



# PALMDALE WATER DISTRICT

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## A CENTURY OF SERVICE

### BOARD OF DIRECTORS

ROBERT E. ALVARADO

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DON WILSON

Division 2

GLORIA DIZMANG

Division 3

KATHY MAC LAREN

Division 4

VINCENT DINO

Division 5

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DENNIS D. LaMOREAUX

General Manager

ALESHIRE & WYNDER LLP

Attorneys

February 6, 2020

### AGENDA FOR A MEETING OF THE RESOURCE AND FACILITIES COMMITTEE OF THE PALMDALE WATER DISTRICT

**Committee Members: Kathy Mac Laren-Chair, Robert Alvarado  
to be held at the District's office at 2029 East Avenue Q, Palmdale**

**TUESDAY, FEBRUARY 11, 2020**

**3:00 p.m.**

***NOTE:*** To comply with the Americans with Disabilities Act, to participate in any Board meeting please contact Dawn Deans at 661-947-4111 x1003 at least 48 hours prior to a Board meeting to inform us of your needs and to determine if accommodation is feasible.

Agenda item materials, as well as materials related to agenda items submitted after distribution of the agenda packets, are available for public review at the District's office located at 2029 East Avenue Q, Palmdale (Government Code Section 54957.5). Please call Dawn Deans at 661-947-4111 x1003 for public review of materials.

***PUBLIC COMMENT GUIDELINES:*** The prescribed time limit per speaker is three-minutes. Please refrain from public displays or outbursts such as unsolicited applause, comments, or cheering. Any disruptive activities that substantially interfere with the ability of the District to carry out its meeting will not be permitted, and offenders will be requested to leave the meeting. (PWD Rules and Regulations, Appendix DD, Sec. IV.A.)

Each item on the agenda shall be deemed to include any appropriate motion, resolution, or ordinance to take action on any item.

- 1) Roll call.
- 2) Adoption of agenda.
- 3) Public comments for non-agenda items.
- 4) Action Items: (The public shall have an opportunity to comment on any action item as each item is considered by the Committee prior to action being taken.)



- 4.1) Consideration and possible action on approval of minutes of meeting held December 10, 2019.
- 4.2) Consideration and possible action on a recommendation declaring District vehicles as surplus and offering same for sale and/or lease returns. (Potential revenue – Facilities Manager Bligh)
- 4.3) Consideration and possible action on a recommendation to update the District’s Standard Specifications for Water Distribution Construction. (No Budget Impact – Engineering/Grant Manager Rogers)
- 4.4) Consideration and possible action on recommendation to authorize staff to enter into a contract for a Well Rehabilitation Prioritization Program with Kyle Groundwater. (\$139,992.00 – Budgeted – Budget Line Item No. 1-02-5070-007 – Engineering/Grant Manager Rogers)
- 4.5) Consideration and possible action on recommendation to adopt Resolution No. 20-4 being a Resolution of the Board of Directors of the Palmdale Water District Revising Appendix M of the District’s Rules and Regulations. (No Budget Impact – Engineering/Grant Manager Rogers)
- 4.6) Consideration and possible action on a recommendation to approve updates to the Water Use Efficiency Rebate Programs including the implementation of a new Smart Controller Rebate Program and increases to the rebate amounts for the District’s current High Efficiency Toilet Rebate and High Efficiency Clothes Washer Rebate Programs. (Budgeted under Department Rebate Programs – Resource and Analytics Supervisor Bolanos).
- 4.7) Review 2019 Resource and Facilities Committee goals and establish 2020 goals.
- 5) Information Items.
  - 5.1) Status of 2019 State Water Project allocation use. (Resource and Analytics Director Thompson II)
  - 5.2) Status on Littlerock Reservoir Sediment Removal Project. (Project Manager Thompson)
  - 5.3) Status on Palmdale Regional Groundwater Recharge and Recovery Project. (Engineering/Grant Manager Rogers)
  - 5.4) Status on Water Conservation and Education Garden. (Resource and Analytics Supervisor Bolanos/Committee Member Alvarado)
  - 5.5) Other.
- 6) Board members’ requests for future agenda items.
- 7) Date of next Committee meeting.
- 8) Adjournment.



**PALMDALE WATER DISTRICT  
BOARD MEMORANDUM**

**DATE:** February 4, 2020 **February 11, 2020**  
**TO:** RESOURCE AND FACILITIES COMMITTEE **Committee Meeting**  
**FROM:** Mr. Chris Bligh, Facilities Manager  
**VIA:** Mr. Adam Ly, Assistant General Manager  
Mr. Dennis D. LaMoreaux, General Manager  
**RE:** *AGENDA ITEM NO. 4.2 – CONSIDERATION AND POSSIBLE ACTION ON A RECOMMENDATION DECLARING DISTRICT EQUIPMENT AS SURPLUS AND OFFERING SAME FOR SALE AND/OR LEASE RETURNS. (POTENTIAL REVENUE – BUDGETED – FACILITIES MANAGER BLIGH)*

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**Recommendation:**

Staff recommends that the Resource and Facilities Committee recommend to the full Board declaring District equipment as surplus and either offer same for sale or as a lease return.

**Alternative Options:**

The Board can choose to not surplus this equipment.

**Impact of Taking No Action:**

The District would keep inefficient equipment in its fleet.

**Background:**

The following vehicle is recommended for surplus and auction:

- Vehicle V-11: 1978 Trailer Mounted Miller Welder

**Strategic Plan Element:**

This work is part of Strategic Element 3 – Systems Efficiency.  
This item directly relates to the District’s Mission Statement.

**Budget:**

The impact to the Budget will be positive depending on the sale/lease return of the equipment.

**P A L M D A L E   W A T E R   D I S T R I C T**  
**B O A R D   M E M O R A N D U M**

**DATE:** February 4, 2020 **February 11, 2020**  
**TO:** RESOURCE AND FACILITIES COMMITTEE **Committee Meeting**  
**FROM:** Mr. Scott L. Rogers, Engineering/Grant Manager  
**VIA:** Mr. Adam Ly, Assistant General Manager  
Mr. Dennis D. LaMoreaux, General Manager  
**RE:** ***AGENDA ITEM NO. 4.3 – CONSIDERATION AND POSSIBLE ACTION ON A RECOMMENDATION TO UPDATE THE DISTRICT’S STANDARD SPECIFICATIONS FOR WATER DISTRIBUTION CONSTRUCTION. (NO BUDGET IMPACT – ENGINEERING/GRA NT MANAGER ROGERS)***

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**Recommendation:**

Staff recommends that the Committee recommend to the full Board to approve the update of the District’s Standard Specifications for Water Distribution Construction.

**Alternative Options:**

Do not update the Standard Specifications.

**Impact of Taking No Action:**

The District will be operating with outdated construction specifications.

**Background:**

The District’s Standard Specifications for Water Distribution Construction were last updated with minor revisions in 2008. The 2020 Update includes revisions for submitting design plans electronically for review, updating the public notice of upcoming construction into Spanish, updated text to refer to specific sections, includes references to most current American Water Works Association (AWWA) standards, and reorganization of the standard details. The attached revision incorporates up-to-date construction standards by AWWA. Specific revisions will be reviewed at the Committee meeting.

**Strategic Plan Initiative/Mission Statement:**

This work is part of Strategic Initiative No. No. 3 – Systems Efficiency and No. 5 – Regional Leadership.

This item directly relates to the District’s Mission Statement.

**Budget:**

No impact to budget.

**Supporting Documents:**

- Standard Specifications for Water Distribution Construction dated January 2020

# **PALMDALE WATER DISTRICT**

## STANDARD SPECIFICATIONS FOR WATER DISTRIBUTION SYSTEM CONSTRUCTION



**January 2020**

PALMDALE WATER DISTRICT  
2029 EAST AVENUE Q, PALMDALE, CA 93550

661-947-4111

[www.palmdalewater.org](http://www.palmdalewater.org)

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## SECTION 1

### GENERAL PROVISIONS

1-01 General.

These specifications are to be used to establish standards of work, materials, and construction procedures for improvements to the water system of the Palmdale Water District. These specifications are intended to establish general requirements and technical standards for all pipeline work within the District. Interpretation, if any, is subject to District discretion.

1-02. Supplementary Specifications.

Wherever reference is made within these documents to certain standard specifications, the reference shall be construed to mean the standards, with all subsequent amendments, changes, or additions as thereafter adopted and published that are in effect at the date of approval of the plans and specifications. Standard specifications and documents referenced herein, and their abbreviations include, without limitation, the following:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AI	The Asphalt Institute
AISC	American Institute of Steel Construction, Inc.
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute (formerly USASI, USAS, ASA)
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
MIL	Military Specification (leading symbol)
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration, U.S. Dept. of Labor
SSPC	Steel Structures Painting Council State
Spec.	California Standard Specifications, Department of Transportation, Division of Highways
UL	Underwriters' Laboratories, Inc.

Definition of Terms.

Whenever in these specifications or other documents where these specifications govern, and the following terms are used and they shall be defined as follows:

a) Acceptance.

Shall mean that the water system has received final completion as defined herein, the one (1) year guarantee period has passed, and all repairs necessary during the one (1) year guarantee period have been made to the satisfaction of the District.

b) Agreement.

The written Agreement between the District and the Applicant providing for the construction of the improvement by the Applicant or his/her Contractor.

c) Applicant.

Shall mean any property owner, firm, or corporation who makes application for District service or enters into an Agreement with the District.

d) Board.

The Board of Directors of the Palmdale Water District.

e) Contract.

A written Agreement executed by and between the Applicant and the Contractor covering the performance of the work.

f) Contractor.

The individual, partnership, association, corporation, entity (public or private), or combination thereof, who has entered into a Contract with the Applicant or into a Public Contract with the District for performance of the work pursuant to these specifications. Except as to Public Contracts, wherever reference is made to Contractor in the Specifications, such reference shall include the Contractor in his/her own capacity and in his/her capacity as authorized agent and representative of the Applicant. Accordingly, where the Specifications require the Contractor to perform certain acts, or hold the Contractor responsible for certain costs, expenses or liabilities, or the like, such requirements and responsibilities shall be equally applicable to and binding upon the Applicant.

g) District.

The Palmdale Water District.

h) Engineer.

A registered civil engineer appointed by the District acting either directly or through his properly authorized engineers.

i) Final Completion.

Shall mean the water system is complete and active, street improvements are complete and required title insurance policies for easements, if any, are provided. The date of final completion shall initiate the beginning of the one-year guarantee period. See Section 1-14 for other requirements.

j) Fire System Activation Letter.

The letter informing Los Angeles County Fire Department that the water system and fire hydrants are available for protection. Two sets of as-built drawings must be submitted, easement documents must be recorded, and title insurance policies to said easements provided prior to issuance of letter. Also, pipe identification wires and compound meters shall be tested if included in the project.

k) Inspector - Owner's Representative.

The personal representative of the District acting on the behalf of the District Engineer and/or District Manager.

l) Plans.

The official scale and full-size approved detail drawings, or exact reproductions thereof, which show location, character, dimensions, elevations, and details of the work.

m) Specifications.

The STANDARD SPECIFICATIONS FOR WATER DISTRIBUTION SYSTEM CONSTRUCTION of the Palmdale Water District. Should job-specific specifications, approved by the District, conflict with these Specifications, the job-specific specifications shall govern.

n) Standard Drawings.

The Standard Drawings, a part of the STANDARD SPECIFICATIONS FOR WATER DISTRIBUTION SYSTEM CONSTRUCTION of the Palmdale Water District, unless otherwise qualified.

o) Work.

All labor, materials, equipment, transportation, supervision, or other facilities necessary to complete the improvement provided for in the Agreement of Public Contract.

p) Private Contract Work.

Work done pursuant to a Contract between the Contractor and the Applicant.

q) Public Contract Work.

Work done pursuant to a Contract between the Contractor and the District.

r) Private Engineer.

A registered civil engineer employed by the Applicant.

s) Approved, Directed, Satisfactory, Proper, Acceptable, Required, Necessary, and Or Equal.

Shall be defined as considered approved, directed, satisfactory, proper, acceptable, required, necessary, or equal in the opinion of the District.

1-04. Abbreviations.

The abbreviations used in the plans and specifications are abbreviations the meanings of which are established by general usage through the industry and those defined in subsection 1-02 herein.

1-05. Inspection of Work.

The District will provide inspection for all work. The inspection fee will be determined in accordance with the "Palmdale Water District Rules and Regulations" and must be paid to the District before beginning construction activity.

Prior to beginning any construction operations, the developer shall give the District at least forty-eight (48) hours advance written notice of the name and contractor's license number of the contractor who will perform the work and a written request for a pre-job meeting with the location for same to be determined by District staff. The contractor shall notify the District's Engineering Manager forty-eight (48) hours in advance of any work to be done in order that inspection services may be provided.

All work shall be performed only with the approval of the District's authorized representative, and any work done in the absence of said District's authorized representative shall be subject to rejection. The Contractor shall give sufficient notice to the District's authorized representative in advance of backfilling or otherwise covering any part of the work so that the District's authorized representative may, if he wishes, observe such part of the work before it is concealed.

District inspection is available between 7:00 a.m. and 4:30 p.m., Monday through Friday, except District holidays. If the Contractor wishes to work on holidays, weekends, or at other hours than stated in this paragraph, the Developer shall submit a written request for said hours at least forty-eight (48) hours in advance and shall obtain the written permission of the District's Engineering Manager. The Developer shall bear the full cost of approved inspection outside of normal District working hours. Said costs will be billed to the developer and must be paid to the District on a monthly basis.

Inspection by the District will not in any way reduce the Developer's or Contractor's responsibility for the work.

All costs for re-testing and re-inspection which are necessitated by defective materials and/or workmanship shall be at the sole expense of the Contractor and or Applicant.

1-06. Plans Submitted by Private Engineers.

First submittal of water improvement plans shall include a letter for District file and record purposes. All documents can be electronic (PDF, CAD). The following described documents, drawings, and materials required by the District to start processing the request:

- a) A Conceptual Plan showing how the project will be served;
- b) One (1) print of an approved tentative map;
- c) One (1) copy of the conditions of approval of said tentative tract map;
- d) Full name, address, and telephone number of the developer;

- e) Name, address, and telephone number of the tract engineer of record and the name of the project engineer representing the firm on the subject project;
- f) Two (2) prints of the tentative map on which the approved, preliminary water system, including required connections to sources of supply, are legibly shown;
- g) A plan check fee determined in accordance with the "Palmdale Water District Rules and Regulations";
- h) Copies of any other maps, plans, surveys, fire department requirements, improvements, etc. that will help expedite the preliminary plan check and which will be required by Palmdale Water District prior to approving plans.

A complete set of plans shall include the following:

- 1) A cover sheet containing the following:
  - a) Benchmark;
  - b) General Notes;
  - c) One (1) inch equals Two hundred (200) feet map showing lot lines, lot numbers, existing and proposed water mains, water main sizes, valves, fire hydrant locations, sheet numbers, and easements;
  - d) Vicinity Map;
  - e) List of Materials;
  - f) Name, address, and telephone number of Engineer and Developer; and
  - g) Approval and revision blocks.
- 2) Plan and profile sheets containing, but not limited to, the following:
  - a) Horizontal scale of one (1) inch equals forty (40) feet;
  - b) Vertical scale of one (1) inch equals four (4) feet;
  - c) Locations of all existing utilities;
  - d) Existing and future surface profiles;
  - e) Approval and revision blocks;
  - f) North arrow;

- g) Curb, gutter, and sidewalk;
- h) Property lines, lot lines, and tract boundaries;
- i) Complete dimensioning for entire right-of-way of subject street and adjoining streets;
- j) Stationing, where applicable, relative to street centerline as shown on the corresponding street improvement plans for the project;
- k) All proposed valves, fittings, and appurtenances;
- l) Profile view showing all sewer and utility crossings, the proposed water main, valves, fittings, air/vacs, and transitions;
- m) Details for transitions including all stationing, and elevations necessary to define pipe alignment and separation from other utilities or improvements;
- n) Label and dimensioning for proposed water main.

District design criteria for new water system improvements include the following:

- 1) Water mains shall be ten (10) feet from curb of face, five (5) feet horizontal, and one (1) foot vertical separation from other utilities. For sewer, see Sheet W-10;
- 2) Project shall have two (2) points of connection/sources of supply;
- 3) All water mains must loop (no dead ends);
- 4) Valves shall be located at right-of-way and property line prolongations;
- 5) All easement lines shall be valved at both ends, have no service connections, and must be ductile iron pipe;
- 6) High points shall have air/vacuum release valves;
- 7) No fittings closer than six (6) feet from curb face;
- 8) All systems will require retaining glands with mechanical joints;
- 9) Fire hydrants to be located on the same side of the street as the main wherever possible. Blue dots to be placed six (6) inches from centerline toward fire hydrant.

Plans for private contract work shall be checked by the District and shall be approved by the District prior to starting work.

Plans submitted to the District for approval shall have thereon the name and registration number of the private engineer who prepared the plans or the name of the engineering firm with the name and registration number of the private engineer under whose direction the plans were prepared. Such plans shall be free of advertising, insignia, labels, emblems, seals, or other markings not relevant to the work. Plans are to be presented in a neat, concise, and professional condition.

Upon District's approval of the plans, a single set of original mylars will be sent to the District for signature. Approval of plans by the District will not relieve the Applicant or private engineer of any responsibility because of errors in the plans either by commission or omission. Such errors, when brought to the attention of the private engineer by the District, shall be promptly remedied as herein provided.

After plans have been approved and filed, changes may be made in the plans only upon approval of the District. In order to obtain such approval, the private engineer shall first submit two sets of prints showing the proposed changes. After approval of changes, four prints of the approved revised plans shall be submitted to the District.

If construction operations are not started within twelve (12) months of the date of approval, the plans must be re-submitted for plan check prior to construction. The re-submitted plans will be checked for conformance with the criteria current at the time of re-submittal. The cost of rechecking plans will be paid by the developer as determined above.

The private engineer shall prepare "RECORD DRAWINGS" on prints of the latest revised plans showing clearly all changes in location and elevation of constructed improvement prior to the project being considered complete. These drawings shall show the configuration, manufacturer, and date of manufacture of all valves.

The private engineer shall submit the "RECORD DRAWINGS" to the District Manager for final inspection and approval. Upon receipt of such approval, the private engineer shall correct and deliver the "as-built" original tracings to the District's Engineering Manager not later than thirty (30) days after receipt of such approval.

1-07. Easement Document Requirements.

All easement documents are to be prepared and submitted on the District's approved format and provided along with plans submitted for plan check review.

Prior to the approval of water system plans, the easement documents must be approved as to form.

Grant deeds for easements are required to be executed by the grantor, re-submitted to the District, and have the Affidavit of Acceptance by the District attached to same prior to the tie-in of the water system.

All required easements will be recorded and a Title Insurance Policy for same in the minimum amount of \$25,000.00 provided to the District prior to issuance of the Fire System Activation Letter.

1-08. Compliance with Laws and Regulations.

The Contractor shall keep himself informed of all laws, ordinances, and regulations in any manner affecting those employed on the work, or the materials used in the work, and of all orders and decrees of bodies or tribunals having any jurisdiction or authority over the same. He shall at all times and at no expense to the District observe and comply with, and shall require all his agents, employees, contractors, and subcontractors to observe and comply with all such applicable laws, ordinances, regulations, orders, and decrees in effect or which may become effective before completion of the work.

Unless otherwise explicitly provided in these specifications, all permits, and licenses required by other agencies necessary to the prosecution of the work shall be secured by the contractor.

1-09. Protection of Persons and Property.

The Contractor shall provide for the protection of all persons and property as herein specified. Attention is called to "General Industry Safety Orders" and "Construction Safety Orders" of the California State Department of Industrial Relations, Division of Industrial Safety, to which the Contractor is required by law to conform. He shall provide himself with copies of these rules and orders. To the extent applicable, the Contractor shall also comply with the provisions of the Safety and Health Regulations for construction promulgated by the Secretary of Labor under Section 107 of the Contract Work Hours and Safety Standards Act, as set forth in Title 29 C.F.R.

The Contractor shall take all necessary measures to protect the work and prevent accidents during the construction. He shall provide and maintain sufficient night lights, barricades, guards, temporary sidewalks, temporary bridges, danger signals, watchmen, and necessary appliances and safeguards to properly safeguard life and property. He shall also protect all excavations, equipment, and materials with barricades and danger signals so that the public will not be endangered.

The Contractor shall so conduct his operations as to offer the least possible obstruction and inconvenience to traffic, and he shall have under construction no greater amount of work than he can handle properly with due regard for the rights of the public. All traffic shall be permitted to pass through the work with as little delay and inconvenience as possible unless otherwise authorized by the County of Los Angeles, the City of Palmdale or Caltrans.

Convenience of abutting property owners shall be provided for as far as practicable. Convenient access to mailboxes, driveways, houses, and buildings adjoining the work, as well as fire hydrants, shall be maintained and temporary approaches to intersections shall be provided and kept in good condition. When a section of surfacing, pavement, or a structure has been completed, it shall be opened for use by traffic at the request of the District. In order that unnecessary delay to the traveling public may be avoided, the Contractor, when so ordered, shall provide competent flagmen whose sole duty shall consist of directing traffic either through or around the work.

Care should be taken to preserve and protect all public and private property and facilities in and around the work site. The Contractor shall be liable for the complete cost of repairing or replacing all such property and facilities damaged or destroyed during the progress of the work.

No valve or other control on the existing system shall be operated for any purpose by the Contractor unless said operation is under the direct supervision of District personnel. Any operation of District facilities without direct supervision of District personnel will be cause for the District to stop work on the project and will be regarded as tampering with a public water system (U.S. Code 300i-1) and could result in imprisonment or fine to the Contractor or Developer responsible. Any damage resulting from said operation will be repaired at the Contractor's expense. Otherwise the District will operate all valves, hydrants, blow-offs, and curb-stops on the existing system. The District Inspector shall be notified 48 hours prior to the construction of tie-ins to existing lines.

1-10.

Public Notice.

a) Notice of Starting Work:

The Contractor shall provide and distribute to all occupants along the streets of the proposed work, printed notices 8-1/2 inches x 11 inches in size, with wording similar to that showing on the following page 1-12.

b) Notice of Temporary Shutdown:

Notice shall be given for temporary interruption of service to existing customers no later than twenty-four (24) hours prior to said interruption. Said note to be printed on 8-1/2 inches x 11 inches paper in a format to be approved by the District prior to distribution.

# PUBLIC NOTICE

**[Contractor's Company Name]** will be conducting construction work on your street on **[Day of Week, Month, Date]** between **[XX a.m. - XX p.m]** for the next **[X months or days]**. As work starts at **[Intersection Street Name]** proceeds along your street and ends at **[Intersection Street Name]**, we will seek your cooperation and appreciate your understanding.

We ask that you please:

1. Remain alert when driving/walking by the construction site.
2. Keep children away from the construction area.
3. Report your concerns to **[construction superintendent's name]** at **[contact number]**.

The work is being performed by **[Contractor Company Name]** and supervised by **[superintendent's name]**, who can be contacted at **[address, and telephone number]**. **[Contractor Company Name]** is being contracted by Palmdale Water District (PWD) for this project. PWD's Project Manager is **[name]**, who can be contacted at **[telephone number]**.

If you have a concern after normal business office hours or have a water emergency, please call PWD's emergency line at 661-947-4114.

Thank you for your cooperation,

**[Contractor's Company Name]**

# NOTICIA PÚBLICA

**Nombre de la firma** llevará a cabo trabajos de construcción en su calle el **día de la semana, mes, fecha** entre las **XX a.m. - XX p.m.** Le agradecemos de antemano su cooperación durante este tiempo.

Te pedimos que por favor:

1. Permanezca alerta al conducir/caminar por el sitio de construcción.
2. Mantenga a los niños alejados del área de construcción.
3. Informe sus inquietudes **al supervisor de construcción** al **número de contacto**.

El trabajo se está realizando **por el nombre de la empresa, el nombre del superintendente, la dirección y el número de teléfono.** **Si tiene alguna inquietud después del horario normal de oficina o una emergencia de agua, llame al 661-947-4114.**

Gracias por su cooperación,

**Nombre de la Firma**

1-11. Materials and Workmanship.

Unless otherwise specified, all materials incorporated in the work shall be new. Materials not otherwise designated by detailed specifications shall be of the best commercial quality, suitable for the purpose intended and approved by the District. Equipment, pipe, fittings, etc. must be transported to the site and installed without damage.

All workmanship shall be in conformance with the best trade practices. Particular attention shall be given to the appearance of exposed work. Any work or workmanship not conforming to the best practices shall be subject to rejection.

The District practices zero tolerance for graffiti, and it is the Contractor's responsibility to protect and maintain facilities are graffiti-free until acceptance.

1-12. Project Clean-Up.

An orderly job shall be maintained at all times. Tools, rubbish, and materials shall be picked up and stored in a workmanlike manner at all times. There shall be removed from the vicinity of the completed work all material, etc., used during construction. Surfaces shall be returned to a condition acceptable to the District. All excess material shall be disposed of as directed by the District or removed from the work site.

1-13. Guarantee.

All parts of the work shall be guaranteed against defective materials or workmanship and against settlement of backfill and any resulting damage to resurfacing for a period of one year from the date of final completion of the work.

The expiration of the one (1) year guarantee period does not limit the developer's liability for work which is done contrary to the plans and specifications. Any Performance Bond provided in accordance with Subsection 1-21 of these Specifications shall remain in full force and effect for the guarantee period.

When such defect or settlement is discovered requiring repairs to be made under this guarantee, all such repair work shall be done at no expense to the District within ten (10) days after written notice has been given by the District. Should the Contractor or Applicant fail to repair the work as directed within ten (10) days thereafter, the District may make the necessary repairs and charge the Developer or Applicant with the actual cost of all labor and materials required.

In the event such defect or settlement is discovered requiring immediate corrective action to be taken in the opinion of the District Manager, the District shall have the right to repair or replace same and to take whatever other action the District deems appropriate to correct same and to charge the Developer with the actual cost incurred by the District.

1-14. Final Completion.

As a necessary condition to, and prior to District recognition of final completion of the work, the Applicant shall submit in duplicate to the District:

- a) An itemized cost breakdown of the work including cost per foot, and total footage installed, for each size and type of pipe installed; cost per each and total number of fire hydrants installed; and cost per each and total number installed for each size of service lateral and meter installed.
- b) A bill of sale conveying, at no cost, to the District all facilities installed.
- c) All easement documents recorded, and title insurance policies issued.
- d) A letter requesting a final walk-through or punch list and the completion of all items on said punch list.

1-15. Equal Opportunity.

During the performance of the public contract, the Contractor agrees as follows:

The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed and that employees are treated, during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of any or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in a conspicuous place available to employees and applicants for employment, notices setting forth the provisions of this Equal Opportunity clause.

The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

The Contractor shall send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding a notice advising the said labor union or worker's representative of the Contractor's commitments under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

When applicable to the project, the Contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965 and of the rules, regulations, and relevant orders of the Secretary of Labor.

- a) The Contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965 and by the rules, regulations, and orders of the Secretary of Labor or pursuant thereto and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- b) In the event of the Contractor's noncompliance with the Equal Opportunity clause of this Section or with any of the said rules, regulations, or orders, the Contract may be canceled, terminated, or suspended in whole or in part, and the Contractor may be declared ineligible for further Government federally assisted construction contracts in accordance with procedure authorized in Executive Order No. 11246 of September 24, 1965 or by rule, regulation, or order of the Secretary of Labor, or as provided by law.
- c) The Contractor will include this Equal Opportunity clause in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965 so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions including sanctions for noncompliance; provided, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

The Equal Opportunity requirements of Executive Order No. 11246 are not applicable to Federally assisted contracts:

- 1) Which do not exceed ten-thousand dollars (\$10,000)

- 2) Where work is to be performed entirely outside the United States and no recruitment of workers within the United States is involved; or
- 3) Which are specifically exempt by the Secretary of Labor.

1-16. Trench Shoring and Sheeting.

In the event the work will entail construction of any trench or trenches or excavation or excavations which will be five (5) feet or deeper and into which a person will be required to descend, prior to commencing such construction, the Contractor shall obtain a permit from the California Division of Industrial Safety pursuant to Section 6501 of the California Labor Code. Said permit shall be posted at the job site prior to opening of the excavation. A copy of said permit shall be provided to the District prior to the start of construction or excavation requiring same.

In addition, and with respect to Public Contract work involving a Public contract price in excess of twenty-five thousand dollars (\$25,000.00), if any such trenches or excavations will be entailed in the work, prior to commencing such construction, the Contractor shall also submit to the District for approval a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches. If such plan varies from the shoring system standards established in Title 8, Article 6, California Division of Industrial Safety Orders, the plan shall be prepared at Contractor's expense by a private engineer registered as a civil or structural engineer.

1-17. Preservation of Monuments.

All historical monuments, benchmarks, survey marks, and stakes shall be preserved. If such monuments are damaged or destroyed during construction, they shall be repaired or replaced at no expense to the District.

