROVED:
S.HUTCHINGS

DATE:
DEC 2008

S03A