1-18. Dust Control.

The work shall be conducted to provide control as follows:

- a) No fuel shall be used nor shall any work be conducted which shall emit into the atmosphere any smoke, which is defined as equal to Ringelmann No. 2, or darker.
- b) No work shall be conducted which will emit into the atmosphere any flying dust or dirt which is hazardous to humans or which might constitute a nuisance. Any dirt, dust, or mud that accumulates on streets is to be removed by the end of each workday.

1-19. Sanitation.

Temporary chemical toilet facilities shall be provided for the use of all workmen. Each toilet building shall be maintained in a sanitary condition at all times, and at the completion of the construction, shall be removed from the site. Pit-type privies shall not be used.

Pure, cool drinking water with individual drinking cups or a sanitary bubbler fountain shall be available at all times.

1-20. Shop Drawings.

The Contractor shall submit to the District four (4) copies of any shop and erection drawings required by the plans or specifications. The District will, within fifteen (15) days, return two copies to the Contractor marked "Disapproved", "Approved", or "Approved as Revised". In the last case, all revisions will be clearly shown on the returned copy, which shall be considered as an approved drawing, and only drawings or prints which are approved shall be used for manufacture.

Revisions shown on the shop drawings shall be considered as changes necessary to meet the requirements of the plans and specifications and shall not be taken as the basis of claims for extra charges. When delay is caused by the re-submission of shop drawings, Contractor shall not be entitled to any damages or extension of time on account of such delay. The corrections on prints marked "Approved as Revised" shall be made on the originals as soon as practicable and new prints submitted. District's approval shall be considered as applying only to the general arrangement, and such approval of the revisions to detail shall not relieve the Contractor from entire responsibility for correctness of details and dimensions. Contractor shall correct any misfits due to any errors in the drawings. Any fabrication or other work performed in advance of the receipt of approved shop drawings shall be done entirely at the Contractor's expense.

1-21. Contract Bonds.

- a) Public Contracts. Simultaneously with the execution of the Agreement, the Applicant shall furnish to the District a bond insuring performance of and full payment for, the work pursuant to the Agreement, Contract, and Specifications in an amount equal to one hundred percent (100%) of the contract price. Insuring performance of the guarantee shall be set forth in Subsection 1-12 of the Specifications in an amount equal to fifty percent (50%) of the contract price. The bond shall be issued by a surety acceptable to the District and shall be released as to insuring such performance and payment of the work immediately upon acceptance of the work by the District and

shall be released as to insuring such performance of the guarantee one (1) year after the District's acceptance of the work.

- b) Other Contracts. The Contractor shall furnish to the County of Los Angeles or to the City of Palmdale any bonds specified in the approval document for the improvements issued by the applicable jurisdiction.

The District shall notify the appropriate agency upon final completion of the work to allow the agency to release construction bonds held to the extent the agency's policy dictates.

## SECTION 2

### PIPELINE MATERIALS

2-01. General.

The work of this section shall include furnishing and installing all pipe, fittings, joints, together with all material, equipment, labor, transportation, supervision, and other items of expense necessary for or incidental to the installation of pressure water mains and appurtenances in accordance with the plans and specifications.

All materials shall be carefully examined at the job site by the Contractor and District Inspector. The pipe and appurtenances shall be new.

2-02. Scope.

This section defines the materials to be used for pipelines, fittings, joints, and appurtenances.

2-03. Cement Mortar Lined and Coated Steel Pipe.

Cement mortar lined and coated steel pipe (CMLC Pipe) and fittings shall be furnished and installed in accordance with the plans. Pipe, including special fittings, shall be manufactured in accordance with AWWA C205-12, *Cement Mortar Protective Lining and Coating for Steel Water Pipe – 4 inch and larger – Shop Applied*, of latest revision and Fed. Spec. SS-P-385 except as further specified in these specifications.

The pipe shall consist of the following component parts: a welded sheet steel or plate steel cylinder with joints formed integrally with the steel cylinder or with the steel joint rings welded to the ends; a five-sixteenth (5/16) inch cement mortar-lining; a one-half (1/2) inch concentric exterior mortar coating; a self-centering bell and spigot joint with a circular pre-formed rubber gasket so designed that the joint will be watertight under all conditions of service.

Steel for cylinders shall be hot-rolled low carbon steel sheets conforming to ASTM A-570 Gr 33. The minimum acceptable yield strength of the steel shall be 33,000 psi, and the minimum wall thickness of any size pipe shall be 10 gauge. Diameter indicated or specified shall be net inside diameter plus or minus one-quarter (1/4) inch after cement mortar-lining. Type II cement shall be used for all mortar-linings and coating.

The exterior of the pipe shall be cement mortar coated. Cement mortar-coating shall be applied in accordance with AWWA C205-12, *Cement Mortar Protective Lining and Coating for Steel Water Pipe – 4 inch and larger – Shop Applied*, of latest revision and Fed. Spec. SS-P-385.

Cathodic protection for CMLC Pipe is required as specified.

a) Joints.

- (1) Rubber Gasket Joints. Rubber gasket joints shall conform to Fed. Spec. SS-P-385 and be made in accordance with Standard Drawings W-9.
- (2) Lap Welded Field Joints. Where indicated on the drawings, lap joints shall comply with AWWA C206-11, *Field Welding of Steel Pipes* of latest revision. See Standard. Drawing No. W-9
- (3) Flanged Ends. Pipe section ends required to be fitted with flanges for special fittings and connections, as shown on the drawings, shall utilize flanges which comply with the requirements of AWWA C207-13, *Steel Pipe Flanges for Waterworks Service* of latest revision Class "D" for steel hub flanges. No plate flanges shall be used. All flanged spools shall be positioned and tack-welded in place prior to completing the weld. Flange bolts installed underground shall be either galvanized or cadmium plated, thoroughly coated with NO-OX Grease and wrapped with 8 mil polyethylene sheet. (AWWA C105/A21.5-10, *Polyethylene Encasement for Ductile Iron Pipe Systems* of latest revision). Gaskets for flanged joints shall be one sixteenth (1/16) inch thick for up to twenty-four (24) inch pipe, one-eighth (1/8) inch thick for pipe larger than twenty-four (24) inches. Rubber gaskets shall not be used for flanged connections. Nuts and bolts shall have hex heads.

b) Fittings for Steel Pipe.

All bends, ells, tees, crosses, reducers, and other fittings for mains twelve (12) inches and smaller shall be either Class 150 or Class 250 Steel Flanged Fittings and shall conform to AWWA Standard C207-13, *Steel Pipe Flanges for Waterworks Service, Sizes 4-inch through 114-inch*, of latest revision and shall be cement mortar lined and coated per AWWA Standard C205-12 or latest revision; or epoxy lined as approved by the District. Fittings for mains larger than twelve (12) inches may be fabricated in accordance to AWWA Standard C208-12, *Dimensions for Fabricated Steel Water Pipe Fittings*.

2-04.

Ductile Iron Pipe.

Ductile iron pipe shall be designed in accordance with the latest revision of ANSI/AWWA C150/A21.50-14 of latest revision, *Thickness Design for Ductile Iron Pipe*, for a minimum 250 psi (or project requirements, whichever is greater) rated working pressure plus a 100 psi minimum surge allowance; a safety factor of 2.

Ductile iron pipe shall be manufactured in accordance with the latest revision of ANSI/AWWA C151/A21.51-09, *Ductile Iron Pipe, Centrifugally Cast*, of latest revision. Each pipe shall be subjected to a hydrostatic pressure test of at least 500 psi at the point of manufacture.

Pipe shall have standard asphaltic pipe coating on the exterior and a double thickness cement mortar lining on the interior in accordance with ANSI/AWWA C104/A21.4-13, *Cement-Mortar Lining for Ductile-Iron Pipe and Fittings*, of latest revision.

Manufacturers certificates indicating that pipe has been double lined must be submitted with each pipe delivery.

The class or nominal thickness, net weight without lining, and name of manufacturer shall be clearly marked on each length of pipe. Additionally, the letters "DI" or "Ductile" and the country where the pipe was cast shall be either cast or stamped on to the pipe.

a) Joints.

All pipe shall be furnished with either Push-On Type Joints, such as "Tyton" or "Fastite", or Mechanical Joints. Joints shall be in accordance with ANSI/AWWA C111/A21.11-12, *Rubber-Gasket Joints for Ductile Iron Pipe and Fittings*, of latest revision, and be furnished complete with all necessary accessories.

Push on Restraint: When restraining push on joints adjacent to restrained fittings, a harness restraint device shall be used. All harnesses shall have a pressure rating equal to that of the pipe on which it is used through 14". Harness assemblies, including the bolts, shall be manufactured of ductile iron conforming to ASTM A536-80. Harness shall be manufactured by EBBA Iron, Inc. or approved equal.

b) Fittings for Ductile Iron Pipe.

Fittings shall be ductile iron. Ductile iron fittings shall conform to the latest revisions of either ANSI/AWWA C110/A21.10-12 *Ductile Iron and Gray Iron Fittings* of latest revisions or ANSI/AWWA C153/A21.53-11 *Ductile Iron Compact Fittings* of latest revision. Fittings shall have a standard asphaltic coating on the exterior and a double thickness

cement mortar lining on the interior in accordance with ANSI/AWWA C104/A21.4-13, *Cement Mortar Lining for Ductile-Iron Pipe and Fittings* of latest revision.

All fittings and accessories shall be furnished with Mechanical Joints in accordance with ANSI/AWWA C111/A21.11-12, *Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings* of latest revision. Retaining glands will be required on all Mechanical Joint fittings. The design of all connections between ductile iron pipe and other types of pipe shall be submitted to the District for approval prior to ordering the connection materials.

c) Mechanical Restrained Joints.

Restrained joint fittings shall be provided at all tees, crosses, reducers, bends, caps, plugs, and valves such that the pipe is fully restrained in any one given direction.

Mechanical Restrained Joints shall meet Uni-B-13 for PVC and be UL/FM approved through 12" for both ductile iron and PVC. The restraint mechanism shall consist of individually activated gripping surfaces to maximize restraint capability.

Twist-off nuts, sized the same as the tee-head bolts, shall be used to insure proper activating of restraining devices. The gland shall be manufactured of ductile iron conforming to ASTM A536-80. The retainer-gland shall have a pressure rating equal to that of the pipe on which it is used through 14" with a minimum safety factor of 2. See Standard Drawings W-21, W-22, and W-23. Gland shall be Megalug by EBBA Iron, Inc. or approved equal.

d) Installation of Ductile Iron Pipe and Fittings.

All pipe, fittings, and accessories shall be installed and tested in accordance with the latest revision of AWWA Standard C600-10, *Installation of Ductile Iron Mains and Their Appurtenances*, of latest revision. Newly installed ductile iron water mains shall be disinfected in accordance with the latest revision of AWWA Standard C651-14 *Disinfecting Water Mains*, of latest revision prior to placing in service.

e) Connections.

All connections for water service shall be made with malleable iron double strap service saddle as shown on Standard Drawing No. W-1 and W-1A and stated in Section 5-08.

f) Short Pipe Lengths.

Short lengths of pipe no less than one half the length of a standard pipe section shall be used only where necessary to permit the deflections required for abrupt changes of grade or short radius curves. If short lengths of pipe are required to necessitate placing a valve or fitting on station, the short length shall be installed a minimum of one full pipe length away from said fitting, otherwise joint restraints will be required.

2-05. Polyvinyl Chloride (PVC) Pipe.

Polyvinyl Chloride (PVC) pipe and joints shall be designed and manufactured in accordance with ANSI/AWWA Standard C900-07, *Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings 4-inch through 12 inch for Water Transmission and Distribution*, of latest revision, and Appendix A of said Standard. All pipe shall have a dimension ratio (DR) as shown on the approved plans. If the DR is not specified, DR 18 shall be installed.

Pipe markings shall be in accordance with ANSI/AWWA Standard C900-07, *Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4-inch through 12-inch for Water Distribution*, of latest revision including the seal (mark) of the testing agency which verified the suitability of the pipe material for potable-water service. An affidavit of compliance to specifications shall be provided for all delivered materials.

a) Fittings for Polyvinyl Chloride (PVC) Pipe.

Fittings shall be ductile-iron and shall conform to the latest revision of either ANSI/AWWA Standard C110/A21.10-12, *Ductile Iron and Gray Iron Fittings*, of latest revision or ANSI/AWWA C153/A21.53-11, *Ductile Iron Compact Fittings* of latest revision Class 350. Fitting shall be cement mortar lined per ANSI/AWWA Standard C104/A21.5-13, *Cement-Mortar Lining for Ductile Iron Pipe and Fittings* of latest revision.

All fittings and accessories shall be furnished with mechanical joints in accordance with the latest revision of ANSI/AWWA Standard C111/A21.11-12, *Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings* of latest revision. All fitting joints shall have Mechanical Restrained Joints.

The design of all connections between Polyvinyl Chloride (PVC) Pipe and other types of pipe shall be submitted to the District for approval prior to ordering the connection materials.

Mechanical Restrained Joints: Restrained joint fittings shall be provided at all tees, crosses, reducers, bends, caps, plugs, and valves such that the pipe is fully restrained in any one given direction.

Mechanical Restrained Joints shall meet Uni-B-13 for PVC and be UL/FM approved through 12" for both ductile iron and PVC. The restraint mechanism shall consist of individually activated gripping surfaces to maximize restraint capability. Twist-off nuts, sized the same as the tee-head bolts, shall be used to insure proper activating of restraining devices. The gland shall be manufactured of ductile iron conforming to ASTM A536-80. The retainer-gland shall have a pressure rating equal to that of the pipe on which it is used through 14" with a minimum safety factor of 2. See Standard Drawings W-18, W-19, and W-20. Gland shall be Megalug by EBBA Iron, Inc. or approved equal.

b) Curves and Bends.

Changes in alignment and grade may be made by deflecting the pipe units at joints as provided herein and pipe units shorter than standard length may be required. Pipe joints shall not be deflected more than half of the manufacturer's recommendation. Pipe with factory installed couplings shall be deflected not more than half the allowable deflection for field installed couplings.

If necessary, alternate methods of providing curves in pipelines other than shown on the plans may be submitted to the District for approval.

Where no radius is given at minor Points of Intersection, the deflection angle shall be accomplished by making the deflection at one or more couplings as required.

Short lengths of pipe no less than one half the length of a standard pipe section shall be used only where necessary to permit the deflections required for abrupt changes of grade or short radius curves. If short lengths of pipe are required to necessitate placing a valve or fitting on station, the short length shall be installed a minimum of one full pipe length away from said fitting, otherwise Mechanical Restrained Joint will be required.

c) Identification Wire.

Identification wire shall be installed with all Polyvinyl Chloride (PVC) Pipe. The wire shall be insulated 14-gauge copper and shall be installed as detailed on Standard Drawing No. W-8. The wire shall be placed on the top of the pipe on the centerline of the pipe. The wire shall be fastened securely at four (4) foot intervals and at each joint or fitting with an eight (8) inch length of two (2) inch wide duct tape or other approved method. All splices to be encapsulated with rubber sealing tape per Duet Industries or approved equal and shall be in hydrant pads where possible. See Standard Drawing W-8.

The wire shall be tested prior to issuance of Fire System Activation Letter to ensure continuity. Testing must be witnessed by the District Inspector.

d) Connections.

All connections for water service shall be made with a Jones Model No. J-969 or approved equal bronze service saddle set with double stainless steel straps as shown on Standard Drawing No. W-1 and W-1A and stated in section 5-07.

e) Underground Marking Tape.

Underground marking tape shall be installed with all PVC pipe. The tape shall be placed one (1) foot above the pipe with the lettering facing up. It shall be six (6) inches wide, blue in color, with the following wording: "Caution -Water Line Buried Below", stretchable, and constructed of six (6) ply high-density copolymer. The tape shall be Terra Tape Extra Stretch 540 or approved equal meeting the requirements listed above.

f) Push on Restraint.

When restraining push on joints adjacent to restrained fittings, a harness restraint device shall be used. All harnesses shall have a pressure rating equal to that of the pipe on which it is used through 14". Harness assemblies, including the bolts, shall be manufactured of ductile iron conforming to ASTM A536-80. Harness shall be manufactured by EBBA Iron, Inc. or approved equal.

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## SECTION 3

### VALVES, FIRE HYDRANTS, AND APPURTENANCES

#### 3-01. Gate Valves.

Unless otherwise specified, no gate valves larger than ten (10) inch shall be used.

All gate valves must equal or exceed the requirements of the latest revision of standards for gate valves and resilient-seated gate valves, AWWA C500-09, *Metal-Seated Gate Valves for Water Supply Service*, of latest revision or AWWA C509-09, *Resilient-Seated Gate Valves for Water Supply Service*, of latest revision and shall further be Mueller, Stockham, Clow, Kennedy, A.P. Smith, American, or approved equal.

Valves supplied shall be resilient seated wedge, with O-ring seals, non-rising stems, two (2) inch operation nut, opening left.

Valves specified "with handwheels" shall be supplied with operating handwheels instead of two (2) inch operating nut.

Valve ends shall conform to AWWA standard; flanged ends per AWWA C110/A21.10-12, *Ductile Iron and Gray Iron Fittings* of latest revision, as required for steel pipe; or mechanical joints as required for ductile iron and polyvinyl chloride (PVC) pipe.

Valves shall be suitable for buried service and horizontal mounting. Valves shall be adequately anchored for thrust in accordance with the requirements of these specifications and as shown in the Standard Drawing W-4.

#### a) Gate Valves Two and One-half (2-1/2) Inches and Smaller.

Valves shall conform to Fed. Spec. WW-V-54, Type III, Class C, and style as required. Valves shall be supplied with operating handwheels.

#### 3-02. Check Valves.

Check valves shall have an unrestricted opening with an adjustable controlled closure rate so that valve slamming is reduced to an absolute minimum upon instantaneous shut-off. Valves shall be mounted vertically between ANSI required class flanges. Body shall be cast iron or steel. Disc and shaft shall be stainless steel 18-8 or 303. It shall be complete with hydraulic or pneumatic cushion chamber, counterweight, and accumulator for hydraulic operators. Seat ring shall be replaceable and shall be Viton or Teflon. Valves shall be Prince Cushion Valves, Apco Cushioned Check Valves, or approved equal. Check valves two and one-half (2-1/2) inches and smaller shall be Walworth, or approved equal.

3-03. Plug Valves.

Plug valves shall be used only where specified.

Plug valves shall be lubricated, have a semi-steel body, and tapered plug with dry film coating on seating surface with adjustable 3-bolt gland assembly sealed by double o-rings. The plug shall be removable through the top of the valve. The valves shall be designed for the working pressures shown on the plans. Valves shall be Rockwell, Dezurick, or approved equal.

Unless approved otherwise, valves shall have flanged ends and shall be equipped for totally enclosed worm gear operating with a two (2) inch square operating nut where called for on plans. Other valves shall be lever operated. Valves shall be equipped with lubricator extensions as indicated on the plans.

3-04. Butterfly Valves.

Butterfly valves, if shown on the plans, shall meet AWWA C504-15, *Rubber-Seated Butterfly Valves* of latest revision for rubber seated, tight closing valves. Valves shall be flanged-pattern short body, and shall be cast iron, shaft or stainless steel 18-8 Type 304, disc of Ni-Resist Type 1. They shall be Class 150 unless noted on the plans. Valve operators shall be waterproof, suitable for buried service and equipped with a two (2) inch square operating nut. Where possible, operators shall be placed on the side of the pipeline nearest the curb, opposite centerline of street. Valves shall be adequately anchored for thrust in accordance with the requirements of these specifications and as shown in the Standard Drawing W-4. Concrete pads shall be poured under butterfly valves adequately anchored for thrust.

All butterfly valves shall be field tested in the presence of the inspector prior to installation for compliance with Section 5 of AWWA C504-15, *Rubber-Seated Butterfly Valves*, of latest revision. This includes performance, leak, and hydrostatic testing. Factory certification is not an acceptable substitute for the field testing. Any valves not tested will be rejected.

Contractor shall coordinate pipe manufacture to insure free movement of valve disc within the pipe.

3-05. Combination Air and Vacuum Valve Assemblies and Blow-off Assemblies.

a) General.

Combination air and vacuum valves and blow-off valves shall be installed in the pipeline at locations shown on the plans. The tap for the air valves and/or blow-off valves shall be made in a level section of pipe, no closer than twenty-four (24) inches from any machined section of pipe, rubber gasketed joint, or flanged joint.

Where practical, connections to steel pipe for combination valve assemblies and/or blow-off assemblies shall be made with a 3,000 lb. half weld-on coupling welded to the pipe in the shop at time of fabrication.

Where it is necessary to make the connection in the field, additional care shall be exercised to minimize the damage to mortar-linings. Wherever connections can be made dry, the coupling shall be welded to the pipe and the mortar lining repaired. The exterior concrete lining shall be repaired, and two heavy coats of coal tar enamel paint applied to all exposed steel fittings in conformance with AWWA C203-15. *Coal-Tar Protective Coatings & Linings for Steel Water Pipe*, of latest revision.

b) Combination Air and Vacuum Valve Assemblies.

The Contractor shall install in the water main combination air and vacuum valve assembly as shown on Standard Drawing W-16 at locations detailed on the plans and sized in accordance with manufacturers recommendations. Generally, one (1) inch assemblies are used for eight (8) inch and smaller mains, and two (2) inch assemblies for larger mains.

c) Blow-off Valve Assemblies.

The Contractor shall install blow-off assemblies as detailed on the plans. Valves and fittings shall equal or exceed the pressure rating of the pipe to which they are attached. Materials and required fittings are shown on Standard Drawings W-6, W-6A, and W-7. The blow-off valves shall be adequately sized for blow-down of water lines.

d) Tapping Valves.

Tapping valves shall be Mueller, A.P. Smith, Clow, or approved equal, and shall have flanged end connection with the appropriate adapters.

3-06. Fire Hydrant Assemblies.

a) General.

Fire hydrant assemblies shall include the connection to the main and shall consist of fire hydrant and appurtenances in accordance with these specifications and as shown on the Standard Drawings W-2, W-2A, W-3, or W-3A.

b) Location.

Fire hydrant risers shall be located on lot lines or at intersections a minimum of five (5) feet beyond curb radius ends and shall set back from face of curb two (2) feet. Distances in each case are measured from the centerline of the fire hydrant riser.

Gate valves shall be located adjacent to the water main.

c) Materials.

Fire hydrants shall be six (6) inches x four (4) inches by two and one-half (2-1/2) inches Clow Model 850 or equal. All valve operating stem ends shall be equipped with pentagonal dummy nuts the same size as the nozzle cap ends.

Fire hydrants shall be cast iron. All hydrants must conform to AWWA C503 and in all cases must be approved by the County of Los Angeles, Forester, and Fire Warden. Fire hydrant tops shall be tapped for two and one-half (2-1/2) inch I.P.T.

Fire hydrant risers and runners shall be a full six (6) inches inside diameter pipe. Type of pipe shall be ten (10) ga. CMLC steel as described in Section 2-04 of these specifications when installed with asbestos cement or steel pipe. The run shall be ductile iron as described in Section 2-05 for all other materials. The bury shall be ductile iron with an eight (8) hole patterned flange.

All required bolts, nuts, and gaskets shall be provided. Bolt holes shall be seven-eighths (7/8) inches in diameter, and bolts shall be three-quarter (3/4) inches by three (3) inches machined bolts. Bolts at hydrant flange shall be Cad-Plated hollow bolts, installed with nuts on bottom. Only hexagonal nuts and bolts will be permitted. All bolts provided must be a minimum length of at least three threads past nut when tightened.

All hydrants shall be painted with one (1) coat of red primer and two (2) finish coats of Rust-Oleum Safety Yellow or approved equal. The Contractor shall apply an additional finish coat after installation.

3-07. Location of Appurtenances.

The District reserves the right to direct the location of all valve marker posts, air release valve assemblies, and blow-off valve assemblies within the road right-of-way or easement to ensure proper drainage and to minimize interference with traffic.

3-08. Valve Boxes and Covers.

Valve boxes for buried valves shall be installed with eight (8) inch Schedule 40 PVC pipe risers. The entire valve box assembly shall be per Standard Drawing No. W-5.

3-09. Concrete Meter Boxes.

Concrete meter boxes shall be furnished and installed as shown on the plans or in the Standard Drawings. Meter boxes shall be as manufactured by Eisel Enterprises, Inc., or approved equal.

Meter boxes shall be furnished according to the following schedule:

- a) Three-quarter (3/4) inch water service and meter: Eisel No. W437MB, or equal.
- b) One (1) inch water service and meter: Eisel No. W438MB, or equal.
- c) One and one-half (1-1/2) inch or two (2) inch water service and meter: Eisel No. W66BMB, or equal.
- d) Two (2) inch blow-off assembly: Eisel No. W437MB, or equal.
- e) Water sampling station: Brook No. 3RT or equal.

3-10. Flexible Couplings.

Flexible couplings shall have all stainless-steel nuts and bolts and be either stainless steel bodies or all epoxy lined and coated. They shall be Rockwell, Smith-Blair, Baker, Dayton, or approved equal. Flanged couplings adapters shall be Rockwell, Smith-Blair, Baker, Dayton, or approved equal. Clamp type mechanical couplings shall be as manufactured by the Victaulic Company of America, Gustin-Bacon, or equal and shall be for pipe with grooved ends for water service and able to withstand a pressure equal to the strength of the pipe to which they are attached. All flexible couplings shall be protected by coating with NO-OX Grease.

3-11. Reduced Pressure Detector Assembly (RPDA).

All projects that are required to provide on-site fire protection will be required to install a reduced pressure detector assembly (RPDA) that is sized appropriately to meet the projects on-site fire protection requirements. RPDA's shall also be field tested by a certified testing firm prior to issuance of Fire System Activation Letter. Testing shall be done at one-year intervals thereafter until the project is accepted.

3-12. Large Meters (3" and Larger).

Large meter assemblies, when required, shall be completely contained in a vault and include sufficient valving and by-pass capabilities to allow the meter to be serviced, removed, or tested without interrupting water service to the customer. Serial number of the large meters shall be clearly labelled on the body of the meter or within the register. The large meter and vault must be fully detailed on improvement plans. The vault shall have the following features:

- a) A steel hot-dipped, galvanized, removable lid with a spring-loaded access hatch;
- b) A ladder; and
- c) A concrete floor sloped to a sump constructed per Standard Drawing W-12.

The large meter, registers, and automatic reading system shall be manufactured and assembled as a complete unit and shall be accompanied by certification from the manufacturer that the automatic reading system is appropriate and an integral part of same. Certification of bench test accuracy shall be provided at the time of delivery of the unit. The remote readers shall accurately reflect the actual meter readings.

Large meters shall also be field tested for accuracy by a certified testing firm prior. Testing shall be done at one-year intervals thereafter until the project is accepted. All registers of the meter shall comply with the AWWA C715-18, *Cold-Water Meters – Electromagnetic and Ultrasonic Type For Revenue Applications*, standard for accuracy, of latest revision. All flanged bolts and appurtenances shall be painted a minimum of two (2) coats of automotive grade non-lead red primer.

3-13. Flange Insulation Kits.

Flange insulation kits are required at connections between ductile mains and steel mains or services. Flange insulation kits shall be installed as shown on approved plans or as directed by the District and shall be Calpico, Inc. rubber-coated gasket kits or approved equal.

## **SECTION 4**

### **PIPELINE INSTALLATION**

4-01. Scope.

This section covers the installation of pipelines and appurtenances, including trenching, laying, backfill, compaction, restoring street surfaces, and clean-up.

4-02. Shop Drawings.

Wherever proposals for alternate methods or materials, special conditions, require approval of the District, detailed shop, fabrication, or erection drawings shall be provided by the Contractor for District approval as specified in Section 1-20 to accommodate the rate of construction.

4-03. Control of Water.

The Contractor shall furnish, install, and operate all necessary machinery, appliances, and equipment to keep excavation sufficiently free from water during construction of the work to permit proper laying and jointing and shall dispose of water so as not to cause injury to public or private property or to cause a nuisance or a menace to the public.

4-04. Excavation.

The Contractor shall perform all excavations for pipelines and appurtenances of whatever substances encountered to the depths indicated or otherwise required. Excavated material suitable for backfilling shall be piled in an orderly manner a minimum of two (2) feet from the excavated banks to avoid overloading and to prevent slides or cave-ins. Such grading shall be done as may be necessary to prevent surface water from flowing into trenches. Any water accumulating therein shall be removed by pumping or other approved means. Such sheeting and shoring shall be installed as may be necessary for protection of the work and safety of personnel in accordance with O.S.H.A. requirements. Excavations in earth and in rock shall be carried to six (6) inches below bottom of pipe. Bell holes and depressions for couplings, valves, and the like shall be excavated the same distances below these installations. The materials excavated shall be used in the backfill or removed and disposed of by Contractor as required and specified by the Engineer.

The overnight use of trench plates will be allowed only upon written request by Contractor or Developer subject to approval by the District's General Manager. Trench plates shall be non-skid, a minimum of one-inch thick, and rated for H.D.-20 loading or greater. The excavation beneath the plate shall be shored, and the plates must be either pinned to the existing surface and ramped with temporary asphalt or counter-sunk flush to the surface. If two or more adjoining plates are to be used, they shall be tack-welded together. In the event that pending inclement weather or other conditions, as determined by the District, may adversely affect the use of plates, said

plates shall be removed, and the excavation shall be backfilled, and the surface secured with temporary asphalt. The placement of trench plates shall be in accordance with the requirements of and meet the approval of the governmental agencies having jurisdiction.

Unless otherwise approved by the District prior to the beginning of construction, the length of open trench shall not exceed 500 feet including excavation, pipeline installing, and backfill in any one location. Minimum trench width shall be as required for proper assembly and joint inspection, but in no case less than twelve (12) inches greater than nominal pipe diameter. Maximum allowable width of trench for all pipelines measured at the top of the pipe shall be the outside diameter of the pipe (exclusive of all bells or collars) plus sixteen (16) inches, and such maximum shall be inclusive of all timbers. All open trenches will be backfilled to the compaction requirements and to the satisfaction of the District Inspector by the end of each workday.

4-05. Location of Existing Facilities.

Contractor shall excavate and locate existing utilities and culverts prior to excavation. All pavement shall be cut or sawed a minimum eight (8) inches wider than the trench prior to trenching.

4-06. Depth of Pipe.

Unless otherwise shown on the plans, all water mains shall have a coverage of forty-two (42) inches between the top of the pipe and the top of finished surface.

4-07. Changes in Line and Grade.

The alignment of the pipeline is shown on the plans.

In the event obstructions not shown on the plans are encountered during the progress of the work, which will require alterations to the plans, the Developer's Engineer shall submit proposed changes to the District for approval. The Contractor shall not make any deviation from the specified line or grade without prior approval by the District.

4-08. Handling and Storing Materials.

During storage, handling, and transporting, every precaution shall be taken to prevent damage to pipe. Pipe shall be handled only by means of fabric slings or other approved methods for the pipe used.

Valves, fittings, hydrants, and other accessories shall be loaded and unloaded by lifting with hoist or skidding, so as to avoid shock or damage. Under no circumstances shall such materials be dropped. Any disapproved materials shall be removed from the job site immediately.

In distributing the material at the site of work, each piece shall be unloaded opposite the place where it is to be laid in the trench.

Steel and ductile iron pipe shall be handled so that the lining and coating will not be damaged. If, however, any part of the coating is damaged, repair shall be made by the Contractor at his expense to manufacturer's specifications.

4-09.

Installing Pipe.

The Contractor is required to coordinate all installation of the various utilities so that the storm drain, sewer and curb and gutter are constructed prior to the water main installation. The Contractor shall, after excavating the trench and preparing the proper bedding for the pipe, furnish all necessary facilities for properly lowering and placing sections of the pipe in the trench without damage and shall properly install the pipe. The sections of pipe shall be fitted together correctly and shall be laid true to line and grade in accordance with elevations established by the Engineer. In the absence of curb and gutter, construction stakes shall be set by a registered civil engineer or licensed land surveyor indicating line and grade and location of all valves, fire hydrants and appurtenances. The maximum stake interval shall be fifty (50) feet. The full length of the barrel of the pipe shall have a uniform bearing upon six (6) inches of bedding material, but if the pipe has a projecting bell, suitable excavation shall be made to receive the bell which shall not bear on the subgrade. The requirement for closely fitting the bottom of the pipe to the bedding material for the width shown on the drawings will be strictly enforced.

Pipe shall be laid uphill. Pipe shall be true in alignment, both vertical and horizontal, and shall not show any undue settlement after laying. No pipe shall be laid which is damaged, cracked, checked, or spalled, or has any other defect deemed by the District to make it unacceptable. All such sections shall be permanently removed from the work.

At all times when the work of installing pipe is not in progress, all openings into the ends of the installed pipelines shall be kept tightly closed with suitable bulkheads to prevent the entrance of animals, foreign materials, and water.

The pipe trench shall be kept free from water at all times, and the Contractor shall take all necessary precautions to prevent the pipe from floating due to water entering the trench from any source, shall assume full responsibility for any damage due to this cause, and shall, at his expense, restore and replace the pipe to its specified condition and grade if it is displaced due to floating or due to any other reason.

All pipelines adjoining concrete structures shall have a flexible joint at eighteen (18) inches from the face of such concrete structures.

Before lowering and while suspended or standing vertically at trench side, the pipe shall be inspected for defects. Any defective, damaged, or unsound material shall be rejected.

a) Ductile Iron or Polyvinyl Chloride (PVC) Pipe.

Pipe shall be laid true to line and grade. Pipe shall be installed in accordance with AWWA C603-05, *Installation of Asbestos-Cement Pressure Pipe*, of latest revision. All pipe on curves shall be assembled straight and laid over. The maximum joint deflection shall be as hereinbefore specified. The rubber rings shall be checked after installation with a gauge supplied by the manufacturer to ensure that the ring is properly seated. If, for any reason, the ring is not properly seated, the joint shall be pulled apart and satisfactorily remade.

At all locations where pipe is to be encased or cradled in concrete, the pipe shall be wrapped with a minimum of two (2) layers of fifteen (15) pound, asphalt-impregnated roofing felt in such a manner that the concrete does not form a bond with the pipe.

Identification wire shall be installed with all non-metallic pipe. The wire shall be insulated, 14-gauge copper, and shall be installed as detailed on Standard Drawing No. W-8. The wire shall be placed on the top of the pipe and the centerline of the pipe. The wire shall be fastened securely at intervals of four (4) feet and at each joint or fitting with an eight (8) inch length of two (2) inch wide duct tape or other approved method.

Underground marking tape shall be installed with all non-metallic pipe. The tape shall be placed one (1) foot above the pipe with the lettering facing up. It shall be six (6) inches wide, blue in color, with the following wording: "Caution - Water Line Buried Below", stretchable, and constructed of six (6) ply high-density copolymer. The tape shall be Terra Tape Extra Stretch 540 or approved equal meeting the requirements listed above.

b) Steel Pipe.

Jointing sections of welded steel pipe with rubber gasket joints shall be accomplished by placing the rubber gasket in the spigot groove before the section is lowered into the trench and lubricating the bell end of the last section laid with an approved lubricant to reduce the friction of the entering gasket. The spigot end shall then be inserted in the bell end of the pipe in place and forced into position without injury to the pipe or gasket. Care shall be taken to ensure that the spigot is fully entered into the bell and a "feeler" gauge used to check the position of the rubber gasket. Just prior to joining the two ends together, each end of pipe shall be "battered" with cement mortar in such a manner and in sufficient quantity to completely fill the space between the respective mortar linings. The mortar shall be composed of one (1) part of Portland Cement of the same type used in the lining and coating, two (2) parts of sand by volume, and one-eighth (1/8) part fire clay with sufficient water added to give the mixture a stiff consistency. The

mixture shall not be held over one (1) hour then shall be discarded and no re-tempering by addition of water shall be allowed. Epoxy concrete adhesive shall be applied to the metal prior to coating of field fabrications or minor repairs on both coating and lining that the District may allow. After the jointing is completed, the pipe interior shall be swabbed to remove all excess mortar by drawing an approved type swab or squeegee through the pipe. After the field joints have been completed and inspected, the joint exterior shall be thoroughly cleaned.

Pipe bonding devices to provide electrical continuity shall be installed in accordance with the pipe manufacturers recommendations.

The outside joint recess shall be grouted with cement mortar after a fabric diaper has first been placed around the joint and tightened securely to prevent leakage while the mortar is being poured. The diaper shall be made of heavy-duty polyethylene fabric or other approved material of sufficiently close weave to prevent cement loss from the mortar. The fabric shall be hemmed on each edge and shall contain a metal strap within each hem sufficiently longer than the circumference of the pipe to allow a secure attachment of the diaper to the pipe. The diaper shall be centered on the joint and positioned to provide a mortar coating of the pipe ends equal in thickness to the mortar coating on the pipe. The mortar shall be the same as for the interior joints except that it shall contain sufficient water to produce a creamy consistency. Prior to placing the mortar, the joint and diaper shall be moistened with water. The joints shall be poured and rodded or manipulated by hand to remove air bubbles from one side only until the mortar comes up to the top of the diaper on the opposite side. The mortar shall completely fill the outside annular space between the ends of the pipes around the entire circumference of the joint. If required by the District, the diaper shall be removed, and the grouted joint inspected after the adjacent pipe sections have been sufficiently covered with backfill material to bring the pipe to a normal in-place temperature. The joint shall be repaired, if necessary, and given a heavy coating of Hunt Process Concrete Curing Compound or curing compound (Hunter equal) at the earliest practicable time after the mortar has hardened sufficiently.

Field welded joints shall be in conformance with AWWA C206-11, *Field Welding of Steel Water Pipe*, of latest revision.

#### 4-10. Foundation Rock.

Where ground water is encountered or the native material does not afford a solid foundation for pipe subgrade as specified herein, the Contractor shall excavate to such depths below the subgrade as the District decides is necessary and shall construct a stable base by placing foundation rock upon

which pipe bedding can be prepared. Foundation rock shall be three-quarter (3/4) inch aggregate base material.

4-11. Protective Coatings.

All otherwise uncoated buried steel surfaces, including nuts and bolts, shall be thoroughly coated with NO-OX Grease and then be wrapped with 8 mil polyethylene sheet per AWWA C-105/A21.5-10, *Polyethylene Encasement for Ductile Iron Pipe Systems*, of latest revision.

4-12. Shop Painting.

All exposed ferrous metal surfaces, including any pipe supports, shall be shop painted unless otherwise shown on the plans.

a) Surface Preparation.

All rust, loose scale, and foreign matter shall be removed from surfaces to be coated by wire brushing or sandblasting. Oil and grease shall be removed with cleaning solvent, and surfaces shall be dry.

b) Coating.

Surfaces which will be in contact with the earth and are to receive a field applied coating as specified elsewhere shall be shop-painted in accordance with AWWA C203-15, *Coal Tar Protective Coatings and Linings for Steel Water Pipe*, of latest revision.

Exposed surfaces shall be shop-painted with one coat of red primer.

4-13. Anchor and Thrust Blocks.

Anchor and thrust blocks shall be installed at fittings and valves and, where directed by the District, in accordance with details shown on Standard Drawing W-4. Excavations and forms for thrust and anchor blocks shall be examined by the District's authorized representative prior to placement of concrete. Thrust blocks shall be constructed of five-sack concrete and shall bear against undisturbed soil and shall be allowed to cure until an adequate strength has been obtained, at least forty-eight (48) hours, prior to pressurizing the pipe. No quick setting additives shall be used. Any flanged fittings coming in contact with concrete shall be thoroughly wrapped, including the bolts and nuts, with a layer of 8 mil polyethylene film. Form work shall be constructed of sandbags wherever necessary to confine the concrete to the prescribed dimensions for the block.

4-14. Hydrostatic Tests.

After the pipe backfill has been completed and accepted, the pipe shall be subjected to a hydrostatic pressure test as hereinafter specified. The District shall be notified twenty-four (24) hours prior to testing. An Inspector shall be present at all tests.

Each water main shall be filled with potable water and shall be tested in sections of convenient lengths as determined by the range of elevations within the test section which shall result in test pressure within the limits hereinafter specified. Testing against valves will not be permitted.

The test pump and gauge shall be connected to the water main at a location other than the highest point in the line in order to facilitate release of air from the high point. The gauge shall be approved by the District.

The test pressure at the location of the testing equipment shall be computed on the basis of the relative elevations of the test gauge and the lowest point in the pipe section being tested and shall result in a pressure equal to the pressure classification of the pipe plus 50 psi at the lowest point in said pipe section. The test pressure at the highest point in the pipe test section shall not be less than 110 percent of pressure classification.

This test shall be made on all sections of water main in order that all pipe, valves, fittings, fire hydrants, connections, and water services may receive the test. The test pressure shall be maintained continuously by pumping for a period of one (1) hour. Pumping shall then be discontinued for one (1) hour and the drop in pressure read on the dial of the gauge at the end of the second hour and recorded. The initial test pressure shall then be restored by pumping, and the quantity of water pumped into the line to accomplish this shall be measured accurately. If there is any sign of leakage or failure at any point on the line during the test, the test shall be discontinued until the same has been repaired after which the test shall be repeated until the pipe section tested shall have met the above requirements. The test shall be performed and accepted only in the presence of District's authorized representative. The following table summarizes the maximum allowable leakage rate for various pipe materials:

PIPE MATERIAL                      ALLOWABLE LEAKAGE (PER MILE, PER HOUR)

STEEL (NON-WELDED)                       $(D)\sqrt{T}$

36.75

DUCTILE IRON & PVC                       $(D)\sqrt{T}$

25.00

D        =        DIAMETER IN INCHES

T        =        TEST PRESSURE (PSI)

Contractor shall furnish and install, at his own expense, all corporation stops, temporary pipe, fittings, connections, equipment, bulkheads, R.P.B.D.'s, and bracing required for the tests and shall be responsible for any and all damage resulting from failure under test of material furnished and installed by him, or from faulty workmanship, negligence, or improper test methods.

All defective joints, cracked, or defective pipe, fittings, valves, hydrants, or service connections shall be removed and replaced by Contractor with sound material. Tests shall be rejected until satisfactory results are obtained as determined by the District.

Before applying the specified test pressure, care shall be taken to insure the expulsion, through hydrants, air release valves, services, or by other suitable means, of all air within the pipe and appurtenances to be tested.

4-15.        Disinfection of Water Mains and Services.

All water mains, water services, attached appurtenances, and temporary connections, if any, shall be disinfected in accordance with AWWA C601-81, *Standard for Disinfecting Water Mains*, of latest revision and the following requirements:

Chlorine shall be applied to the water in sufficient quantity to produce a dosage of not less than 50 ppm in all sections of the line, services, and appurtenances. Treated water shall be retained in the system for a period of twenty-four (24) hours minimum and shall produce not less than twenty-five (25) ppm in all sections being disinfected at the end of the twenty-four (24) hour period. Chlorination shall be done using a chlorine gas/water or sodium

hypochlorite solution. Chlorine dosage not-to-exceed one hundred (100) ppm under normal conditions.

The chlorinated water may be used later, if practicable, for water settling operations in connection with backfilling, for testing other mains, or if not so used, Contractor shall properly dechlorinate and dispose of the water. District will not be responsible for loss or damage resulting from such disposal.

Contractor shall install corporation valves in accordance with Standard Drawing W-1 of the proper size wherever necessary to chlorinate or sample and/or dispose of any chlorinated water. There shall be no separate payment for tapping and installing connections which are for filling, testing, sampling, or chlorination or flushing only.

Temporary taps for bacteriological samples shall be installed every 500 feet on main lines where there are no other outlets available for sampling.

Disinfecting the main and services, hydrostatic testing, and preliminary retention may run concurrently for the required twenty-four (24) hour period, but in the event there is leakage and repairs are necessary, additional disinfection may be required.

During the chlorination process, all valves and accessories shall be operated.

After the required period of retention of the chlorine or hypochlorite solution, a District representative will test the water for residual chlorine and any further tests which may be required.

After chlorination, the water shall be flushed from the line at its extreme ends until the replacement water is chemically and bacteriologically equal to the permanent source of water supply. One set of samples for bacterial analysis will be taken not less than twenty-four (24) hours later by the District and sent to the District's laboratory for analysis. The disinfection will not be considered complete until the supply is in conformance with the public health standards for drinking water and pseudomonas aeruginosa is no greater than the water source. The number of samples required will be as determined by the District, and the cost of processing shall be borne by the Developer.

If the tests are not satisfactory, Developer shall provide additional disinfection as required at no extra cost to the District.

4-16. Water.

District will provide water at the standard metered rate to perform all necessary operations. No other water shall be used unless test results are provided proving the water meets all applicable quality standards at point of connection to system. Contractor shall bear the cost of any necessary testing and connections and install any necessary facilities to obtain water, unless stated on the drawings.

4-17. Excavation of Pipeline Trench.

- a) Trench excavation shall be per Section 4-04.
- b) Placing of Pipe Zone Bedding and Backfill Material.

All pipe zone backfill from a depth of six (6) inches below the bottom of the pipe to twelve (12) inches above the top of the pipe shall be imported fill sand having a minimum sand equivalency of 30 per ASTM 2419. The six (6) inch bedding layer shall be placed and compacted to a minimum of 90% of the maximum density of the material at optimum moisture content. The pipe shall then be installed after which the remaining imported pipe zone material up to twelve (12) inches above the top of the pipe shall be placed and compacted in lifts, if necessary, to said relative compaction of 90%.

- c) Backfilling Pipe Trenches Above the Pipe Zone.

Backfill in pipe trenches above the pipe zone shall be a structural fill accomplished by filling and compacting the trench in lifts of depths that will permit obtaining a minimum compaction of 90% of the maximum density of the material at optimum moisture content.

All backfill materials shall be placed in such a manner as to not disturb the pipe or damage its coating. Impact, free fall, hydro hammer, or similar compaction equipment shall not be used for compaction in water system trenches. Slurry or cement-treated backfill material will not be allowed in trench with the exception of cross gutters, etc. as determined by the District Inspector or by written permission by the General Manager.

- d) Trench Backfill Compaction Tests.

The Developer will retain the services of an independent geotechnical engineering firm having a State of California licensed laboratory to make soils compaction tests at any point or points or depths as required by the District as the trench is backfilled. The minimum number of tests shall be shown on the plans. In the event any of said tests indicate that the trench compaction is less than the compaction above described, the Contractor will be required, at his own expense, to remove placed trench material in the zone or zones directed by the District. Contractor shall replace and compact said trench material to meet the requirements of this specification. Re-tests will be required on re-compacted material. No compaction tests shall be spotted by the District until all utilities have been installed.

- e) Trench Resurfacing.

Trench resurfacing, where required, shall be accomplished in accordance with the requirements of and meet the approval of the

governmental agencies having jurisdiction, such as the Los Angeles County Road Department, the City of Palmdale, or Caltrans.

f) Trench Width.

The trench width shall be the outside diameter of the pipe (exclusive of all bells or collars) plus sixteen (16) inches.

4-18. Valves.

All main line valves shall be located on the property line or utility easement prolongation in the street unless otherwise indicated by the District.

All valve box risers shall be of eight (8) inch Schedule 40 PVC pipe. All valve risers shall be adjusted so that the valve box lid will be flush with the finished street grade per Standard W-5.

Valves shall be installed plumb and in alignment with the pipe. Each valve shall be operated prior to its installation to assure proper functioning.

4-19. Fire Hydrants.

a) Location.

Hydrants shall be located as shown or as directed and in a manner to provide complete accessibility and also in such a manner that the possibility of damage from vehicles or injury to pedestrians will be minimized. When placed behind the curb, the centerline of the hydrant barrel shall be set twenty-four (24) inches behind the face of curb unless specifically stated on approved plans.

The installation of the hydrants shall be in accordance with Standard Drawing No. W-2, W-2A, W-3, or W-3A.

b) Position.

All hydrants shall stand plumb and shall have their nozzles facing the curb at an angle of forty-five (45) degrees. Hydrants installed where there is no curb shall have the four (4) inch nozzle facing the street. Hydrants shall be set to the established grade as shown in Standard Drawings W-2, W-2A, W-3, or W-3A.

c) Fire Hydrant Barricades.

When required, fire hydrant barricades shall not obstruct the outlets and shall be constructed per Standard Drawing W-14 or W-15.

4-20. Connections to Existing Water Lines.

No connection to the existing system shall be made until after the new system has been completed and fully accepted by the District.

In the locations shown on the drawings, the Contractor shall cut and machine existing water pipes and install the new fittings and lines as specified or noted. The Contractor shall make all connection within a maximum shutdown period required by the District. If, in the opinion of the District, the connection cannot be accomplished within the required shutdown period, the connection shall be made at night or on weekends. The District will supervise operation of all existing valves necessary for the shutdown.

Contractor shall be responsible for handling dewatering from existing main, prevent cross contamination of existing water system, dechlorination, and disposal of water.

4-21. Hot Tapping of Existing Water Line.

Pressure taps are allowed only as shown on approved plans.

All hot taps shall either be performed by the District or an experienced licensed contractor specializing in said work. Contractors must have a proved ability and experience to perform hot taps, hold a current underground contractor's license, and carry sufficient insurance as determined by the District and be approved by the District prior to commencing said work.

Existing mains to be tapped must be cleaned. The area required to be cleaned shall be either the diameter of the hot tap plus seven (7) inches or the full diameter of the main to be tapped when full circle reinforcement is required. The following steps are then required prior to hot tapping:

a) Steel Mains.

The nozzle shall be welded to the main after cleaning. It shall then be blind flanged and air tested to 100 psi. The pressure must hold for a minimum of three minutes. The test must be done in the presence of a District Inspector.

After passing the air test, the reinforcement ring shall be placed and welded continuously on edges to the existing main and to the nozzle pipe.

b) Ductile Iron and PVC Mains.

Mechanical tapping sleeves are required. After cleaning, the sleeve shall be bolted to the main and a blind flange placed on the nozzle. An air test shall then be performed as described above.

## **SECTION 5**

### **SERVICE LINES**

#### 5-01. Location of Service Lines.

- a) The trench for a single service diameter size ranging from (3/4") to (2") shall have a minimum width of ten (10) inches and a depth of thirty (30) inches below the existing or finished grade throughout the length of service. Services larger than two (2) inches shall be detailed in supplementary drawings which will be furnished to the Contractor if such larger size is specified.
- b) Services in existing, paved streets shall be installed by boring under the pavement, where practicable.
- c) Size of services shall be as shown on the plans, as specified, or as determined by the District.
- d) In general, each service shall start at the new water main and shall extend to the meter location at an elevation determined by Standard Drawing W-1 or W-1A and the existing grade at the meter location. Each service shall be connected to the corporation valve at the main and an angle valve shall be installed at its end in the meter box location.
- e) The locations of the meter boxes shall be as indicated on the plans or as directed by the Inspector. No meter box shall be installed closer than five (5) feet from the edge of a driveway apron.
- f) Single service lines shall not be less than five (5) horizontal feet from sewer laterals.
- g) In no case shall a service or other tap be made in a main closer than twenty-four (24) inches to a bell, coupling, joint, fitting, or another service tap.
- h) A single service line is required for each metered connection. However, two individual services may be installed in a single twenty-four (24) inch wide trench excavated approximately along the projection of a lot line common to any two (2) lots. In such cases, service taps on the main shall not be less than two (2) feet apart.
- i) Meter will be purchased from the District and installed by Contractor. Water services shall be installed by Contractor only when indicated on the plans.

- j) Services shall be tested and disinfected in the same manner as specified elsewhere herein for water mains. These operations shall be performed concurrently with the testing and disinfecting of the water mains where practicable.

5-02. Corporation Valves and Angle Valves.

All corporation valves and angle valves shall be same size as the service size. Corporation valves shall have male iron pipe threads on the inlet.

All valves shall have a circular waterway of service line diameter. All nuts, washers, and contact surfaces shall be faced to a true fit. All tapers shall be carefully ground and show no leakage under hydrostatic test. All valves shall be finished in a neat and workmanlike manner, and the thickness of metal shall be equal around the axis of the circular way. All burrs on the inside of valves shall be carefully removed leaving a clean, smooth waterway. All valves, including copper tubing connections, shall be field tested with the water main as noted above.

All valves shall be sand cast of high-grade bronze conforming to ASTM B62. District shall have the right to take one or more from each lot and have same analyzed.

5-03. Copper Tubing.

Copper tubing shall be required for all services. It shall be seamless copper water tube, Type K, cold drawn, and annealed of the size shown on the plans. It shall be true, smooth, clean on both inside and outside, and free from any cracks, seams, or other defects. It shall be truly cylindrical, of the full specified outside and inside diameters and of uniform thickness of metal and shall conform to ASTM B88. The tubing shall be continuous between the main line and the meter with no splices permitted. All copper tubing shall be wrapped with 20 mil tape within 18" of the water main inclusive of corporation valve.

5-04. Fittings.

All fittings shall have copper flare connections. All joints shall be made in accordance with manufacturers recommendations.

5-05. Connections to Asbestos Cement Mains.

All connections for water services shall be made with a bronze double strap service clamp as shown on Standard Drawing W-1 and W-1A.

5-06. Connections to Cement Mortar Lined and Coated Steel Mains.

Where practical, connections for water services shall be made with 3,000 lb. weld-on half coupling, welded to the pipe in the shop at time of pipe fabrication. After coupling is welded to the pipe, it shall be covered by mortar coating, so no bare metal is left exposed. Where it is necessary to make the connection in the field, additional care shall be exercised to minimize the damage to mortar linings.

5-07. Connections to Polyvinyl Chloride (PVC).

All connections for water services shall be made with a bronze service saddle positioned as shown on Standard Drawing W-1 and W-1A; Jones Model No. J-969 or approved equal.

5-08. Connections to Ductile Iron Mains.

All connections for water services shall be made with a bronze service saddle with double stainless-steel straps, positioned as shown on Standard Drawing W-1 and W-1A; Jones Model No. J-969, or approved equal.

5-09. Water Meters.

All water meters shall include an approved Automatic Meter Reading System. Water meters shall be purchased from the Water District. Meters must be paid for and ordered from the District a minimum of thirty days prior to date of need.

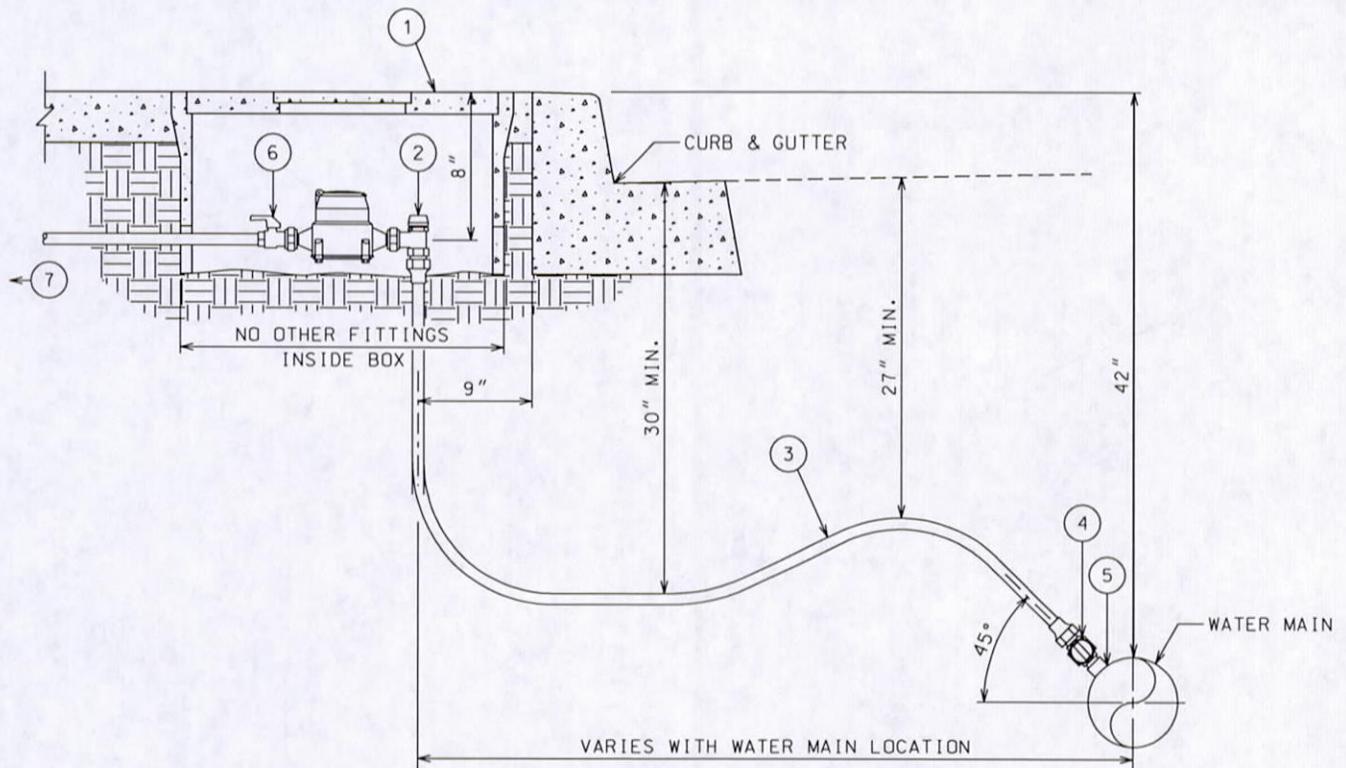
5-10. Pressure Regulators.

All services at 80 psi or greater must be equipped with pressure regulators. Regulators may not be installed within the meter box. All pressure regulators shall be installed on the property and are maintained by the property owner.

5-11. Cross Connection Protection.

All cross-connection protection shall conform to District Ordinance No. 88-1. In addition, all plumbing between meter and backflow prevention assembly must be visually inspected and approved by Cross Connection Specialist or District Inspector. Said assemblies shall be placed as close as practical to meter. Backflows to be tested within seven (7) days of activation of service and submitted to the District for approval.





KEY NOTES:

1. ALL METER BOXES WILL BE SET BEHIND CURB SECTION EXCEPT IN THE ABSENCE OF SIDEWALK & CURB SECTION. METER BOX THEN WILL BE SET IN A CONCRETE PAD 12" THICK & 12" WIDE AROUND BOX WITH C.I. LID. SET METER BOX SO THERE IS 2" TO 4" BETWEEN BACK OF CURB & METER BOX. METER BOX TO BE SET TO SIDEWALK GRADE. NO METER BOX SHALL BE LOCATED CLOSER THAN 5'-0" FROM EDGE OF DRIVEWAY APRON.

MATERIAL DESCRIPTION

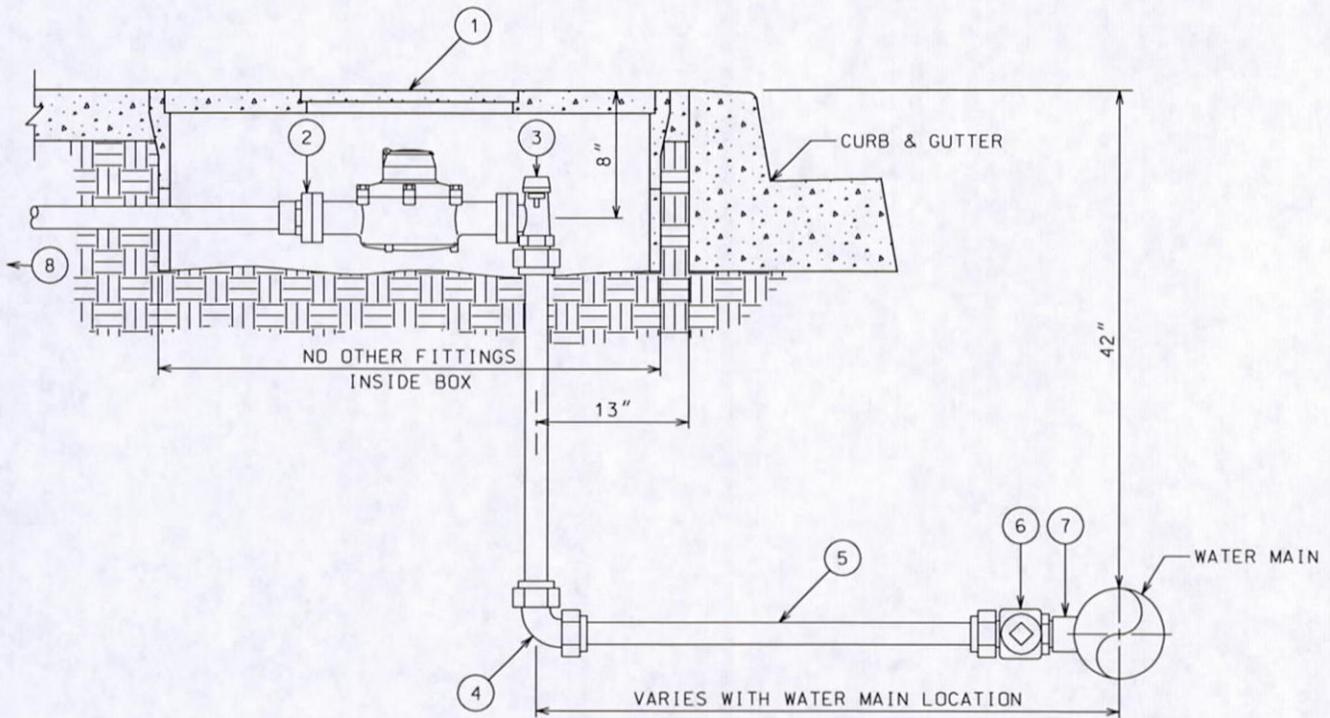
- ① 12" x 20" x 12" EISEL METER BOX NO. W437MB W/ 2-PIECE COVER NO. W437PC AND READING LID NO. W437RL FOR 3/4" SERVICES AND NO W348MB W/ 2-PIECE COVER NO. W438PC AND READING LID NO. W438RL FOR 1" SERVICES OR APPROVED EQUAL.
- ② BALL ANGLE METER VALVE W/ LOCKWING (FORD NO. BA43-232W-G-NL COMPRESSION CORP.) FOR 3/4" & 1" TUBING OR APPROVED EQUAL.
- ③ TYPE "K" SOFT COPPER TUBING SERVICE LINE.
- ④ 3/4" & 1" BALL TYPE CORPORATION VALVE WITH MALE I.P.T. ON THE INLET (MUELLER NO. B-25028N COMPRESSION CORP.) OR APPROVED EQUAL. SET CORPORATION VALVE AT 45° ON 3/4" AND 1" SERVICE CONNECTIONS.
- ⑤ 3000 LB. WELD ON HALF COUPLING FOR 3/4" & 1" SERVICE CONNECTIONS ON STEEL PIPE. DOUBLE STRAP BRONZE SERVICE SADDLES FOR 3/4" & 1" SERVICE CONNECTION ON ASBESTOS CEMENT PIPE (FORD NO.202B) OR APPROVED EQUAL. DOUBLE STRAP MALLEABLE IRON SADDLES WITH DIELECTRIC BUSHINGS FOR DUCTILE IRON PIPE. BRONZE SERVICE SADDLES W/ DOUBLE STAINLESS STEEL STRAPS FOR P.V.C. PIPE. ALL SADDLES TO BE GREASED AND WRAPPED. WRAP SERVICE WITH 10 MIL TAPE WITHIN 18" OF CORP FOR D.I. PIPE.
- ⑥ CUSTOMER SHUT-OFF VALVE JONES NO. E-1908 FOR 3/4" AND 1" SVCS OR APPROVED EQUAL.
- ⑦ APPROVED BACKFLOW PREVENTION DEVICE IS REQUIRED FOR NON-RESIDENTIAL USE.

# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
 APPROVED:

TYPICAL SERVICE CONNECTION  
 (3/4" AND 1")

W-1



KEY NOTES:

1. ALL METER BOXES WILL BE SET BEHIND CURB SECTION EXCEPT IN THE ABSENCE OF SIDEWALK & CURB SECTION. METER BOX THEN WILL BE SET IN A CONCRETE PAD 12" THICK & 12" WIDE AROUND BOX WITH C.I. LID. SET METER BOX SO THERE IS 2" TO 4" BETWEEN BACK OF CURB & METER BOX. METER BOX TO BE SET TO SIDEWALK GRADE. NO METER BOX SHALL BE LOCATED CLOSER THAN 5'-0" FROM EDGE OF DRIVEWAY APRON.

MATERIAL DESCRIPTION

- ① 17" x 30" x 12" EISEL METER BOX NO. W66BMB AND 17<sup>5</sup>/<sub>8</sub>" x 30<sup>1</sup>/<sub>2</sub>" 2-PIECE COVER NO. W66BPC AND READING LID NO. W66BRL OR APPROVED EQUAL.
- ② METER FLANGE COUPLING (FORD NO. CF31) OR APPROVED EQUAL WITH FULL-FACE OR DROP-IN GASKET.
- ③ BALL ANGLE METER VALVE WITH LOCKWING (JONES NO. E-1975W) FOR 1<sup>1</sup>/<sub>2</sub>" & 2" TUBING OR APPROVED EQUAL WITH FULL-FACE OR DROP-IN GASKET.
- ④ COMPRESSION 90° ELBOW COUPLING (JONES NO. E-2611) OR APPROVED EQUAL.
- ⑤ TYPE "K" SOFT COPPER TUBING SERVICE LINE AND COMPRESSION FITTINGS WILL BE USED.
- ⑥ 1<sup>1</sup>/<sub>2</sub>" OR 2" BALL TYPE CORPORATION VALVE WITH MALE I.P.T. ON THE INLET (JONES NO. J-1935 COMPRESSION) OR APPROVED EQUAL. SET CORPORATION VALVE HORIZONTAL ON 1<sup>1</sup>/<sub>2</sub>" & 2" SERVICE CONNECTIONS.
- ⑦ 3000 LB. WELD ON HALF COUPLING FOR 1<sup>1</sup>/<sub>2</sub>" & 2" SERVICE CONNECTIONS ON STEEL PIPE. DOUBLE STRAP BRONZE SERVICE SADDLES FOR 1<sup>1</sup>/<sub>2</sub>" & 2" SERVICE CONNECTION ON ASBESTOS CEMENT PIPE (FORD NO. 202B) OR APPROVED EQUAL. DOUBLE STRAP MALLEABLE IRON SADDLES WITH DIELECTRIC BUSHINGS FOR DUCTILE IRON PIPE. BRONZE SERVICE SADDLE W/ DOUBLE STAINLESS STEEL STRAPS FOR P.V.C. PIPE. ALL SADDLES TO BE GREASED AND WRAPPED. WRAP SERVICE WITH 10 MIL TAPE WITHIN 18" OF CORP FOR D.I. PIPE.
- ⑧ APPROVED BACKFLOW PREVENTION DEVICE IS REQUIRED FOR NON-RESIDENTIAL USE.

# PALMDALE WATER DISTRICT

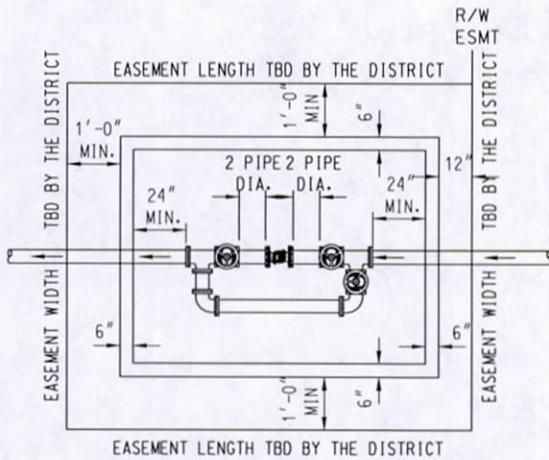
DATE: DEC. 2019 MRW  
APPROVED:

TYPICAL SERVICE CONNECTION  
(1<sup>1</sup>/<sub>2</sub>" AND 2")

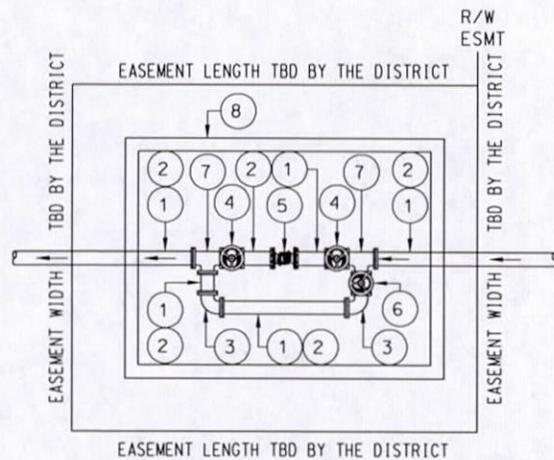
W-1A

MATERIAL DESCRIPTION

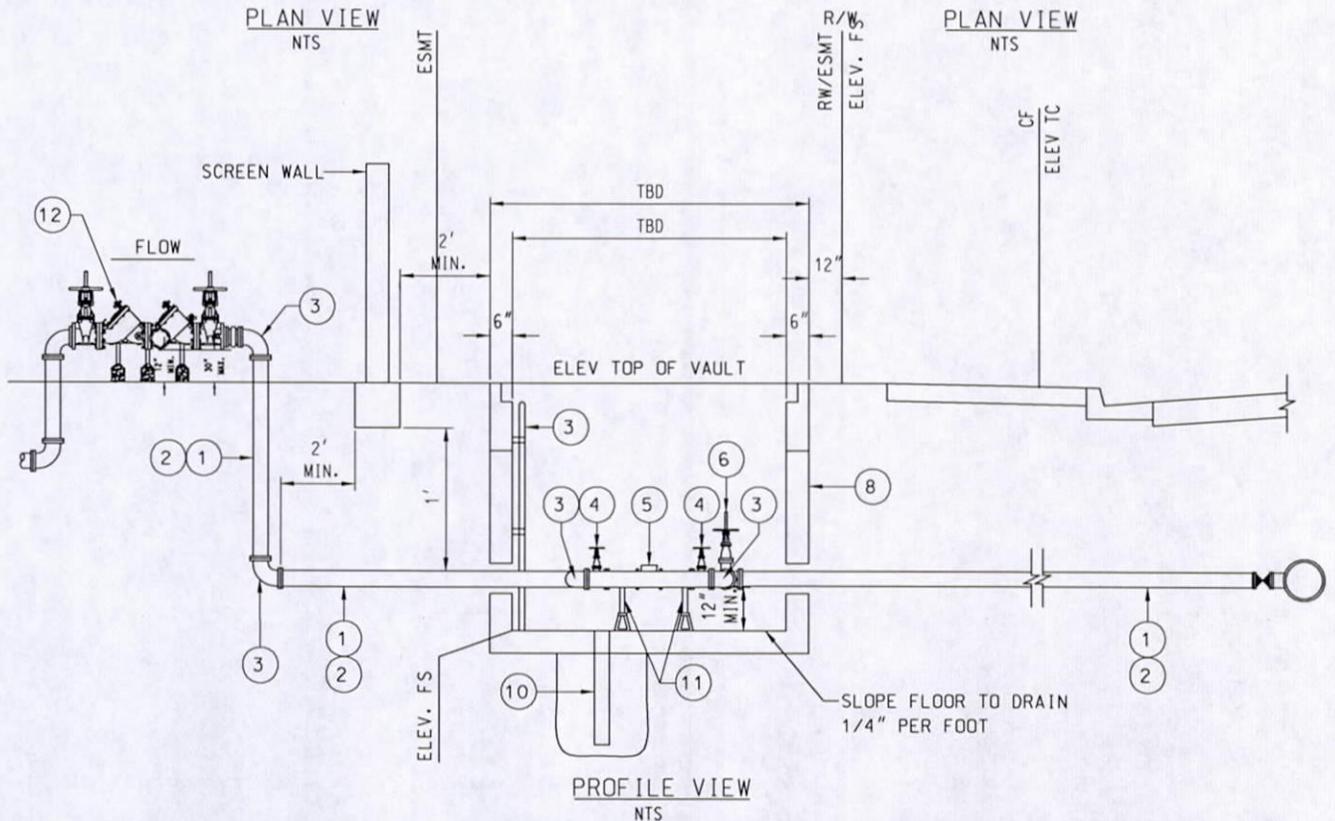
- ① STEEL PIPE, 10 GA., CML & CMC
- ② SLIP ON WELD FLANGE
- ③ FLANGED 90° ELBOW, C.I., CL150, CML
- ④ FLANGED GATE VALVE CL150 W/WHEEL HANDLE
- ⑤ LARGE METER, MODEL OCTAVE ULTRASONIC WITH ITRON "ERT" AUTOMATIC METER READING SYSTEM.
- ⑥ GATE VALVE, FLANGED, 150 PSI WWP W/ WHEEL HANDLE O.S. & Y. ( OUTSIDE SCREW YOKE AND HANDLE ) AND LOCKING HANDLE.
- ⑦ FLANGED TEE, C.I., CL150, CML
- ⑧ CONCRETE VAULT, MODEL JENSEN PRECAST OR APPROVED EQUAL.
- ⑨ LADDER, HOT-DIPPED GALVANIZED IRON.
- ⑩ SUMP DRAIN PER PWD STD. W-12
- ⑪ ADJUSTABLE STEEL SUPPORTS.
- ⑫ REDUCED PRESSURE-PRINCIPLE BACKFLOW PREVENTER



PLAN VIEW  
NTS



PLAN VIEW  
NTS



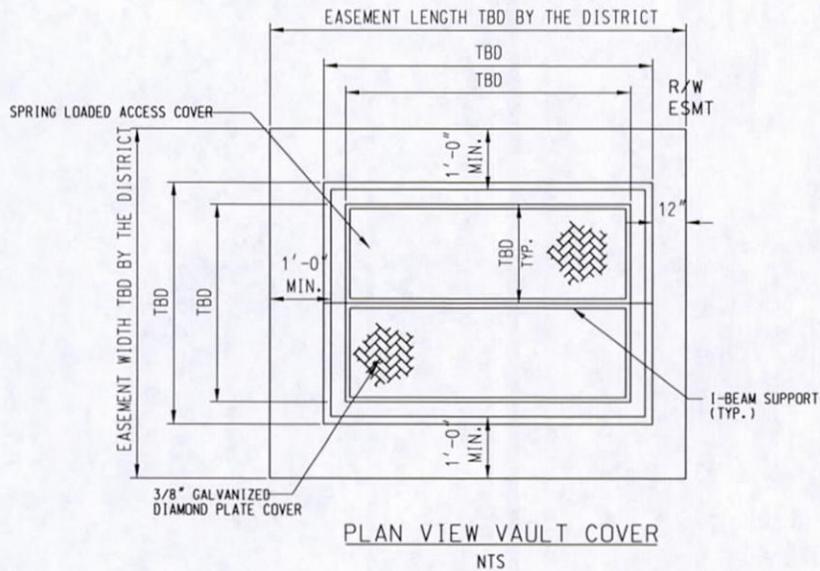
PROFILE VIEW  
NTS

# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
APPROVED:

TYPICAL LARGE METER SERVICE CONNECTION  
( 3" - 10" )

W-1B



**NOTES:**

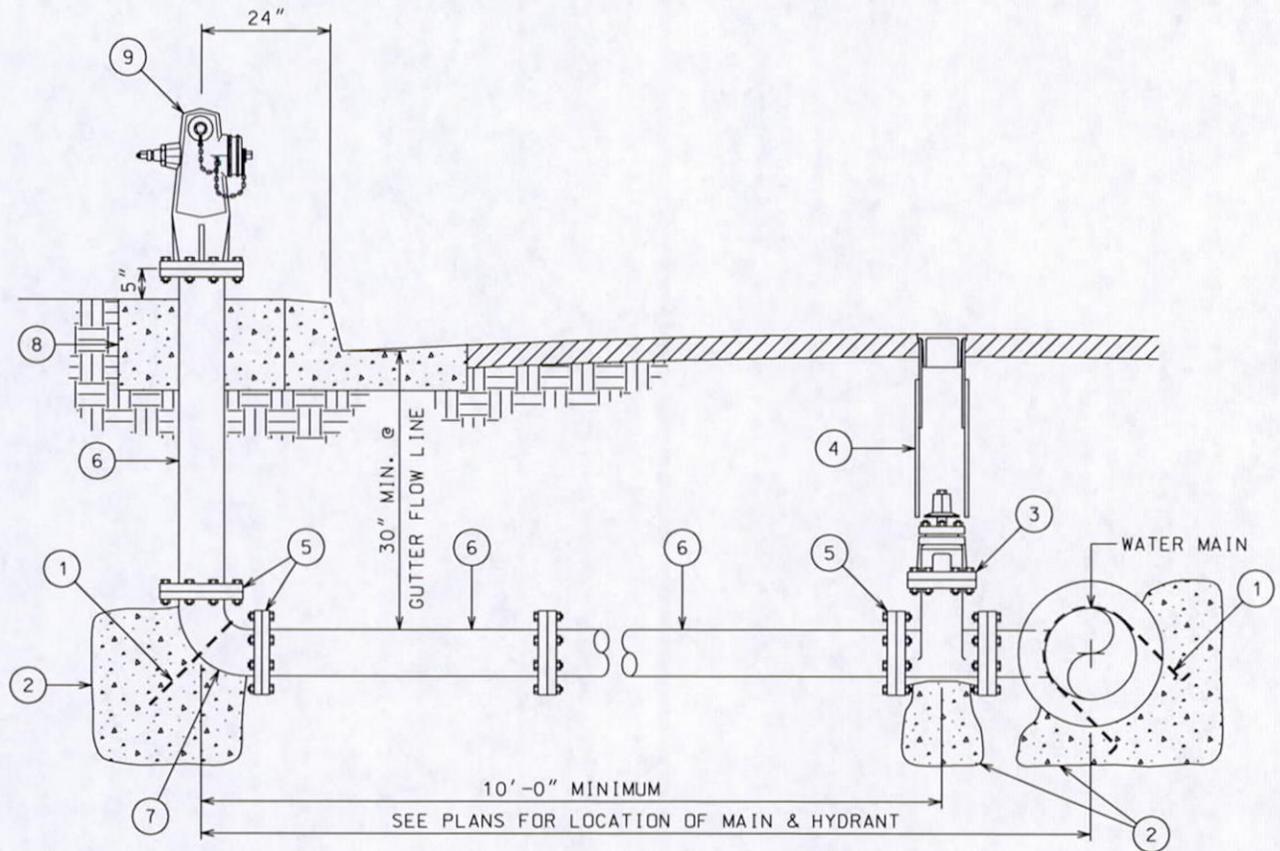
1. FRAME AND COVER TO BE HOT DIPPED GALVANIZED AFTER FABRICATION.
2. VAULT AND LID SUBMITTAL TO BE PROVIDED BY CONTRACTOR AND APPROVED BY DISTRICT PRIOR TO INSTALLATION.
3. VAULT LID SHALL BE RATED FOR H-20 LOADING.
4. EASEMENT SHALL BE GRANTED TO THE PALMDALE WATER DISTRICT FOR ACCESS, MAINTENANCE, AND INCIDENTAL PURPOSES.
5. AREA WITHIN AND ADJACENT TO THE VAULT EASEMENT SHALL BE GRADED TO DIRECT FLOWS AWAY FROM THE VAULT.
6. METER MUST BE SET IN A HORIZONTAL POSITION AT LEAST TWO (2) DIAMETERS OF STRAIGHT PIPE REQUIRED AT INLET END.
7. SCREEN WALL, IF REQUIRED, MUST BE LOCATED OUTSIDE DISTRICT EASEMENT. NO JOINTS WITHIN 2' OF FOOTING EDGE.
8. REDUCED-PRESSURE PRINCIPLE BACKFLOW PREVENTER TO BE MAINTAINED BY OWNER/DEVELOPER.

# PALMDALE WATER DISTRICT

DATE: DEC. 2019    MRW  
APPROVED:

TYPICAL LARGE METER SERVICE CONNECTION  
( 3" - 10" )

W-1B  
CONTINUED



KEY NOTES:

- 1 CENTERLINE OF RISER SHALL BE 2 FEET BEHIND CURB FACE. NO FIRE HYDRANT SHALL BE INSTALLED CLOSER THAN 5 FEET FROM THE EDGE OF ANY DRIVEWAY APRON OR CURB RETURN. ALL UNCOATED METAL SURFACES (INCLUDING NUTS AND BOLTS) INSTALLED UNDERGROUND SHALL BE THOROUGHLY COATED W/ NO-OX GREASE AND THEN WRAPPED WITH 8 MIL POLYETHYLENE SHEET (AWWA C-105) ALL HYDRANTS SHALL BE PAINTED WITH ONE COAT OF RED PRIMER AND TWO COATS OF RUSTOLEUM SAFETY YELLOW OR APPROVED EQUAL. INTERMEDIATE PIPE JOINTS IN LATERAL SHALL BE FLANGED. PIPE SHALL BE INSTALLED HORIZONTAL OR SLOPING DOWNWARD FROM MAIN TO PROVIDE MINIMUM COVER.

MATERIAL DESCRIPTION

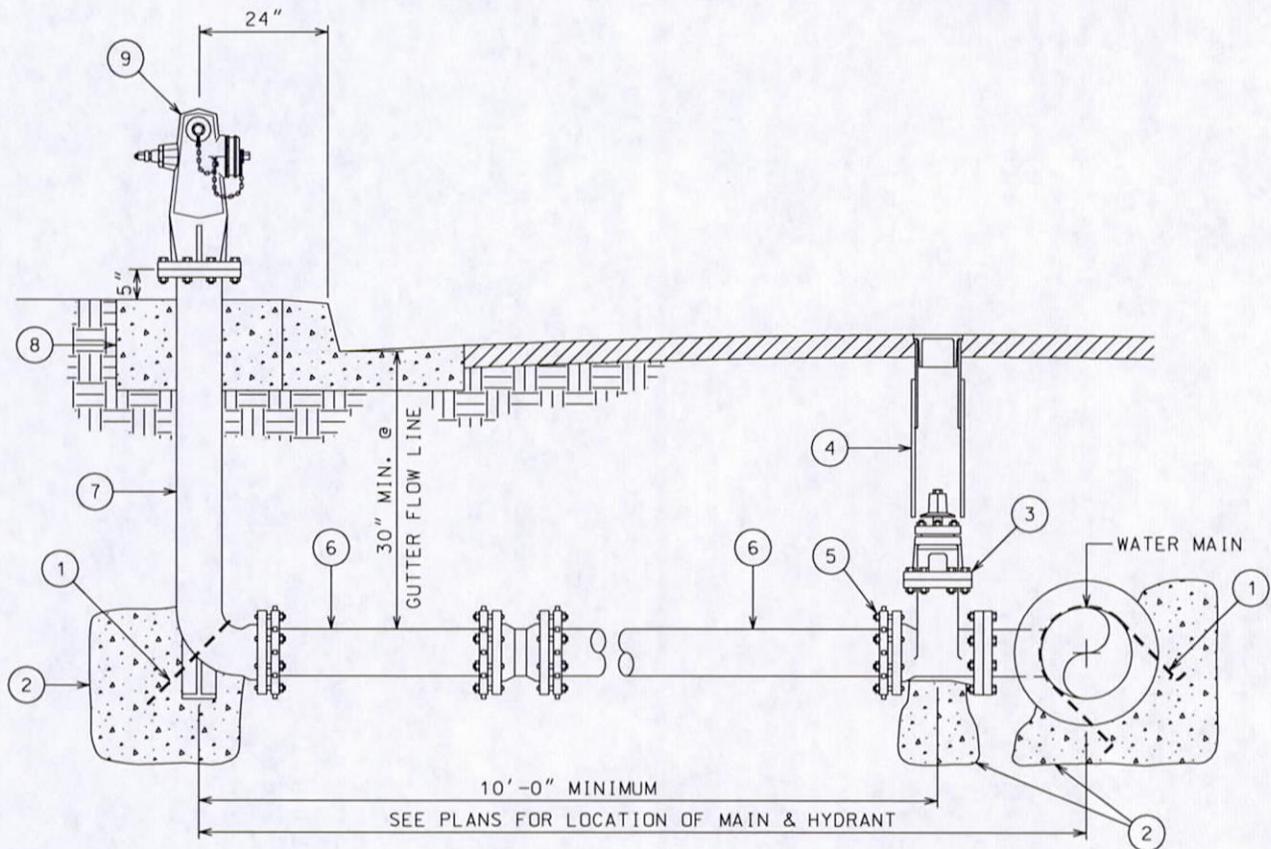
- ① ANCHOR ROD PER STD. W-4
- ② USE 2000 PSI MIN. CONCRETE FOR THRUST BLOCKS AND HYDRANT PAD. PLACE CONCRETE ON UNDISTURBED OR COMPACTED SOIL. THRUST BLOCKS MUST MEET REQUIREMENTS OF STD. W-4.
- ③ 6" FLG. GATE VALVE CL 150.
- ④ VALVE BOX PER STD. W-5.
- ⑤ 6" SLIP-ON WELD FLANGE CL 150.
- ⑥ 6 5/8" O.D. STL. PIPE 10 GA. C.M.L.& C. EXTEND NON-SHRINK MORTAR COATING WITH EXPANDED GALVANIZED LATH REINFORCEMENT TO MEET FLG. TAPER THICKNESS AND TO MEET FLG. HUB.
- ⑦ 6" FLG. 90° ELBOW, STL., C.M.L.C., CL 150 FLG.
- ⑧ 36" x 36" x 12" CONCRETE PAD WITH SIDEWALK FINISH TO BE SLOPED 1/4" PER FOOT TOWARDS THE CURB. IN THE ABSENCE OF A CONCRETE CURB OR WHERE TYPE "E" CURB (ROLLED) IS USED, SET BOTTOM OUTLET 24" ABOVE CROWN OF ROAD AND INSTALL BARRICADES PER STD. W-14.
- ⑨ 6" x 4" x 2 1/2" FIRE HYDRANT (CLOW 850 O.A.E.) SET F.H. OUTLETS AT 45° TO STREET. INSTALL BOLTS WITH HEADS UP. (HOLLOW BOLTS REQUIRED)

# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
 APPROVED:

6" x 4" x 2 1/2" FIRE HYDRANT  
 (FOR STEEL OR A.C. PIPE)

W-2



**KEY NOTES:**

- 1 CENTERLINE OF RISER SHALL BE 2 FEET BEHIND CURB FACE. NO FIRE HYDRANT SHALL BE INSTALLED CLOSER THAN 5 FEET FROM THE EDGE OF ANY DRIVEWAY APRON OR CURB RETURN. ALL UNCOATED METAL SURFACES (INCLUDING NUTS AND BOLTS) INSTALLED UNDERGROUND SHALL BE THOROUGHLY COATED W/ NO-OX GREASE AND THEN WRAPPED WITH 8 MIL POLYETHYLENE SHEET (AWWA C-105) ALL HYDRANTS SHALL BE PAINTED WITH ONE COAT OF RED PRIMER AND TWO COATS OF RUSTOLEUM SAFETY YELLOW OR APPROVED EQUAL. INTERMEDIATE PIPE JOINTS IN LATERAL SHALL BE RESTRAINED WITH A MECHANICAL JOINT SLEEVE WITH RETAINING GLANDS OR JOINT RESTRAINT. PIPE SHALL BE INSTALLED HORIZONTAL OR SLOPING DOWNWARD FROM MAIN TO PROVIDE MINIMUM COVER.

**MATERIAL DESCRIPTION**

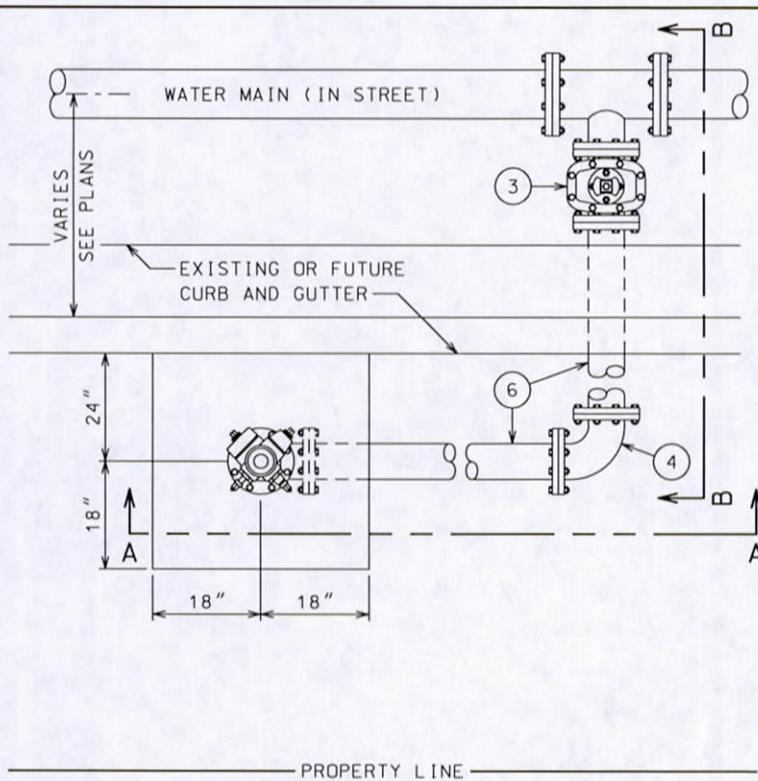
- ① ANCHOR ROD PER STD. W-4
- ② USE 2000 PSI MIN. CONCRETE FOR THRUST BLOCKS AND HYDRANT PAD. PLACE CONCRETE ON UNDISTURBED OR COMPACTED SOIL. THRUST BLOCKS MUST MEET REQUIREMENTS OF STD. W-4.
- ③ 6" FLG. GATE VALVE CL 150.
- ④ VALVE BOX PER STD. W-5.
- ⑤ 6" RETAINING GLAND CL 150.
- ⑥ 6.90" O.D. DUCTILE IRON PIPE CL 350 D.C.M.L.
- ⑦ 6" M.J. DUCTILE IRON HYDRANT BURY (8HOLE) WITH RETAINING GLAND OR 6" DUCTILE IRON SPOOL AND 6" M.J. x FLG. 90° ELBOW, D.I., D.C.M.L., CL 350 WITH RETAINING GLAND.
- ⑧ 36" x 36" x 12" CONCRETE PAD WITH SIDEWALK FINISH TO BE SLOPED 1/4" PER FOOT TOWARDS THE CURB. IN THE ABSENCE OF A CONCRETE CURB OR WHERE TYPE "E" CURB (ROLLED) IS USED, SET BOTTOM OUTLET 24" ABOVE CROWN OF ROAD AND INSTALL BARRICADES PER STD. W-14.
- ⑨ 6" x 4" x 2 1/2" FIRE HYDRANT (CLOW 850 D.A.E.) SET F.H. OUTLETS AT 45° TO STREET. INSTALL BOLTS WITH HEADS UP. (HOLLOW BOLTS REQUIRED)

# PALMDALE WATER DISTRICT

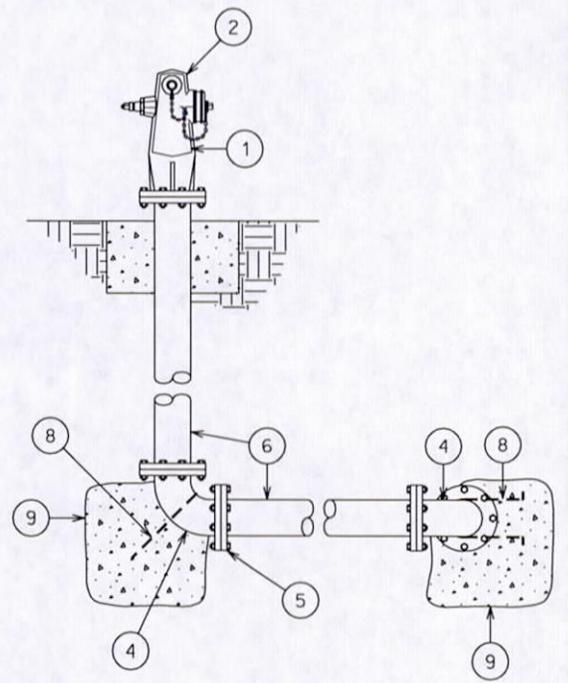
DATE: DEC. 2019 MRW  
APPROVED:

6" x 4" x 2 1/2" FIRE HYDRANT  
(FOR DUCTILE IRON PIPE OR C-900 PVC PIPE)

W-2A



**PLAN VIEW**



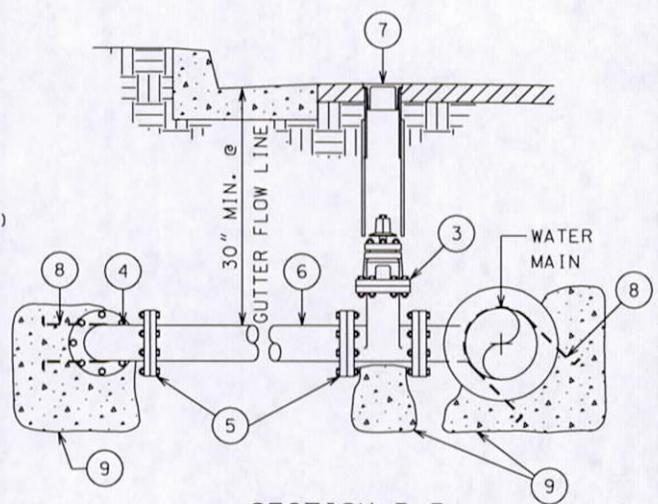
**SECTION A-A**

**KEY NOTES:**

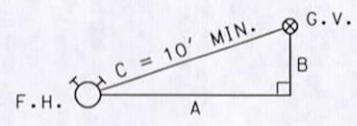
- 1 CENTERLINE OF RISER SHALL BE 2 FEET BEHIND CURB FACE. NO FIRE HYDRANT SHALL BE INSTALLED CLOSER THAN 5 FEET FROM THE EDGE OF ANY DRIVEWAY APRON OR CURB RETURN. ALL UNCOATED METAL SURFACES (INCLUDING NUTS AND BOLTS) INSTALLED UNDERGROUND SHALL BE THOROUGHLY COATED W/ NO-OX GREASE AND THEN WRAPPED WITH 8 MIL POLYETHYLENE SHEET (AWWA C-105) ALL HYDRANTS SHALL BE PAINTED WITH ONE COAT OF RED PRIMER AND TWO COATS OF RUSTOLEUM SAFETY YELLOW OR APPROVED EQUAL. INTERMEDIATE PIPE JOINTS IN LATERAL SHALL BE FLANGED. PIPE SHALL BE INSTALLED HORIZONTAL OR SLOPING DOWNWARD FROM MAIN TO PROVIDE MINIMUM COVER.

**MATERIAL DESCRIPTION**

- ① SEE STANDARD W-2 FOR FIRE HYDRANT REQUIREMENTS.
- ② SET FIRE HYDRANT OUTLETS AT 45° TO STREET.
- ③ 6" FLANGED GATE VALVE CL 150.
- ④ 6" FLG. 90° ELBOW, STL., C.M.L.C., CL 150 FLG.
- ⑤ 6" SLIP-ON WELD FLANGE, CL 150.
- ⑥ 6 5/8" O.D. STEEL 10 GA. MIN. C.M.L.C.
- ⑦ VALVE BOX PER STD. W-5.
- ⑧ ANCHOR ROD PER STD. W-4.
- ⑨ USE 2000 PSI MINIMUM CONCRETE FOR THRUST BLOCKS AND CONCRETE PAD. PLACE CONCRETE AGAINST UNDISTURBED OR COMPACTED SOIL. THRUST BLOCKS MUST MEET REQUIREMENTS OF STD. W-4. IN THE ABSENCE OF A CONCRETE CURB OR WHERE TYPE "E" CURB (ROLLED) IS USED, SET BOTTOM OUTLET 24" ABOVE CROWN OF ROAD AND INSTALL BARRICADES PER P.W.D. STD. W-14.



**SECTION B-B**

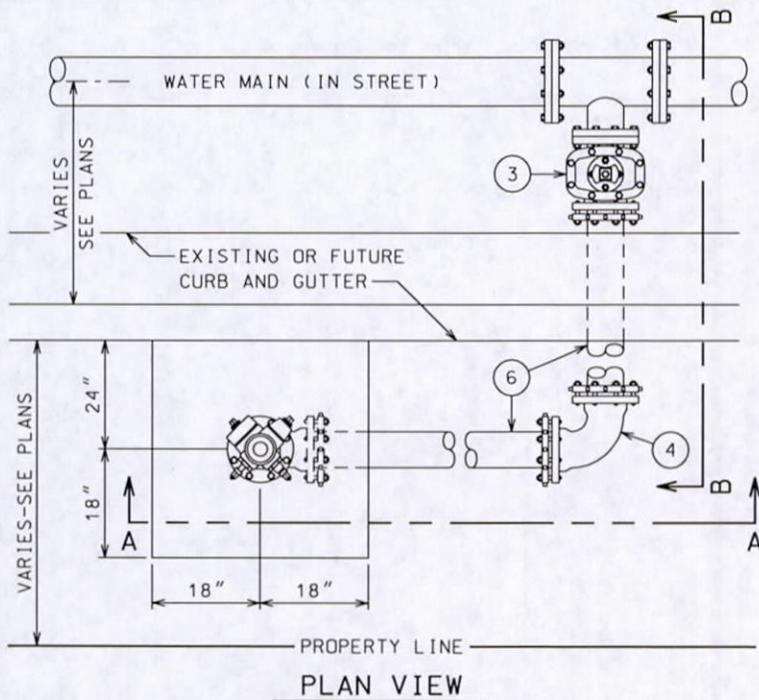


$$\sqrt{A^2 + B^2} = C$$

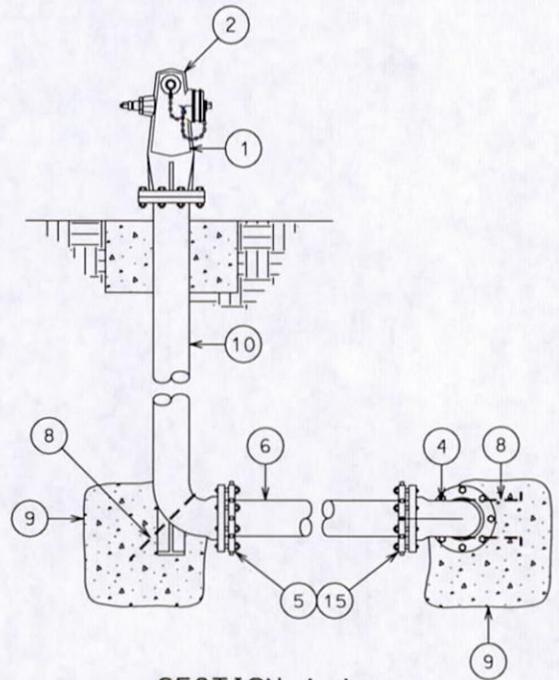
**FORMULA FOR FIGURING HYDRANT FROM VALVE LOCATION**

# PALMDALE WATER DISTRICT

DATE: DEC. 2019    MRW APPROVED:	<b>PARALLEL FIRE HYDRANT</b> (FOR STEEL OR A.C. PIPE)	W-3
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PLAN VIEW



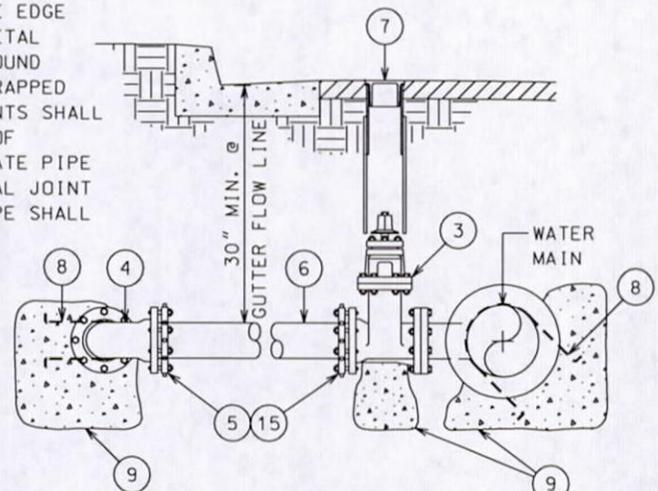
SECTION A-A

KEY NOTES:

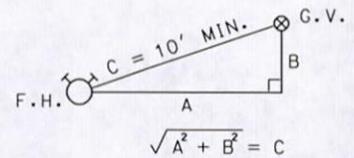
- 1 CENTERLINE OF RISER SHALL BE 2 FEET BEHIND CURB FACE. NO FIRE HYDRANT SHALL BE INSTALLED CLOSER THAN 5 FEET FROM THE EDGE OF ANY DRIVEWAY APRON OR CURB RETURN. ALL UNCOATED METAL SURFACES (INCLUDING NUTS AND BOLTS) INSTALLED UNDERGROUND SHALL BE THOROUGHLY COATED W/ NO-OX GREASE AND THEN WRAPPED WITH 8 MIL POLYETHYLENE SHEET (AWWA C-105) ALL HYDRANTS SHALL BE PAINTED WITH ONE COAT OF RED PRIMER AND TWO COATS OF RUSTOLEUM SAFETY YELLOW OR APPROVED EQUAL. INTERMEDIATE PIPE JOINTS IN LATERAL SHALL BE RESTRAINED WITH A MECHANICAL JOINT SLEEVE WITH RETAINING GLANDS OR JOINT RESTRAINT. PIPE SHALL BE INSTALLED HORIZONTAL OR SLOPING DOWNWARD FROM MAIN TO PROVIDE MINIMUM COVER. FOR C-900 PIPE USE TRACER WIRE PER P.W.D. STD. W-8.

MATERIAL DESCRIPTION:

- ① SEE STANDARD W-2A FOR FIRE HYDRANT REQUIREMENTS.
- ② SET FIRE HYDRANT OUTLETS AT 45° TO STREET.
- ③ 6" FLG. x M.J. GATE VALVE CL 150 WITH RETAINING GLAND.
- ④ 6" M.J. 90° ELBOW, D.I., D.C.M.L., CL 350 WITH RETAINING GLAND.
- ⑤ ALL M.J. FITTINGS SHALL HAVE RETAINING GLANDS.
- ⑥ 6.90" D.D. DUCTILE IRON PIPE CL 350 D.C.M.L.
- ⑦ VALVE BOX PER STD. W-5.
- ⑧ ANCHOR ROD PER STD. W-4.
- ⑨ USE 2000 PSI MINIMUM CONCRETE FOR THRUST BLOCKS AND CONCRETE PAD. PLACE CONCRETE AGAINST UNDISTURBED OR COMPACTED SOIL. THRUST BLOCKS MUST MEET REQUIREMENTS OF STD. W-14. IN THE ABSENCE OF A CURB OR WHERE TYPE "E" CURB(ROLLED) IS USED, SET BOTTOM OUTLET 24" ABOVE CROWN OF ROAD AND INSTALL BARRICADES PER STD. W-14.
- ⑩ 6" M.J. DUCTILE IRON HYDRANT BURY (8 HOLES) WITH RETAINING GLAND OR 6" DUCTILE IRON SPOOL AND 6" M.J. X FLG. 90° ELBOW, D.I., D.C.M.L., CL 350 WITH RETAINING GLAND.



SECTION B-B



FORMULA FOR FIGURING HYDRANT FROM VALVE LOCATION

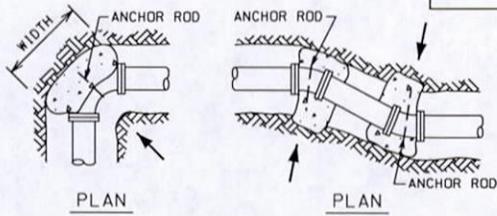
# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
APPROVED:

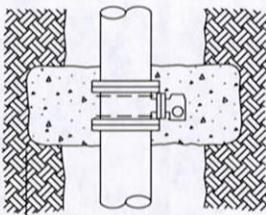
PARALLEL FIRE HYDRANT  
(FOR DUCTILE IRON PIPE OR C-900 PVC PIPE)

W-3A

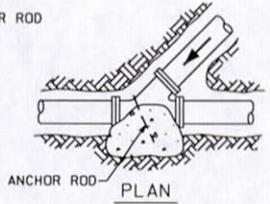
→ = DIRECTION OF RESULTANT THRUST



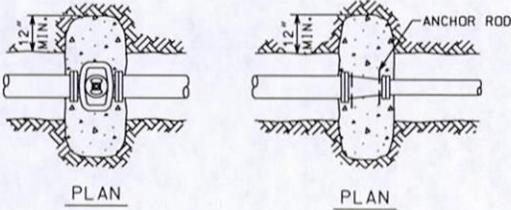
**BENDS**



**VERTICAL BEND**  
(SEE NOTE 5)

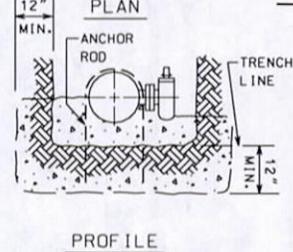


**WYE**

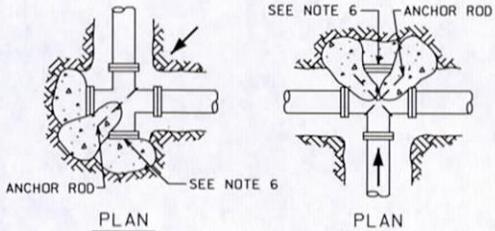


**VALVES**  
(ALL TYPES EXCEPT BFV)

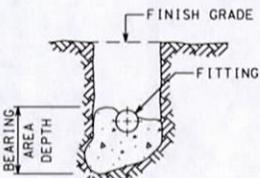
**REDUCERS**



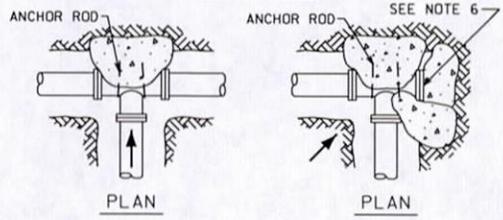
**BUTTERFLY VALVES**



**CROSSES**



**FITTING SECTION**  
(TYPICAL)



**TEES**

TABLE I

* MINIMUM BEARING AREAS IN SQ. FT.				
MAIN SIZE	** TEE	90° BEND	45° BEND	22 1/2° BEND
6"	4	4	4	3
8"	5	7	4	3
10"	9	12	6	4
12"	12	16	9	6

\* BASED ON 150 PSI W.W.P. PRESSURE AND SOIL BEARING LOADS OF 2000 PSF. THE RATIO OF WIDTH TO HEIGHT SHALL NOT EXCEED 1 1/2 TO 1.

\*\* TEES, PLUG, CAPS AND HYDRANTS.

TABLE II

*** SOIL TYPE	**** MAX. ALLOWABLE SOIL BEARING VALUES	FACTORS FOR INCREASING AREAS IN TABLE I
LOOSE SAND	500 PSF	4
SOFT SANDY CLAY	1000 PSF	2
ADOBE	1000 PSF	2
COMPACT FINE SAND	2000 PSF	1
COMPACT COARSE SAND	2000 PSF	1
MEDIUM STIFF CLAY	2000 PSF	1

\*\*\* THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE SAFE SOIL BEARING VALUES AND THE POSITION AND SIZE OF BEARING AREAS.

\*\*\*\* BASED ON 2 FEET MINIMUM DEPTH OF COVER OVER PIPE.

GENERAL NOTES:

1. ALL ANCHOR AND THRUST BLOCKS SHALL BEAR AGAINST UNDISTURBED OR COMPACTED SOIL.
2. MINIMUM ALLOWABLE WATER PRESSURE FOR DESIGN OF THRUST BLOCKS IS 150 PSI. BEARING AREA INCREASES DIRECTLY WITH INCREASE IN PRESSURE.
3. ALL CONCRETE USED IN THRUST BLOCKS SHALL ATTAIN 2000 PSI STRENGTH.
4. ANCHOR RODS SHALL BE A MINIMUM OF 1/2" DIAMETER REINFORCING STEEL AND SHALL BE USED FOR ALL THRUST BLOCKS. ENCASE RODS IN 2000 PSI CONCRETE. EXPOSED PORTIONS OF RODS SHALL BE THOROUGHLY COATED IN NO-OX GREASE AND WRAPPED W/ 8 MIL POLYETHYLENE SHEET (AWWA C-105).
5. USE ANCHOR BLOCKS AT VERTICAL BENDS WHEN PIPE IS ABOVE OR BELOW GROUND. SIZE OF BLOCK AND ROD SHALL BE AS SHOWN ON THE PLANS OR AS DETERMINED BY THE ENGINEER IN THE FIELD.
6. USE 30 POUND FELT TO INSURE COLD JOINT OR 8 MIL POLYETHYLENE WRAP PER AWWA C105.

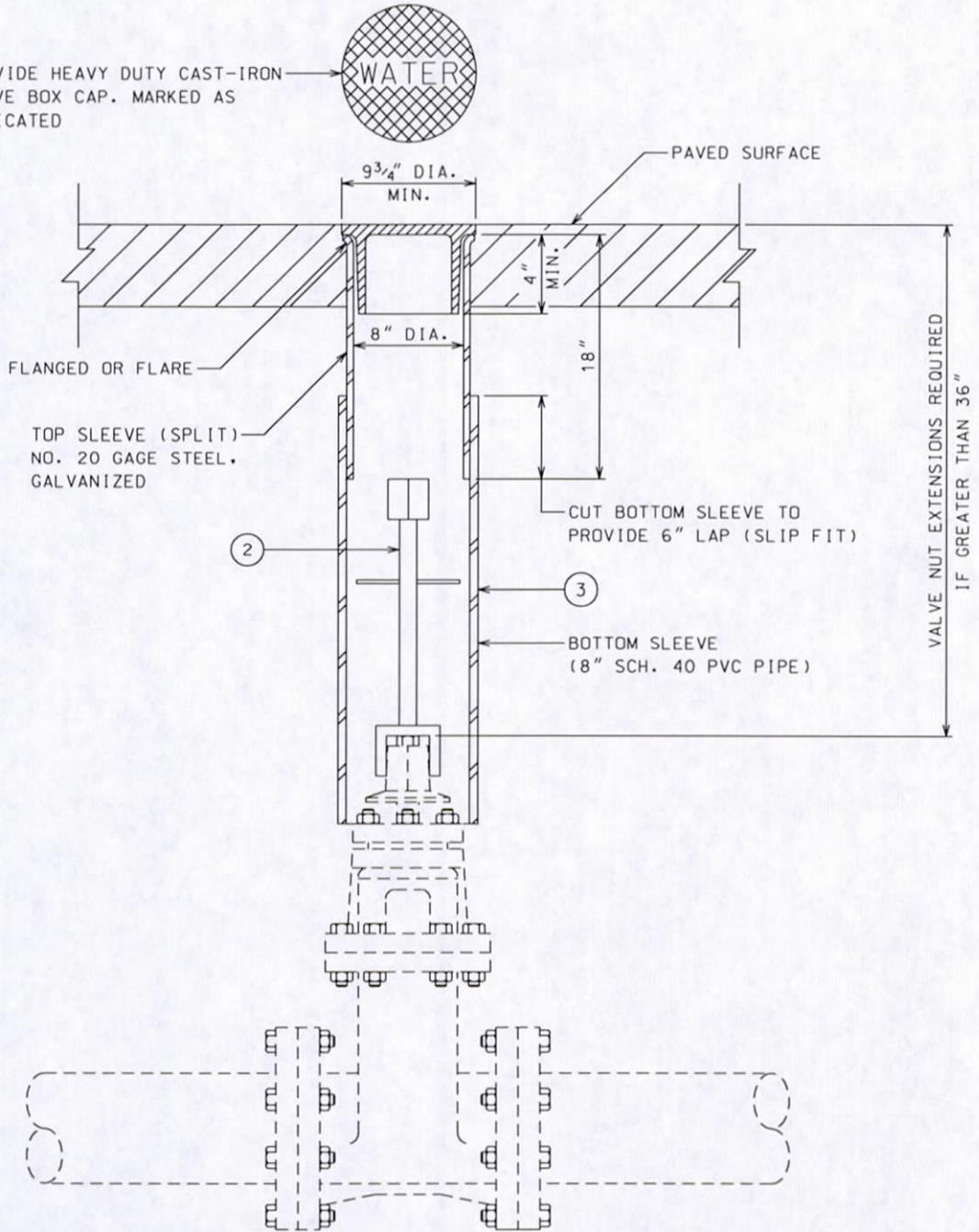
# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
APPROVED:

## CONCRETE THRUST BLOCKS

W-4

PROVIDE HEAVY DUTY CAST-IRON VALVE BOX CAP. MARKED AS INDICATED



GENERAL NOTES:

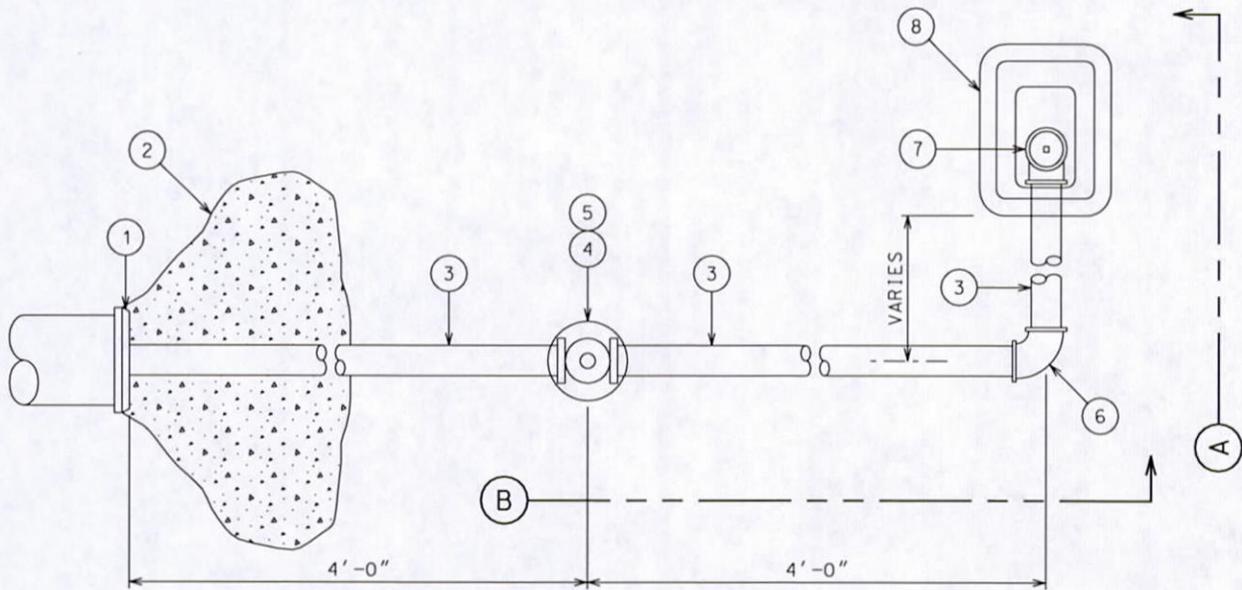
1. ALL VALVE BOXES LOCATED IN UNIMPROVED STREETS OR DIRT AREA SHALL BE ENCLOSED IN 24" x 24" x 12" CONCRETE PAD.
2. VALVE NUT EXTENSION - 1 1/4" DIAMETER GALVANIZED STEEL PIPE WITH 2" SQUARE BOX AT BASE AND 2" SQUARE OPERATING NUT AT TOP AND 1/4" CENTERING PLATE CUT 1/4" SMALLER THAN THE INSIDE DIAMETER OF VALVE RISER.
3. ALL VALVE RISERS SHALL BE ADJUSTED SO THAT THE VALVE BOX LID WILL BE FLUSH WITH THE FINISHED STREET GRADE.
4. VALVE MARKERS ARE REQUIRED WHEREVER VALVES ARE CONSTRUCTED IN UNIMPROVED STREETS OR EASEMENTS. MARKERS SHALL BE PLACED AS CLOSE AS PRACTICABLE TO VALVES. MARKERS SHALL FACE VALVES AND BE ORIENTED PERPENDICULAR TO THE MAINLINE. DISTANCE AND DIRECTION TO THE VALVE SHALL BE CLEARLY SHOWN ON THE MARKER.

# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
 APPROVED:

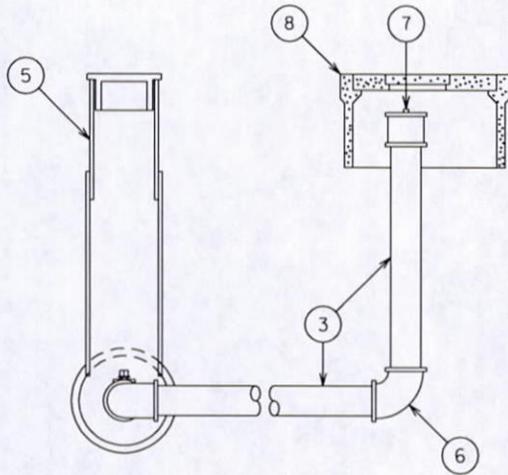
TYPICAL VALVE BOX INSTALLATION  
 (IMPROVED OR UNIMPROVED ROADS)

W-5



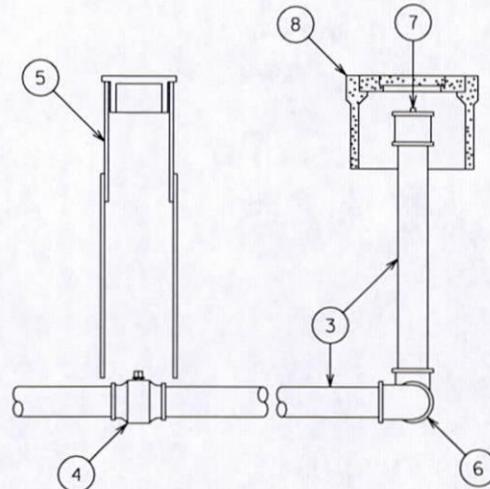
**PLAN VIEW**

N.T.S.



**SECTION A**

N.T.S.



**SECTION B**

N.T.S.

**KEY NOTES:**

1. DUCTILE PIPE WILL REQUIRE A DIELECTRIC BUSHING.
2. 10 MIL TAPE REQUIRED FROM END CAP TO 1 FT PAST CONCRETE OR 18" MIN.

**MATERIAL DESCRIPTION:**

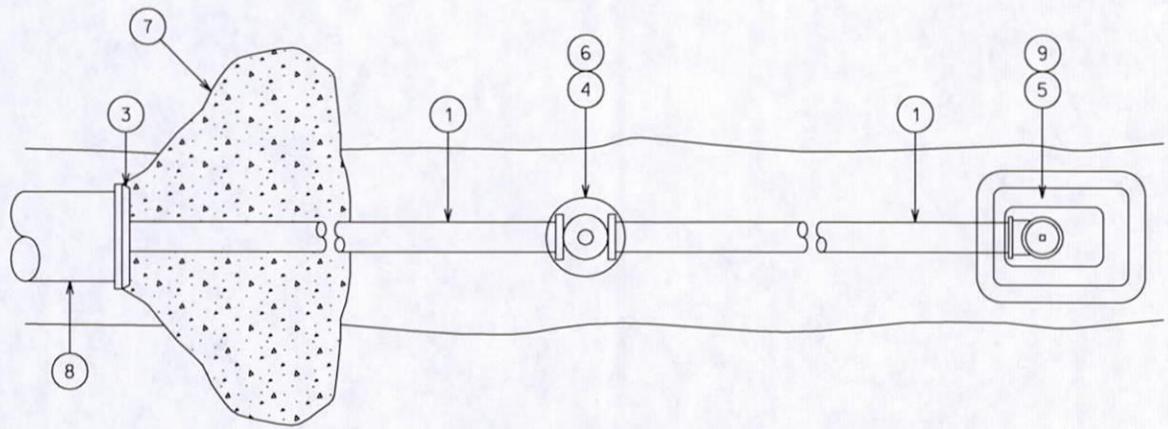
- ① 2" TAPPED CAP OR BLIND FLANGE
- ② CONCRETE THRUST BLOCK PER P.W.D. STD. W-4.
- ③ 2" BRASS ALLOY LEAD FREE (LF) PER NSF/ANSI 61 AND 372.
- ④ 2" LF BRASS BALL STRAIGHT SVC VALVE (JONES NO. J-1900W OR APPROVED EQUAL).
- ⑤ VALVE BOX PER STD. W-5 (NOTE: VALVE RISER IS NOT TO REST ON PIPE).
- ⑥ 2" 90° ELBOW BRASS ALLOY LEAD FREE (LF) PER NSF/ANSI 61 AND 372.
- ⑦ 2" COUPLING WITH SQUARE HEAD PLUG BRASS ALLOY LEAD FREE (LF).
- ⑧ SET NO. W438 METER BOX 1 1/2" TO 2" BEHIND THE CURB SECTION. IN THE ABSENCE OF CURB, SET METER BOX ADJACENT TO RIGHT-OF-WAY LINE WITH CONCRETE PAD PER STD. W-1.

**PALMDALE WATER DISTRICT**

DATE: DEC. 2019 MRW  
APPROVED:

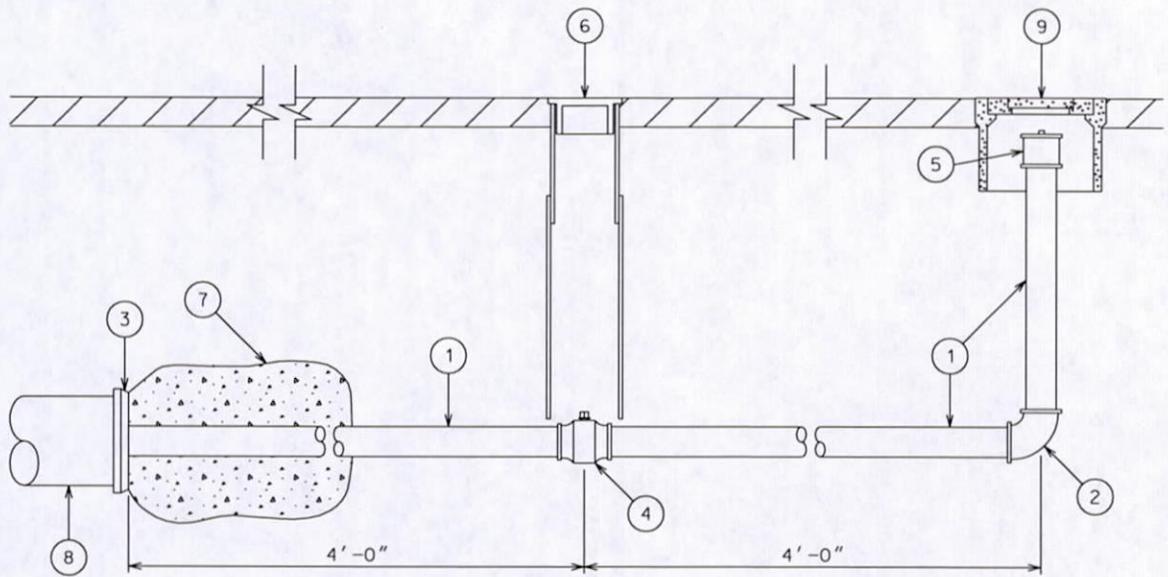
**2" TEMPORARY BLOW-OFF ASSEMBLY**  
(BEHIND CURB IN PARKWAY)

W-6



PLAN VIEW

N.T.S.



SECTION VIEW

N.T.S.

GENERAL NOTES:

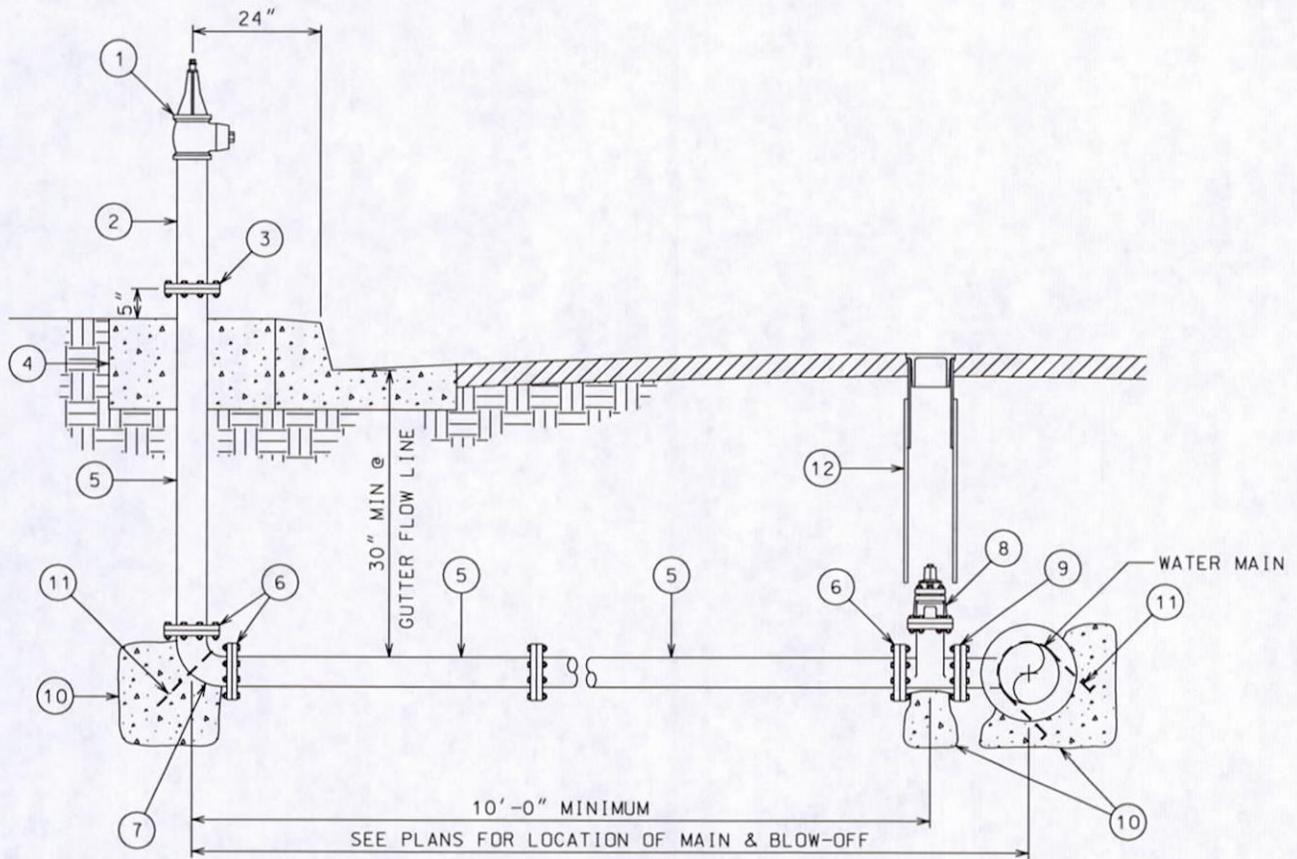
1. 2" BRASS ALLOY LEAD FREE (LF) PER NSF/ANSI 61 AND 372.
2. 2" BRASS ALLOY LEAD FREE (LF) PER NSF/ANSI 61 AND 372.
3. 2" LF BRASS TAPPED CAP OR BLIND FLANGE.
4. 2" LF BRASS BALL STRAIGHT SVC VALVE (JONES NO. J-1900W OR APPROVED EQUAL).
5. 2" LF BRASS COUPLING WITH SQUARE HEAD PLUG.
6. VALVE BOX PER STD. W-5 (NOTE: VALVE RISER IS NOT TO REST ON PIPE).
7. CONCRETE THRUST BLOCK PER STD. W-4.
8. SET NO. W438 METER BOX 1 1/2" TO 2" BEHIND THE CURB SECTION. IN THE ABSENCE OF CURB, SET METER BOX ADJACENT TO RIGHT-OF-WAY LINE WITH CONCRETE PAD PER STD. W-1.
9. DUCTILE PIPE WILL REQUIRE A DIELECTRIC BUSHING.
10. 10 MIL TAPE REQUIRED FROM END CAP TO 1 FT PAST CONCRETE OR 18" MIN.

# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
APPROVED:

2" TEMPORARY BLOW-OFF ASSEMBLY  
(IN THE STREET)

W-6A



KEY NOTES:

1. IN THE ABSENCE OF A CURB OR WHERE TYPE "E" CURB (ROLLED) IS USED, SET OUTLET 24-INCHES ABOVE CROWN OF ROAD AND INSTALL BARRICADES PER STD. W-14.
2. CENTERLINE OF RISER SHALL BE 2 FEET BEHIND CURB FACE.
3. NO BLOW-OFF SHALL BE INSTALLED CLOSER THAN 5 FEET FROM EDGE OF ANY DRIVEWAY APRON OR CURB RETURN.
4. ALL UNCOATED METAL SURFACES (INCLUDING NUTS AND BOLTS) INSTALLED UNDERGROUND SHALL BE THOROUGHLY COATED W/ NO-OX GREASE AND THEN BE WRAPPED WITH 8 MIL POLYETHYLENE SHEET (AWWA C-105).
5. ALL BLOW-OFFS SHALL BE PAINTED WITH ONE COAT OF RED PRIMER AND TWO COATS OF RUST-OLEUM FOREST GREEN OR APPROVED EQUAL.
6. INTERMEDIATE PIPE JOINTS IN LATERAL SHALL BE FLANGED. PIPE SHALL BE INSTALLED HORIZONTAL OR SLOPING DOWNWARD FROM MAIN TO PROVIDE MINIMUM COVER.

MATERIAL DESCRIPTION:

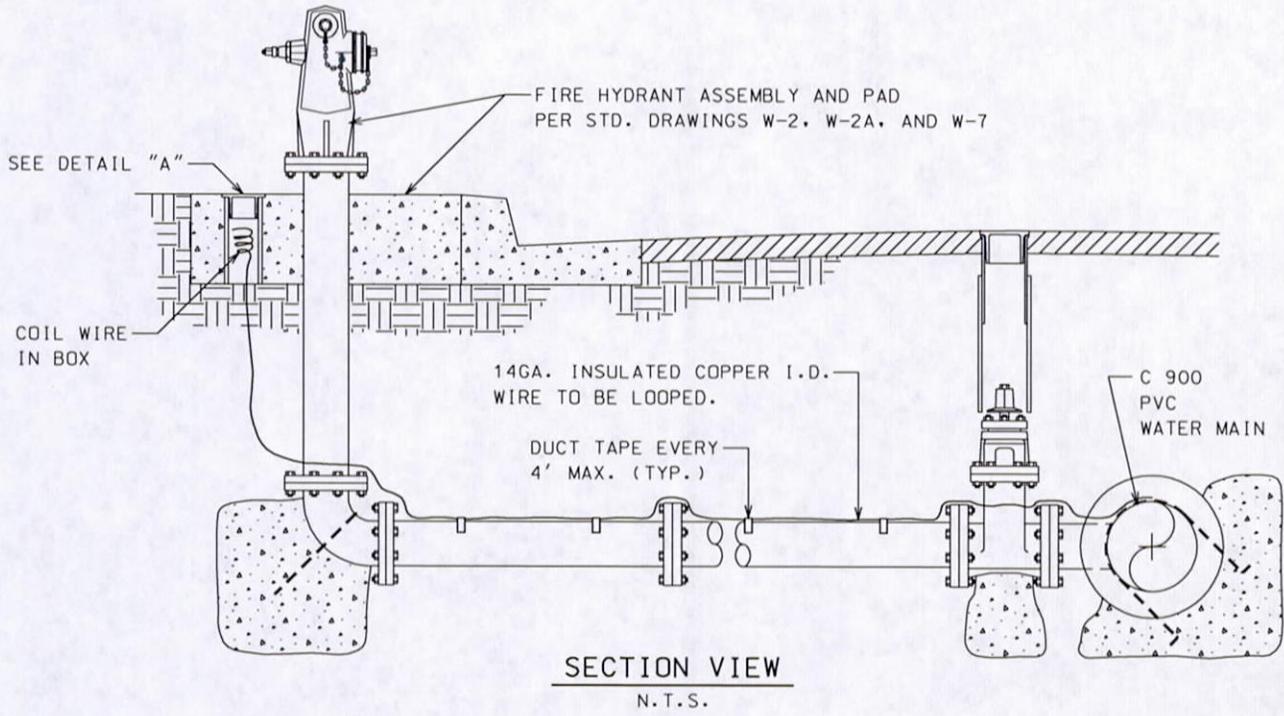
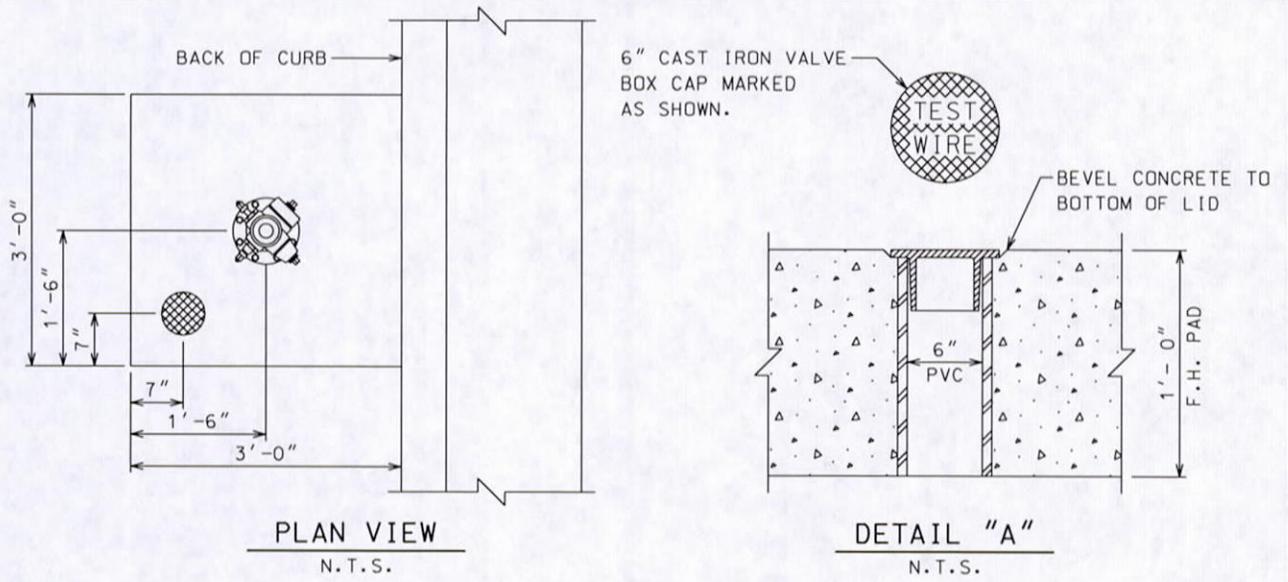
- ① 4" x 2 1/2" WHARF HEAD. (JONES MODEL NO. J-344 H.P. O.A.E.)
- ② 4" x 18" L.F. BRASS NIPPLE.
- ③ 4" COMPANION FLANGE CL 125. INSTALL BOLTS WITH HEADS UP. (HOLLOW BOLTS REQUIRED)
- ④ 36" x 36" x 12" CONCRETE PAD WITH SIDEWALK FINISH TO BE SLOPED 1/4" PER FOOT TOWARDS THE CURB.
- ⑤ 4 1/2" STL. PIPE 10 GA. MIN. C.M.L. & C. EXTEND NON-SHRINK MORTAR COATING WITH EXPANDED GALVANIZED LATH REINFORCEMENT TO MEET FLG. TAPER THICKNESS AND TO MEET FLG. HUB
- ⑥ 4" SLIP-ON WELD FLANGE.
- ⑦ 4" FLG. 90° ELBOW. STL., C.M.L.C., CL 150 FLG.
- ⑧ 4" FLG. GATE VALVE CL 150.
- ⑨ 4" FLG. INSULATION KIT (WHEN WATER MAIN IS DUCTILE IRON)
- ⑩ USE 2000 PSI MINIMUM CONCRETE FOR THRUST BLOCKS AND CONCRETE PAD. PLACE CONCRETE ON UNDISTURBED OR COMPACTED SOIL. THRUST BLOCKS MUST MEET REQUIREMENTS OF P.W.D. STD. W-4.
- ⑪ ANCHOR ROD PER STD. W-4.
- ⑫ VALVE BOX PER P.W.D. STD. W-5.

# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
APPROVED:

4" BLOW-OFF ASSEMBLY

W-7



GENERAL NOTES:

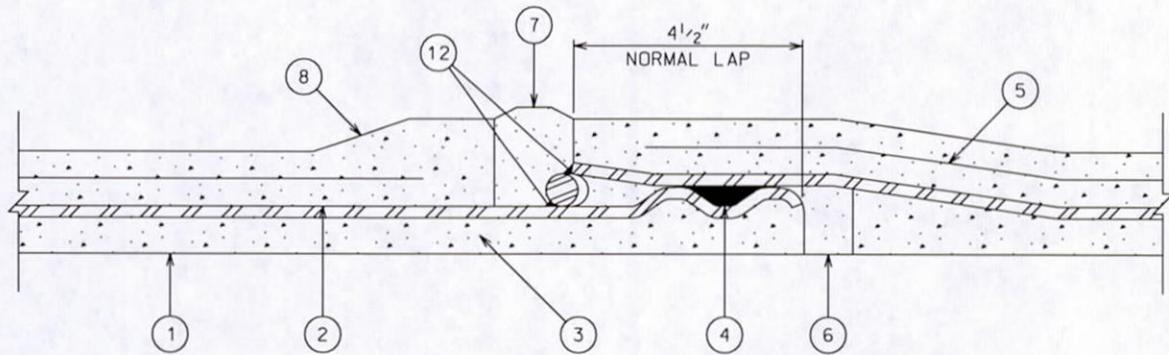
1. WIRE MUST BE LAID ON TOP OF PIPE AND FASTENED SECURELY AT 4' MAX. INTERVALS WITH AN EIGHT INCH LENGTH OF DUCT TAPE OR OTHER APPROVED METHOD.
2. SPLICES TO BE MADE WITH BUTT CONNECTORS AND ARE TO BE ENCAPSULATED WITH RUBBER SEALING TAPE (POLYISOBUTYLENE) PER DUET INDUSTRIES OR OTHER APPROVED TYPE.
3. INSTALL TEST STATION AT ALL DEAD ENDS OR POINT OF CONNECTION.

# PALMDALE WATER DISTRICT

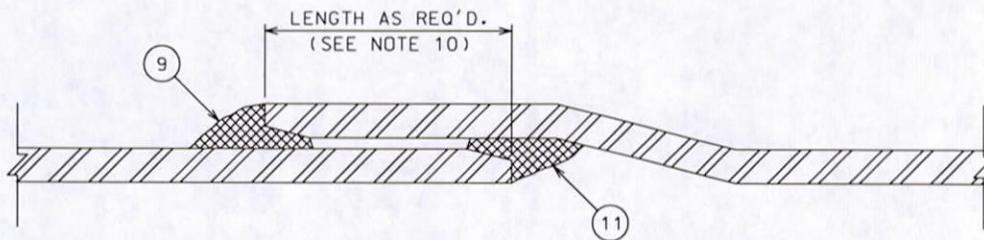
DATE: DEC. 2019 MRW  
APPROVED:

INSTALLATION OF IDENTIFICATION WIRE  
(C-900 PVC PIPE)

W-8



TYPICAL RUBBER GASKET JOINT



TYPICAL LAP-WELDED SLIP JOINT

GENERAL NOTES:

1. I.D. PIPE
2. O.D. CYLINDER
3. CEMENT MORTAR LINING
4. RUBBER GASKET
5. WIRE REINFORCEMENT
6. CEMENT MORTAR - PLACE IN FIELD - STEEL TROWEL FINISH FOR PIPE 24" DIAMETER & LARGER. BALL FINISHED FOR LESS THAN 24" DIAMETER.
7. CEMENT GROUT PLACED IN FIELD WITH FACTORY SUPPLIED DIAPERS.
8. CEMENT MORTAR COATING
9. OUTSIDE WELD
10. NORMAL LAP - 1 1/2 INCHES.  
10TH JOINT LAP - 3 INCHES (NOT TO BE WELDED UNTIL 9 JOINTS ON EACH SIDE HAVE BEEN WELDED).
11. INSIDE WELD MAY BE SUBSTITUTED FOR OUTSIDE WELD.
12. CONTINUITY CONNECTOR.

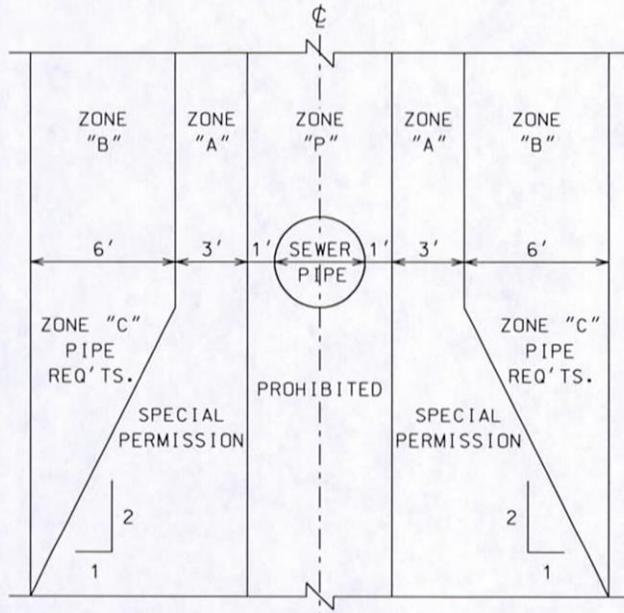
# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
APPROVED:

TYPICAL STEEL PIPE JOINT DETAILS

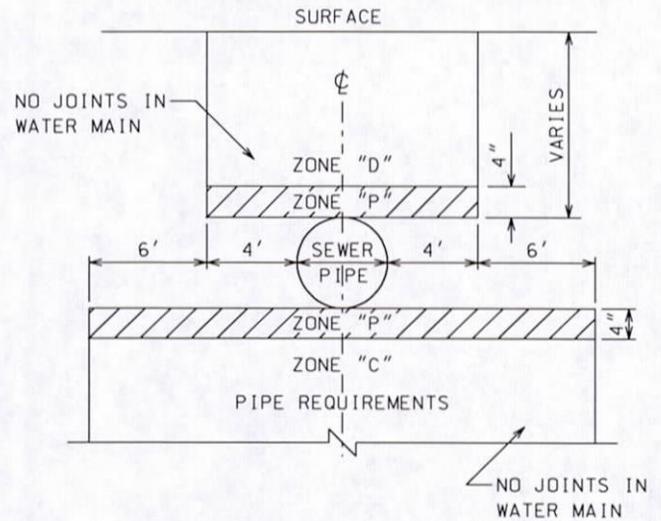
W-9

PARALLEL CONSTRUCTION



SPECIAL CONSTRUCTION WILL BE REQUIRED IF HORIZONTAL CLEARANCE BETWEEN PRESSURE WATER MAIN AND SEWER LINE IS LESS THAN 10 FEET. SEE THE ZONE ABOVE CORRESPONDING TO CONSTRUCTION REQUIREMENTS BELOW.

PERPENDICULAR CONSTRUCTION



SPECIAL CONSTRUCTION WILL BE REQUIRED IF VERTICAL CLEARANCE BETWEEN PRESSURE WATER MAIN AND SEWER LINE IS LESS THAN 1 FOOT AT CROSSING. SEE THE ZONE ABOVE CORRESPONDING TO CONSTRUCTION REQUIREMENTS BELOW.

ZONE	WATER MAIN CONSTRUCTION REQUIREMENTS
A	NO WATER MAINS PARALLEL TO SEWERS SHALL BE CONSTRUCTED WITHOUT APPROVAL FROM THE HEALTH AGENCY.
B	USE THE FOLLOWING TYPES OF PIPE: DUCTILE IRON PIPE, C.M.L. WITH HOT DIP BITUMINOUS COATING OR STEEL PIPE 10 GA. (MIN.), C.M.L. & C.M.C. WITH WELDED JOINTS.
C	NO JOINTS WITHIN 10 FEET OF OUTER EDGES OF SEWER LINE. PIPE REQUIREMENTS: DUCTILE IRON PIPE, C.M.L. WITH HOT DIP BITUMINOUS COATING OR STEEL PIPE 10 GA. (MIN.), C.M.L. & C.M.C. WITH WELDED JOINTS. PIPE SHALL BE 20 FT LENGTHS
D	NO JOINTS WITHIN 4 FEET OF EITHER SIDE OF SEWER LINE. USE THE FOLLOWING TYPES OF PIPE: DUCTILE IRON PIPE, C.M.L. WITH HOT DIP BITUMINOUS COATING OR STEEL PIPE 10 GA. (MIN.), C.M.L. & C.M.C. WITH WELDED JOINTS.
P	PROHIBITED ZONE - NO WATER MAINS ARE ALLOWED TO BE INSTALLED WITHIN THIS ZONE.

GENERAL NOTES:

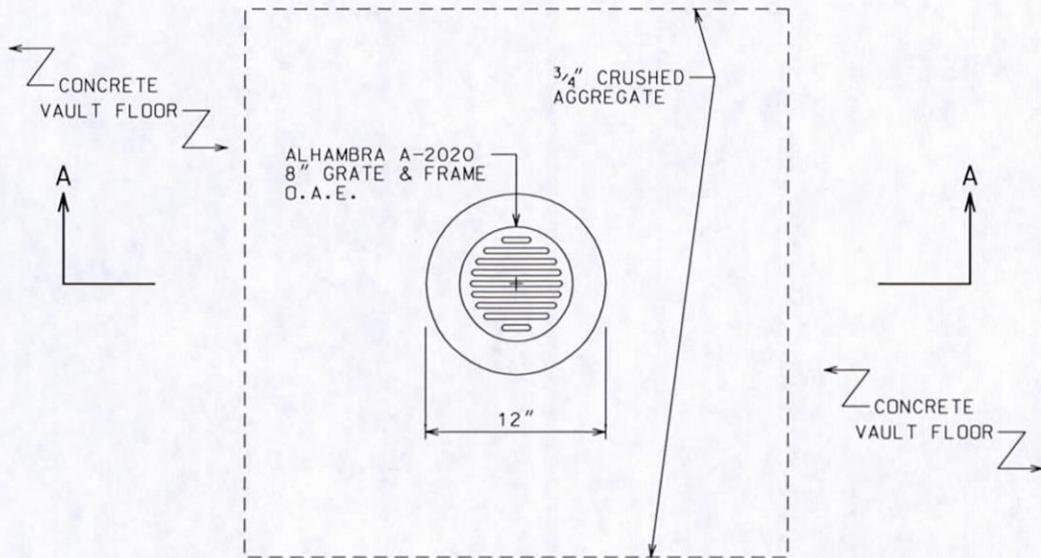
1. WATER MAINS AND SEWER LINES SHALL NOT BE INSTALLED IN THE SAME TRENCH.
2. SEPARATION DISTANCES SPECIFIED SHALL BE MEASURED FROM THE OUTER EDGES OF PIPE.
3. THE "CALIFORNIA WATERWORKS STANDARDS" SETS FORTH THE MINIMUM SEPARATION REQUIREMENTS FOR WATER MAINS AND SEWER LINES. THESE STANDARDS ARE CONTAINED IN SECTION 64630, TITLE 22, CALIFORNIA ADMINISTRATIVE CODE.

PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
APPROVED:

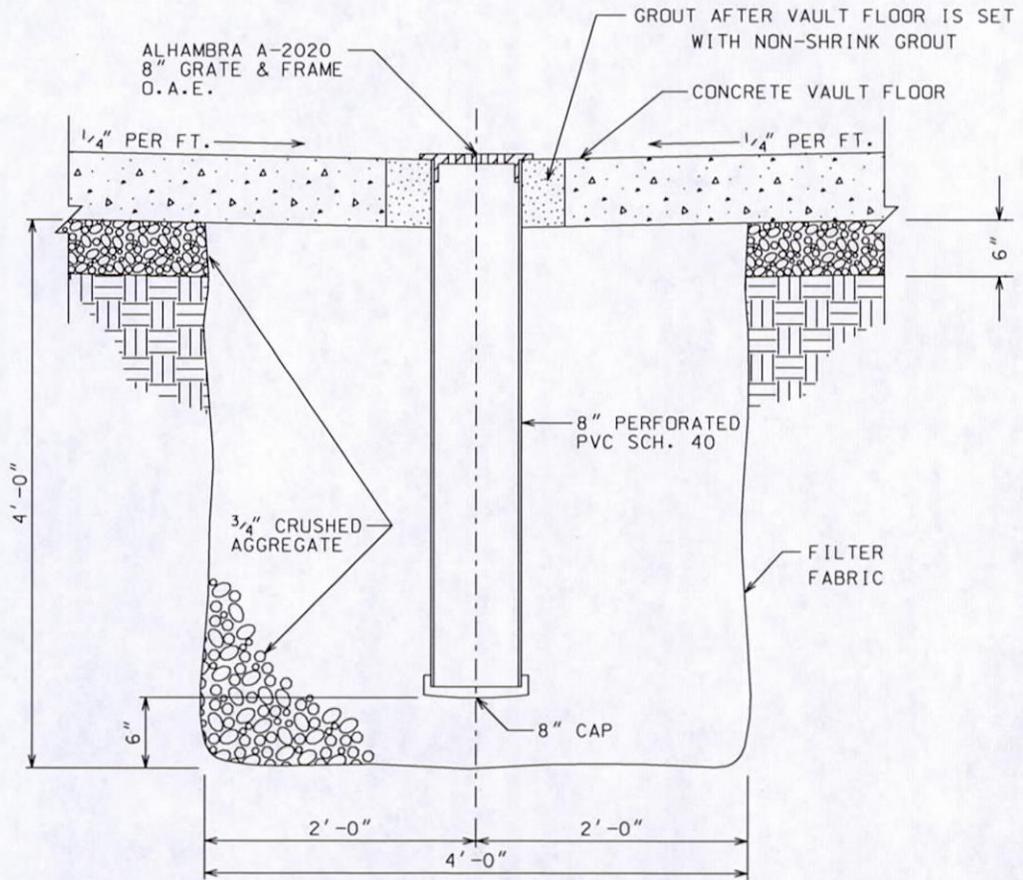
DESIGN REQUIREMENTS FOR WATER MAINS  
IN THE VICINITY OF SANITARY SEWERS

W-10



PLAN VIEW

N.T.S.



SECTION A-A

N.T.S.

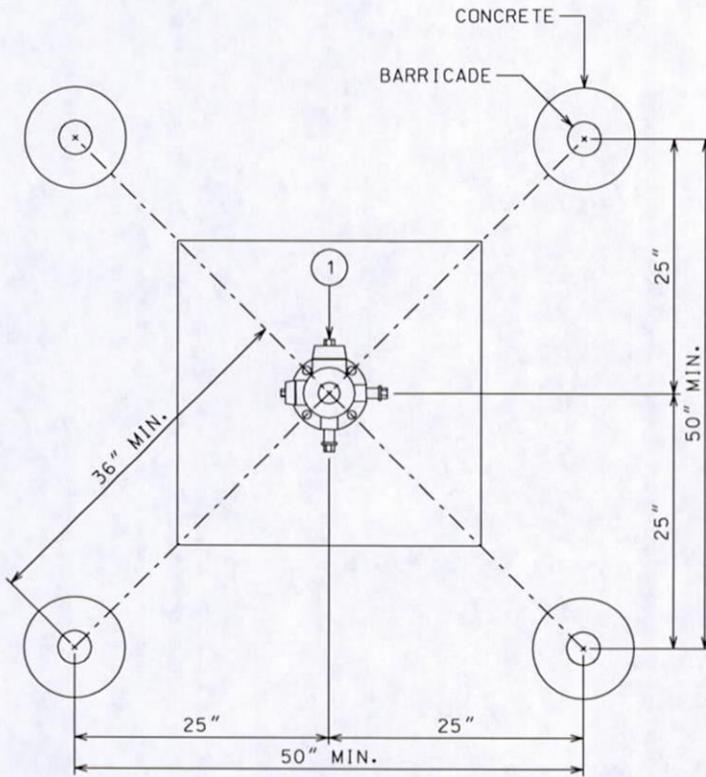
# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
APPROVED:

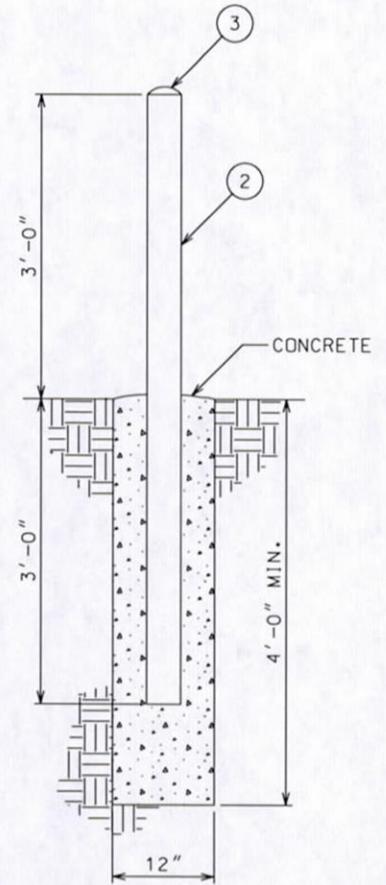
SUMP DETAIL FOR METER VAULTS  
(TO BE LOCATED PER APPROVED PLAN)

W-12

STREET WITHOUT CONCRETE CURB



**BARRICADE PLAN**  
**TYPICAL PER L.A. CO. FIRE DEPARTMENT**  
 N.T.S.



**BARRICADE DETAIL**  
 N.T.S.

GENERAL NOTES:

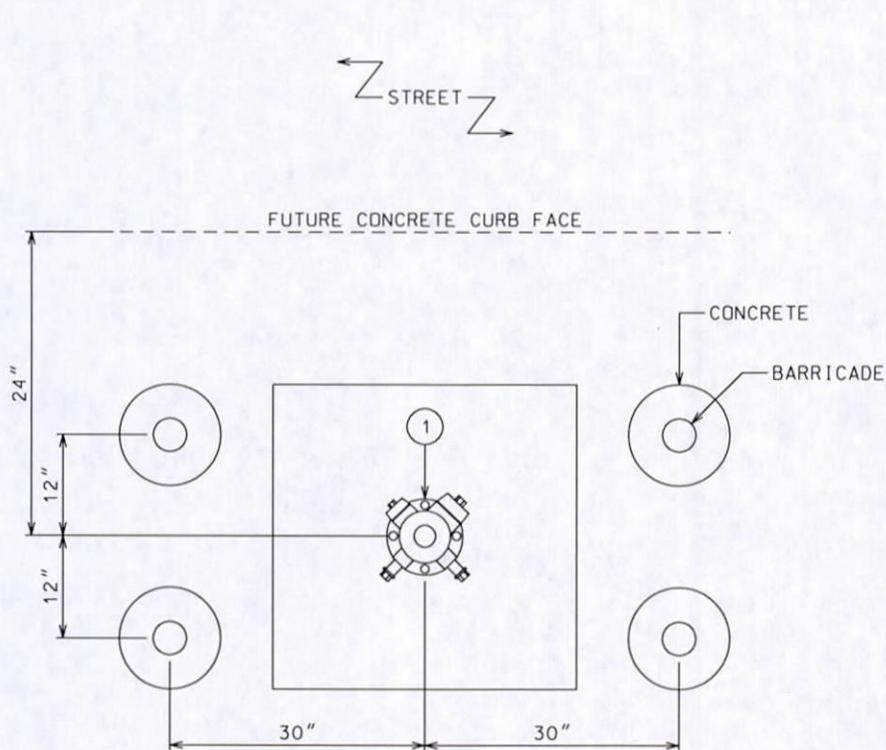
1. WATER DEVICE (HYDRANT SHOWN) BEING PROTECTED.
2. 6' OF 4" STANDARD STEEL PIPE SCHEDULE 40 CONCRETE FILLED
3. CONCRETE CAP
4. FOUR BARRICADES ARE TO BE USED UNLESS OTHERWISE SPECIFIED.
5. THE EXACT LOCATION OF BARRICADES MAY BE CHANGED BY THE DISTRICT REPRESENTATIVE IN THE FIELD.
6. THE STEEL PIPE ABOVE THE GROUND SHALL BE PAINTED A MINIMUM OF ONE FIELD COAT OF RED PRIMER AND TWO COATS OF RUST-OLEUM SAFETY YELLOW OR APPROVED EQUAL.
7. 25" BARRICADE SPACING SHALL BE WIDENED AS REQUIRED TO PROVIDE CLEARANCE FOR ATTACHMENTS TO FIRE HYDRANT OUTLETS.

PALMDALE WATER DISTRICT

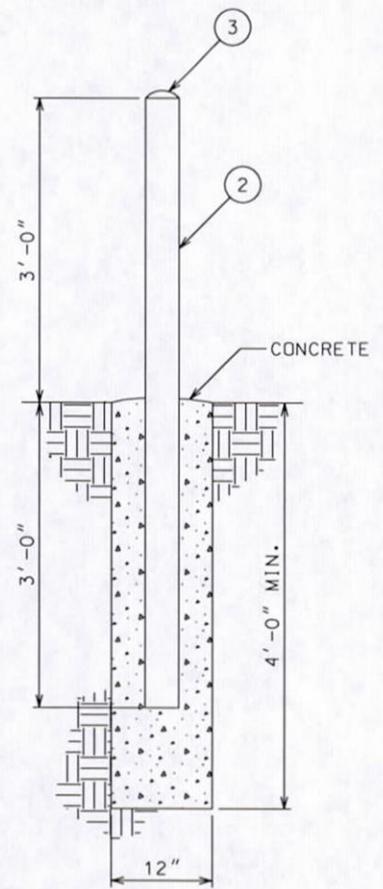
DATE: DEC. 2019 MRW  
 APPROVED:

TYPICAL BARRICADES DETAIL  
 (STREET WITHOUT CONCRETE CURB)

W-14



TEMPORARY BARRICADE PLAN  
 TYPICAL PER L.A. CO. FIRE DEPARTMENT  
 N.T.S.



BARRICADE DETAIL  
 N.T.S.

GENERAL NOTES:

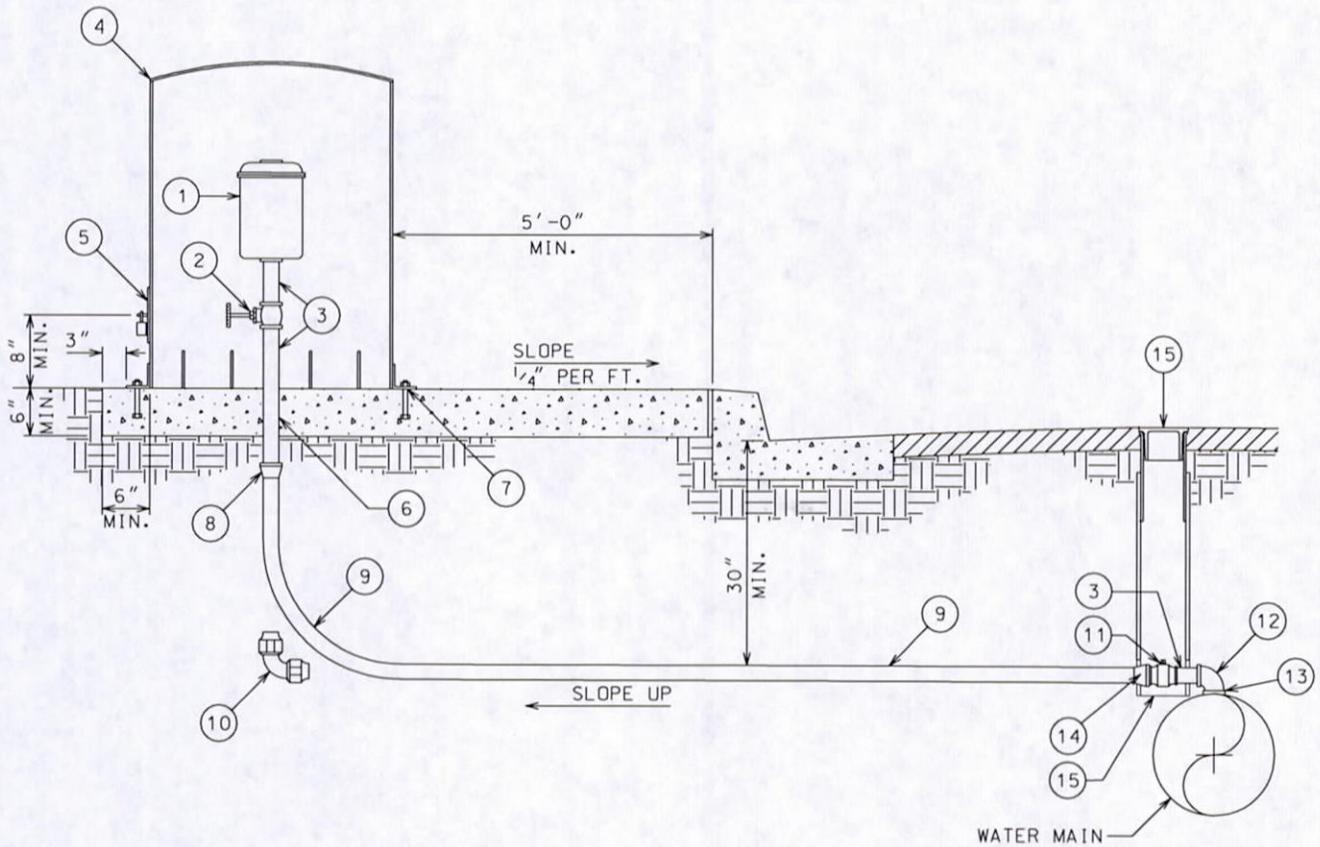
1. FIXTURE BEING PROTECTED.
2. 6' OF 4" STANDARD STEEL PIPE SCHEDULE 40 CONCRETE FILLED
3. CONCRETE CAP
4. FOUR BARRICADES ARE TO BE USED UNLESS OTHERWISE SPECIFIED.
5. THE EXACT LOCATION OF BARRICADES MAY BE CHANGED BY THE DISTRICT REPRESENTATIVE IN THE FIELD.
6. THE STEEL PIPE ABOVE THE GROUND SHALL BE PAINTED A MINIMUM OF ONE FIELD COAT OF RED PRIMER AND TWO COATS OF RUST-OLEUM SAFETY YELLOW OR APPROVED EQUAL.

# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
 APPROVED:

TYPICAL TEMPORARY BARRICADES DETAIL  
 FOR FIRE HYDRANTS

W-15



KEY NOTES:

1. WHEN WATER MAIN IS REQUIRED TO BE HOT TAPPED USE M.I.P. x M.I.P. CORPORATION VALVE.
2. IF NO CURB AND GUTTER OR IF TYPE "E" CURB (ROLLED). INSTALL BARRICADES PER STANDARD W-14 AS REQUIRED (RUST-OLEUM SAFETY YELLOW).
3. ALL VALVES AND PIPING ABOVE GROUND SHALL BE INSULATED.
4. PAINT VALVE ASSEMBLY ABOVE GROUND, AND STEEL COVER (INSIDE AND OUTSIDE), WITH TWO COATS OF RED PRIMER AND TWO COATS OF RUSTOLEUM FOREST GREEN OR APPROVED EQUAL.
5. USE PROPER CLASS FITTINGS FOR WATER WORKING PRESSURE (CLASS 150 MINIMUM).
6. SEE PLANS FOR VALVE SIZES AND USE SAME SIZE FITTINGS AND NIPPLE LENGTHS TO SUIT (NO CLOSE NIPPLES).
7. ALL EDGES AGAINST OTHER CONCRETE TO HAVE PREFORMED JOINT FILLER.
8. ALL PIPING AND APPURTENANCES WILL BE AIR VACUUM VALVE SIZE.
9. 36" x 36" x 6" CONCRETE PAD WITH SIDEWALK FINISH TO BE SLOPED 1/4" PER FOOT TOWARDS THE CURB.

MATERIAL DESCRIPTION:

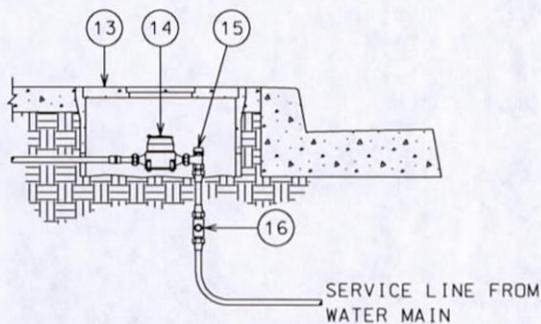
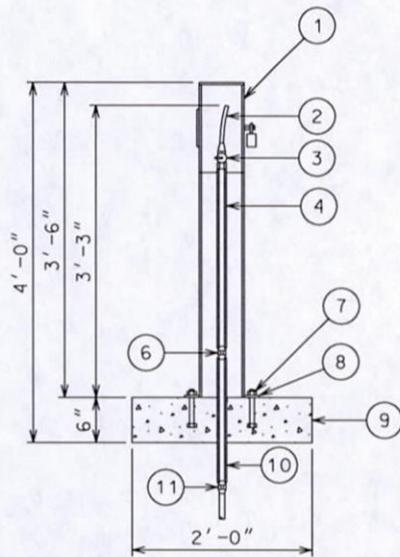
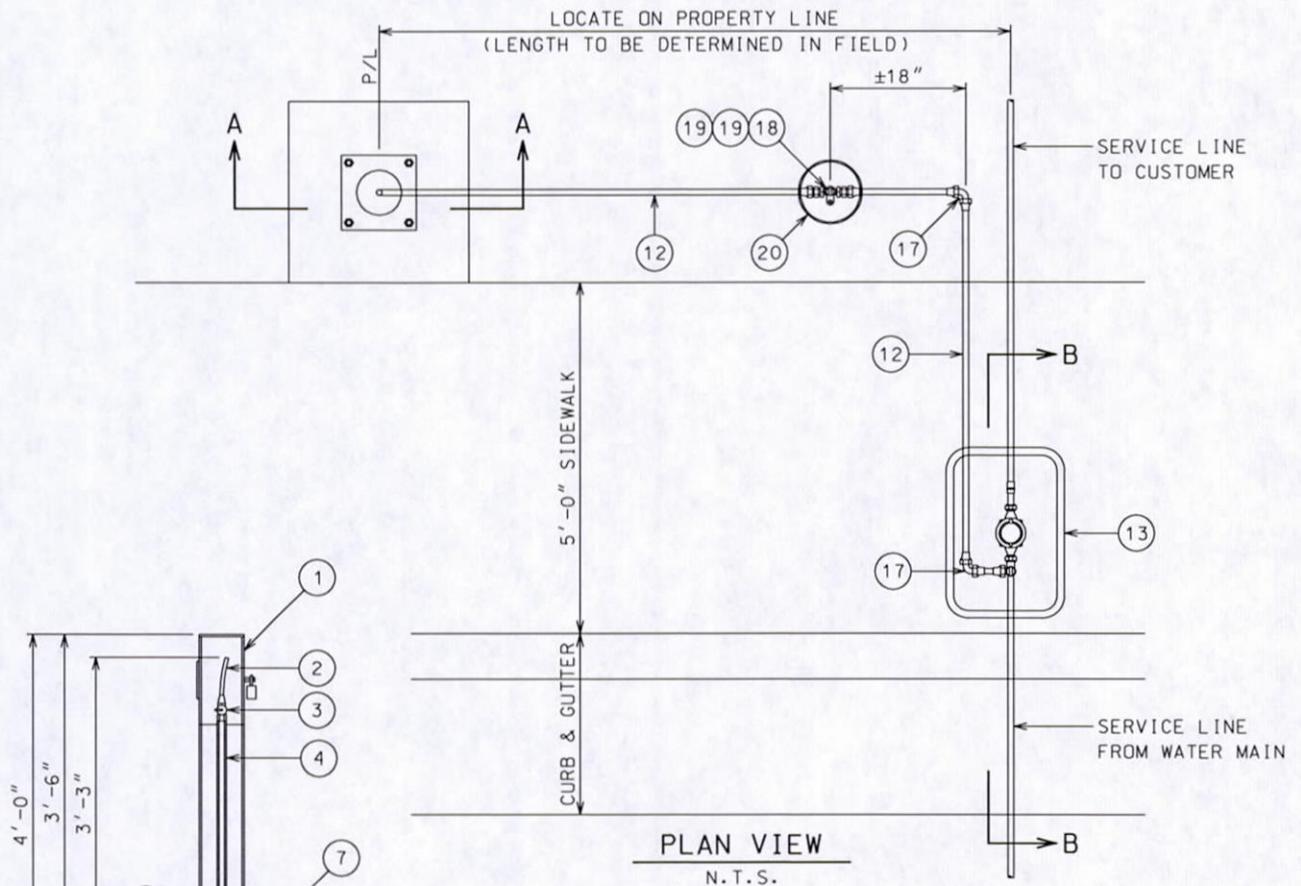
- ① COMBINATION AIR AND VACUUM RELEASE VALVE A.R.I. D-040.
- ② GATE VALVE. BRASS
- ③ BRASS NIPPLE
- ④ A.R.I. VALVE ENCLOSURE
- ⑤ 6" x 6" DOOR WITH WELDED HINGES AND PADLOCK HASP. PADLOCK TO BE SUPPLIED BY DISTRICT.
- ⑥ PROTECT PIPE WITH 20 MIL TAPE
- ⑦ 3" x 3" x 1/4" L, 3" LONG WITH 9/16" DIA. HOLE WELDED TO STEEL COVER (4 REQUIRED)
- ⑧ COUPLING, F.I.P. x COMPRESSION FOR 2", FIP x COMP. FOR 1"
- ⑨ USE TYPE "K" COPPER TUBING.
- ⑩ COMPRESSION 90° ELBOW REQUIRED FOR 1 1/2" AND 2" ASSEMBLIES.
- ⑪ BALL STRAIGHT SVC VALVE (JONES NO. J-1900W, OR APPROVED EQUAL)
- ⑫ 90° STREET ELBOW. BRASS
- ⑬ CONNECTIONS SHALL BE MADE WITH MATERIALS SPECIFIED IN P.W.D. STD. W-1.
- ⑭ MIP x COMPRESSION ADAPTER FOR 2", MIP x COMP. ADAPTER FOR 1".
- ⑮ VALVE BOX PER P.W.D. STD. W-5 (NOTCH VALVE RISER AROUND PIPE)

# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
 APPROVED:

AIR AND VACUUM RELEASE VALVE  
 (TYPICAL 1" THROUGH 2" COMBINATION)

W-16



**MATERIAL DESCRIPTION:**

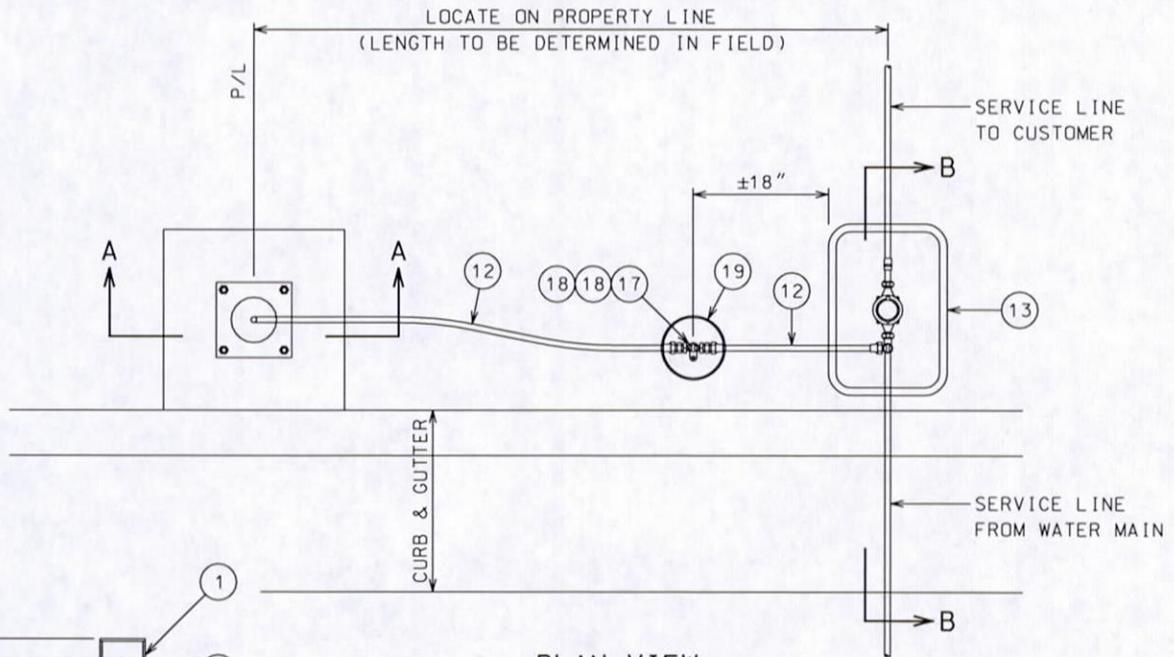
- ① 6" DIA. STL. PIPE WITH 12" HINGED DOOR & CLASP FOR LOCKING (PADLOCK TO BE SUPPLIED BY THE DISTRICT).
- ② 3/8" COPPER TUBE
- ③ 3/4" BALL VALVE WITH 3/4" x 3/8" BRASS BUSHING & 3/8" M.I.P. x COMP. ADAPTER.
- ④ 3/4" x 30" L.F. BRASS NIPPLE WITH PIPE INSULATION.
- ⑤ NO ITEM
- ⑥ 3/4" L.F. BRASS COUPLING
- ⑦ 4 - 1/2" ANCHOR BOLTS
- ⑧ 10" x 10" x 3/16" BASE PLATE
- ⑨ 24" x 24" x 6" CONCRETE PAD
- ⑩ 3/4" x 18" L.F. BRASS NIPPLE WITH PIPE INSULATION
- ⑪ 3/4" F.I.P. x COMP. ADAPTER
- ⑫ 3/4" TYPE "K" SOFT COPPER TUBING
- ⑬ METER BOX
- ⑭ METER
- ⑮ ANGLE STOP WITH COMPRESSION INLET (SIZE VARIES).
- ⑯ VARIES" x 3/4" COMPRESSION TEE
- ⑰ 3/4" COMPRESSION 90° ELBOW
- ⑱ 3/4" STRAIGHT STOP
- ⑲ 3/4" M.I.P. x COMP. ADAPTER
- ⑳ IRRIGATION CONTROL VALVE BOX

# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
APPROVED:

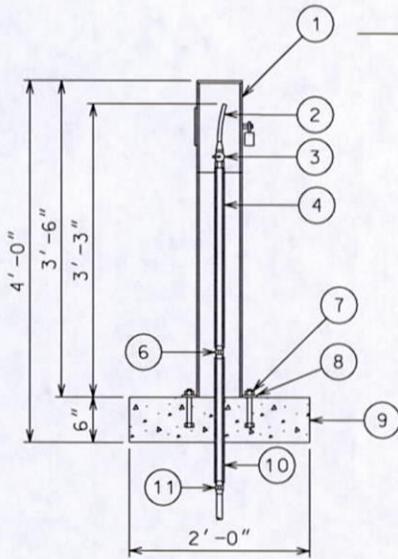
**BACTERIOLOGICAL TEST STATION**  
(TEST STATION BEHIND SIDEWALK)

W-17



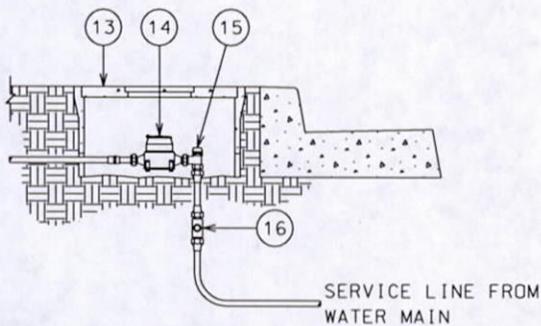
**PLAN VIEW**

N.T.S.



**SECTION A-A**

N.T.S.



**SECTION B-B**

N.T.S.

**KEY NOTES:**

IF NO CURB AND GUTTER OR IF TYPE "E" CURB (ROLLED),  
INSTALL BARRICADES PER P.W.D. STD. W-14 AS REQUIRED  
(RUSTOLEUM SAFETY YELLOW)

**MATERIAL DESCRIPTION:**

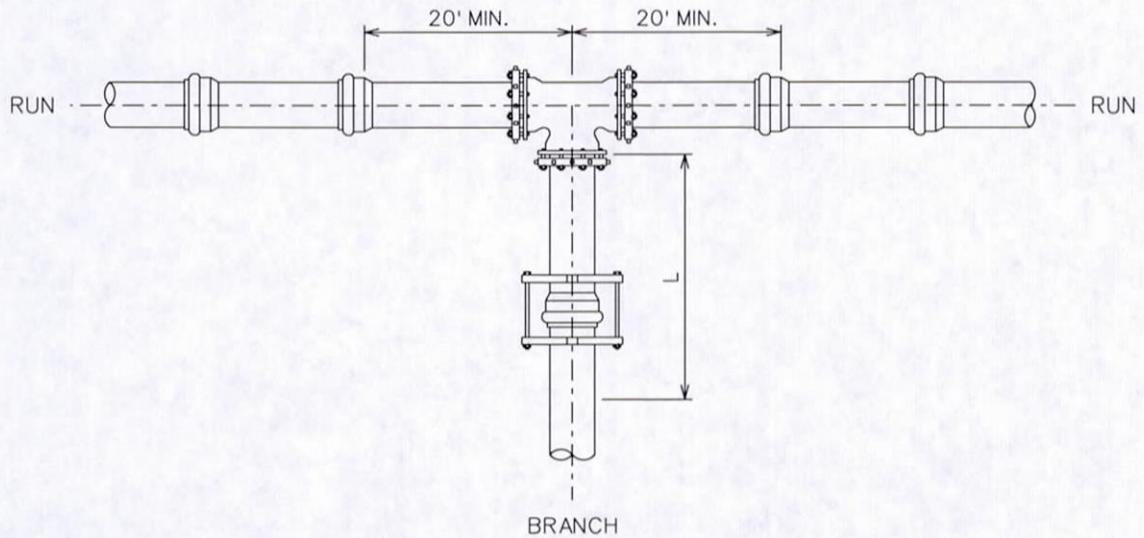
- ① 6" DIA. STL. PIPE WITH 12" HINGED DOOR & CLASP FOR LOCKING (PADLOCK TO BE SUPPLIED BY THE DISTRICT).
- ② 3/8" COPPER TUBE
- ③ 3/4" BALL VALVE WITH 3/4" x 3/8" BRASS BUSHING & 3/8" M.I.P. x COMP. ADAPTER.
- ④ 3/4" x 30" L.F. BRASS NIPPLE WITH PIPE INSULATION.
- ⑤ NO ITEM
- ⑥ 3/4" L.F. BRASS COUPLING
- ⑦ 4 - 1/2" ANCHOR BOLTS
- ⑧ 10" x 10" x 3/16" BASE PLATE
- ⑨ 24" x 24" x 6" CONCRETE PAD
- ⑩ 3/4" x 18" L.F. BRASS NIPPLE WITH PIPE INSULATION
- ⑪ 3/4" F.I.P. x COMP. ADAPTER
- ⑫ 3/4" TYPE "K" SOFT COPPER TUBING
- ⑬ METER BOX
- ⑭ METER
- ⑮ ANGLE STOP WITH COMPRESSION INLET (SIZE VARIES).
- ⑯ VARIES" x 3/4" COMPRESSION TEE
- ⑰ 3/4" COMPRESSION 90° ELBOW
- ⑱ 3/4" STRAIGHT STOP
- ⑲ 3/4" M.I.P. x COMP. ADAPTER
- ⑳ IRRIGATION CONTROL VALVE BOX

**PALMDALE WATER DISTRICT**

DATE: DEC. 2019 MRW  
APPROVED:

**BACTERIOLOGICAL TEST STATION**  
(TEST STATION FOR NO SIDEWALK OR SIDEWALK WIDER THAN 5')

W-17A



		RUN SIZE									
		4	6	8	10	12	14	16	18	20	24
BRANCH SIZE	4	x	x	x	x	x	x	x	x	x	x
	6		x	x	x	x	x	x	x	x	x
	8			x	x	x	x	x	x	x	x
	10				x	x	x	x	x	x	x
	12					13	x	x	x	x	x
	14						24	13	x	x	x
	16							36	25	14	x
	18								47	37	16
	20									58	39
	24										79

x - FOR THIS CONDITION NEED ONLY RESTRAIN THE BRANCH OUTLET OF THE TEE.

RESTRAINED LENGTHS, "L" (IN FEET)

1. RESTRAIN THE TWO MECHANICAL JOINTS ON THE RUN SIDES OF THE TEE. THERE SHOULD BE A FULL 20' LENGTH OF PIPE INSTALLED ON EACH SIDE OF THE RUN.
2. ALL JOINTS WITHIN THE LENGTH "L" ON THE BRANCH MUST BE RESTRAINED. USE RETAINER GLAND AT MECHANICAL JOINTS AND HARNESS ON PUSH-ON PIPE PER P.W.D. SPECIFICATION.
3. FOR TEST PRESSURES AND LAYING CONDITIONS SEE SECTION OF GENERAL NOTES FOR USE OF RESTRAINED JOINT LENGTHS ON STANDARD DRAWING W-20.

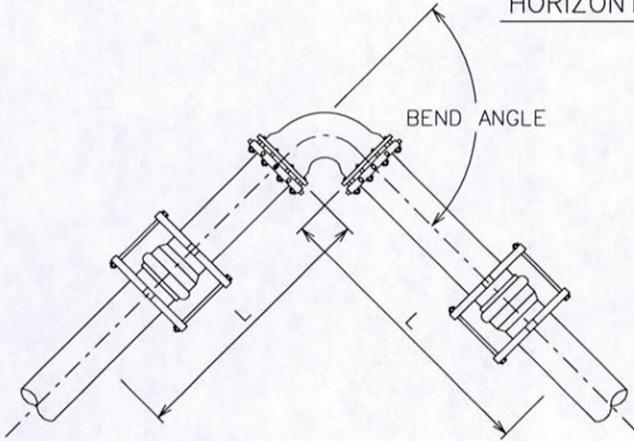
# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
APPROVED:

STANDARD TEE RESTRAINT  
(FOR C-900 PVC PIPE)

W-18

### HORIZONTAL BEND

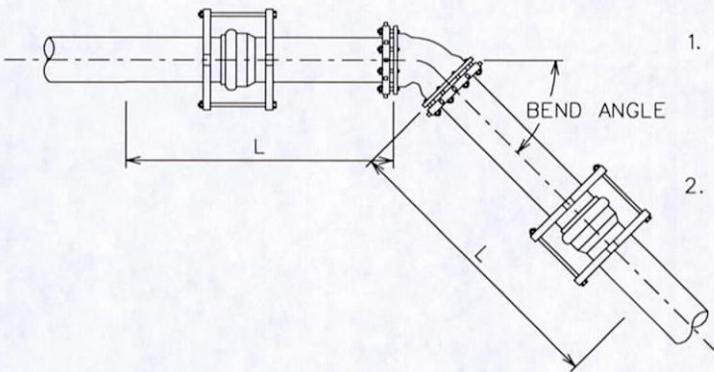


1. ALL JOINTS WITHIN LENGTH "L" MUST BE RESTRAINED. USE RETAINER GLAND AT MECHANICAL JOINTS AND HARNESS WITH PUSH-ON PIPE PER P.W.D. SPECIFICATION.
2. FOR TEST PRESSURES AND LAYING CONDITIONS SEE SECTION OF GENERAL NOTES FOR USE OF RESTRAINED JOINT LENGTHS ON STANDARD DRAWING W-20.

RESTRAINED LENGTHS, "L" (IN FEET)

		RUN SIZE						
		4	6	8	10	12	14	16
BEND ANGLE	11.25	3	3	3	4	4	5	5
	22.5	3	5	7	7	9	10	11
	45	7	11	13	15	18	20	23
	90	17	24	31	37	43	49	55

### VERTICAL BEND



1. ALL JOINTS WITHIN LENGTH "L" MUST BE RESTRAINED. USE RETAINER GLAND AT MECHANICAL JOINTS AND HARNESS WITH PUSH-ON PIPE PER P.W.D. SPECIFICATION.
2. FOR TEST PRESSURES AND LAYING CONDITIONS SEE SECTION OF GENERAL NOTES FOR USE OF RESTRAINED JOINT LENGTHS ON STANDARD DRAWING W-20.

RESTRAINED LENGTHS, "L" (IN FEET)

		RUN SIZE						
		4	6	8	10	12	14	16
BEND ANGLE	11.25	5	7	9	11	13	15	17
	22.5	11	15	19	23	27	31	35
	45	23	31	40	48	56	64	72

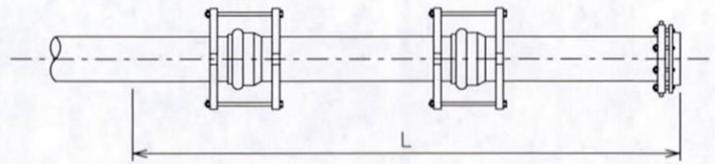
# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
APPROVED:

STANDARD BEND RESTRAINT  
(FOR C-900 PVC PIPE)

W-19

DEAD END P.V.C. PIPE



1. ALL JOINTS WITHIN LENGTH "L" MUST BE RESTRAINED. USE RETAINER GLAND AT MECHANICAL JOINTS AND HARNESS WITH PUSH-ON PIPE PER P.W.D. SPECIFICATION.
2. FOR TEST PRESSURES AND LAYING CONDITIONS SEE GENERAL NOTES BELOW.

PIPE SIZE

4	6	8	10	12	14	16
52	73	96	115	136	155	174

RESTRAINED LENGTHS, "L" (IN FEET)

RESTRAINED JOINT LENGTHS USAGE GENERAL NOTES

RESTRAINED LENGTH CALCULATIONS ARE BASED ON THE FOLLOWING DESIGN CRITERIA TYPICALLY USED WITH BACKFILL IN P.W.D. :

1. FORTY-TWO (42) INCHES MINIMUM DEPTH OF COVER.
2. A MINIMUM SAFETY FACTOR OF 1.5
3. SOIL TYPE PER P.W.D. SPECIFICATION.
4. PIPE ZONE BACKFILL FROM A DEPTH OF SIX (6) INCHES MINIMUM UNDER THE PIPE TO TWELVE (12) INCHES ABOVE THE TOP OF PIPE SHALL BE IMPORTED FILL SAND HAVING A MINIMUM SAND EQUIVALENCY OF SAE-30. PIPE ZONE AND TRENCH BACKFILL MATERIALS SHALL BE PLACED AND COMPACTED TO A MINIMUM OF 90% OF THE MAXIMUM DENSITY OF THE MATERIAL AT OPTIMUM MOISTURE CONTENT.
5. 200 PSI TEST PRESSURES FOR FOUR (4) THROUGH SIXTEEN (16) INCH SIZE PIPES.

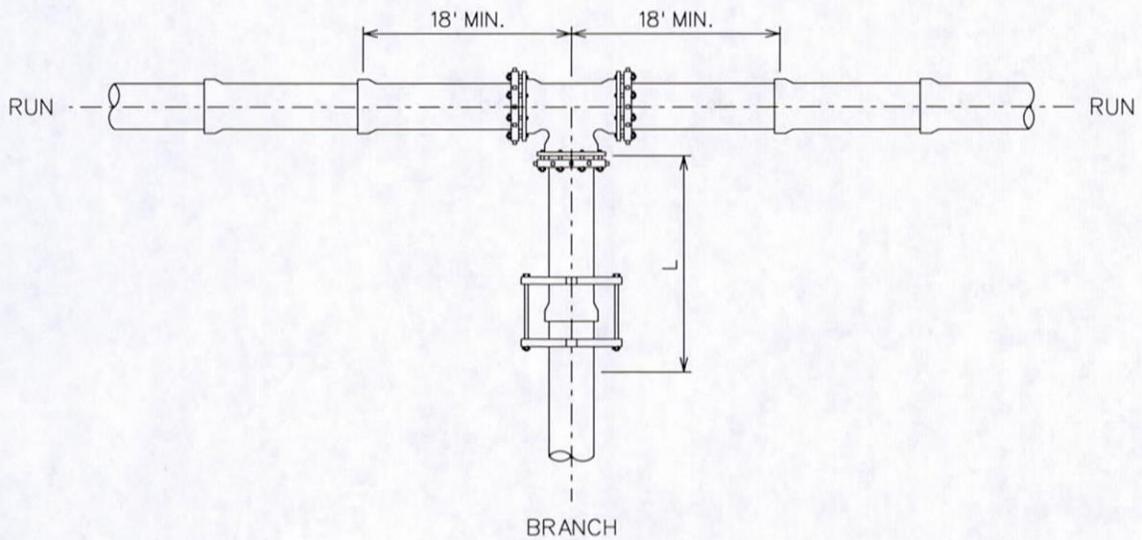
IF ACTUAL CONDITIONS DIFFER FROM THOSE LISTED ABOVE OR THE REQUIRED RESTRAINED LENGTH CANNOT BE MET, THE RESTRAINED JOINT LENGTH SHALL BE DETERMINED BY THE DISTRICT ENGINEER.

PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
APPROVED:

STANDARD DEAD END RESTRAINT  
(FOR C-900 PVC PIPE)

W-20



		RUN SIZE									
		4	6	8	10	12	14	16	18	20	24
BRANCH SIZE	4	x	x	x	x	x	x	x	x	x	x
	6		x	x	x	x	x	x	x	x	x
	8			x	x	x	x	x	x	x	x
	10				x	x	x	x	x	x	x
	12					13	x	x	x	x	x
	14						24	13	x	x	x
	16							36	25	14	x
	18								47	37	16
	20									58	39
	24										79

x - FOR THIS CONDITION NEED ONLY RESTRAIN THE BRANCH OUTLET OF THE TEE.

RESTRAINED LENGTHS, "L" (IN FEET)

1. RESTRAIN THE TWO MECHANICAL JOINTS ON THE RUN SIDES OF THE TEE. THERE SHOULD BE A FULL 18' LENGTH OF PIPE INSTALLED ON EACH SIDE OF THE RUN.
2. ALL JOINTS WITHIN THE LENGTH "L" ON THE BRANCH MUST BE RESTRAINED. USE RETAINER GLAND AT MECHANICAL JOINTS AND HARNESS ON PUSH-ON PIPE PER P.W.D. SPECIFICATION.
3. FOR TEST PRESSURES AND LAYING CONDITIONS SEE SECTION OF GENERAL NOTES FOR USE OF RESTRAINED JOINT LENGTHS ON STANDARD DRAWING W-23.

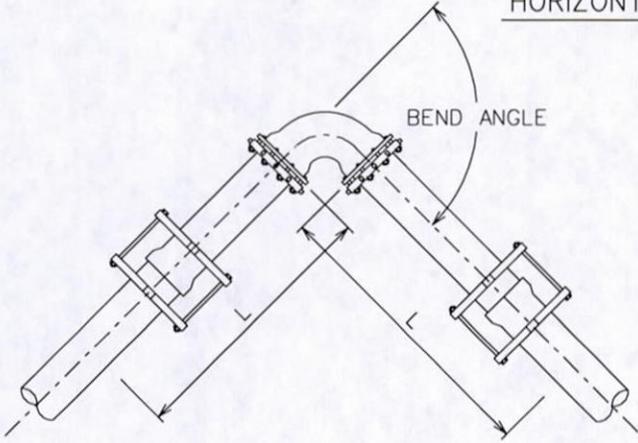
# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
APPROVED:

STANDARD TEE RESTRAINT  
(FOR DUCTILE IRON PIPE)

W-21

### HORIZONTAL BEND

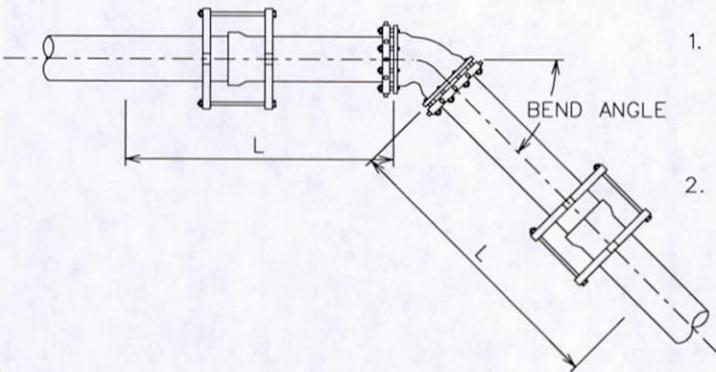


1. ALL JOINTS WITHIN LENGTH "L" MUST BE RESTRAINED. USE RETAINER GLAND AT MECHANICAL JOINTS AND HARNESS WITH PUSH-ON PIPE PER P.W.D. SPECIFICATION.
2. FOR TEST PRESSURES AND LAYING CONDITIONS SEE SECTION OF GENERAL NOTES FOR USE OF RESTRAINED JOINT LENGTHS ON STANDARD DRAWING W-23.

RESTRAINED LENGTHS, "L" (IN FEET)

		RUN SIZE						
		4	6	8	10	12	14	16
BEND ANGLE	11.25	3	3	3	4	4	4	5
	22.5	3	4	7	7	8	9	10
	45	7	9	12	15	17	19	21
	90	16	23	29	35	40	45	51

### VERTICAL BEND



1. ALL JOINTS WITHIN LENGTH "L" MUST BE RESTRAINED. USE RETAINER GLAND AT MECHANICAL JOINTS AND HARNESS WITH PUSH-ON PIPE PER P.W.D. SPECIFICATION.
2. FOR TEST PRESSURES AND LAYING CONDITIONS SEE SECTION OF GENERAL NOTES FOR USE OF RESTRAINED JOINT LENGTHS ON STANDARD DRAWING W-23.

RESTRAINED LENGTHS, "L" (IN FEET)

		RUN SIZE						
		4	6	8	10	12	14	16
BEND ANGLE	11.25	3	5	7	8	8	10	11
	22.5	7	11	12	15	17	20	22
	45	15	19	25	31	36	41	46

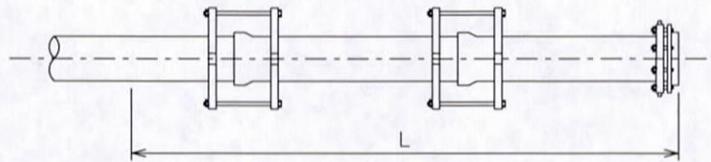
# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
APPROVED:

STANDARD BEND RESTRAINT  
(FOR DUCTILE IRON PIPE)

W-22

DEAD END DUCTILE IRON PIPE



1. ALL JOINTS WITHIN LENGTH "L" MUST BE RESTRAINED. USE RETAINER GLAND AT MECHANICAL JOINTS AND HARNESS WITH PUSH-ON PIPE PER P.W.D. SPECIFICATION.
2. FOR TEST PRESSURES AND LAYING CONDITIONS SEE GENERAL NOTES BELOW.

PIPE SIZE

4	6	8	10	12	14	16
33	47	61	73	86	98	111

RESTRAINED LENGTHS, "L" (IN FEET)

RESTRAINED JOINT LENGTHS USAGE GENERAL NOTES

RESTRAINED LENGTH CALCULATIONS ARE BASED ON THE FOLLOWING DESIGN CRITERIA TYPICALLY USED WITH BACKFILL IN P.W.D. :

1. FORTY-TWO (42) INCHES MINIMUM DEPTH OF COVER.
2. A MINIMUM SAFETY FACTOR OF 1.5
3. SOIL TYPE PER P.W.D. SPECIFICATION.
4. PIPE ZONE BACKFILL FROM A DEPTH OF SIX (6) INCHES MINIMUM UNDER THE PIPE TO TWELVE (12) INCHES ABOVE THE TOP OF PIPE SHALL BE IMPORTED FILL SAND HAVING A MINIMUM SAND EQUIVALENCY OF SAE-30. PIPE ZONE AND TRENCH BACKFILL MATERIALS SHALL BE PLACED AND COMPACTED TO A MINIMUM OF 90% OF THE MAXIMUM DENSITY OF THE MATERIAL AT OPTIMUM MOISTURE CONTENT.
5. 200 PSI TEST PRESSURES FOR FOUR (4) THROUGH SIXTEEN (16) INCH SIZE PIPES.

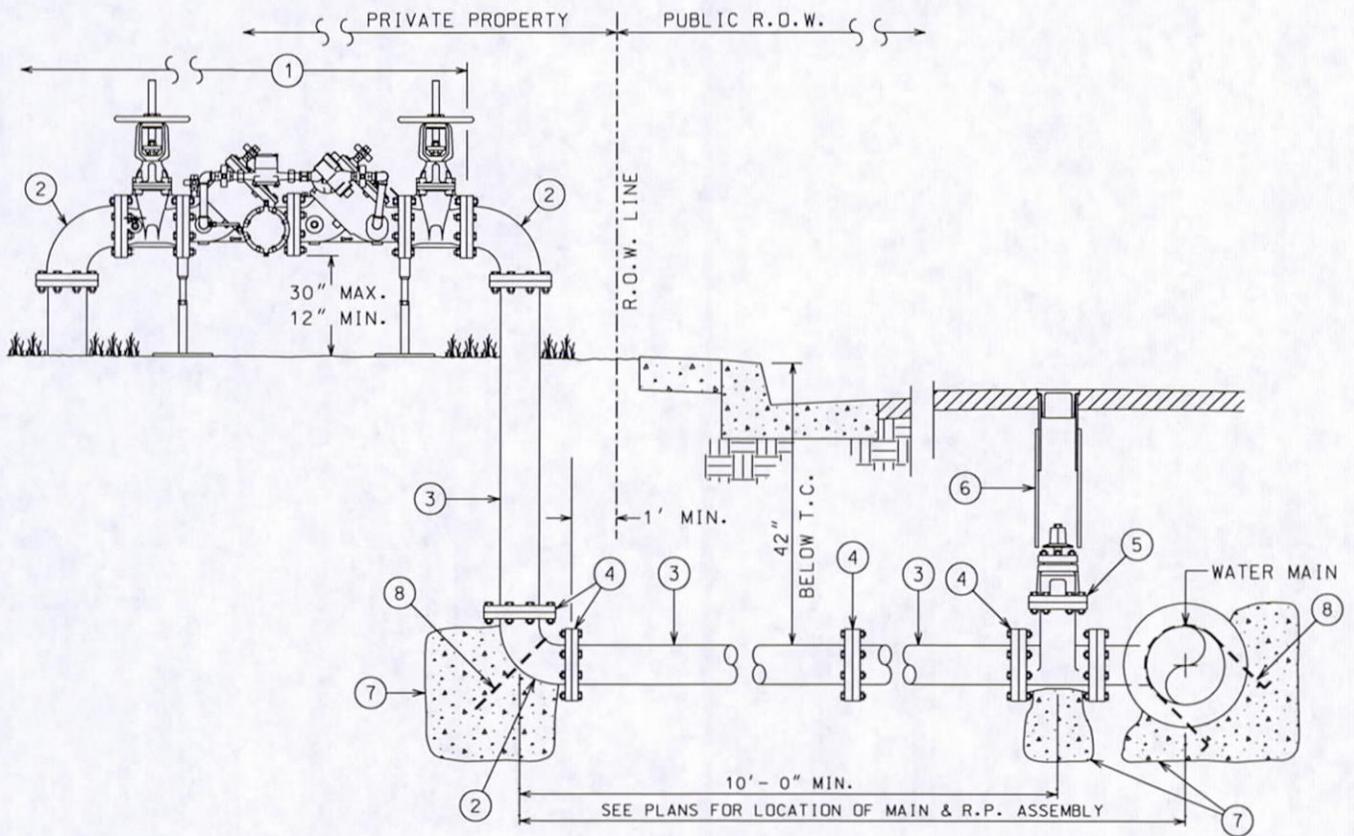
IF ACTUAL CONDITIONS DIFFER FROM THOSE LISTED ABOVE OR THE REQUIRED RESTRAINED LENGTH CANNOT BE MET, THE RESTRAINED JOINT LENGTH SHALL BE DETERMINED BY THE DISTRICT ENGINEER.

PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
APPROVED:

STANDARD DEAD END RESTRAINT  
(FOR DUCTILE IRON PIPE)

W-23



KEY NOTES:

1. PROPERTY OWNER SHALL BE RESPONSIBLE FOR MAINTENANCE INCLUDING REPAIR OR REPLACEMENT AND MUST PROVIDE RESULTS OF REQUIRED ANNUAL BACKFLOW TEST TO THE DISTRICT.
2. METER ATTACHED TO REDUCED PRESSURE DETECTOR ASSEMBLY (RPDA) SHALL BE OWNED AND MAINTAINED BY THE DISTRICT. RPDA METER TO BE ACCESSIBLE TO THE DISTRICT AT ALL TIMES.
3. ALL UNCOATED METAL SURFACES (INCLUDING NUTS AND BOLTS) INSTALLED UNDERGROUND SHALL BE THOROUGHLY COATED W/ NO-OX GREASE AND THEN BE WRAPPED WITH 8 MIL POLYETHYLENE SHEET (AWWA C-105).
4. INTERMEDIATE PIPE JOINTS IN LATERAL SHALL BE FLANGED. PIPE SHALL BE INSTALLED HORIZONTAL OR SLOPING DOWNWARD FROM MAIN TO PROVIDE MINIMUM COVER.
5. IF THE ABSENCE OF A CURB OR WHERE TYPE "E" CURB (ROLLED) IS USED, INSTALL BARRICADES PER P.W.D. STD. W-14 AS REQUIRED.

MATERIAL DESCRIPTION:

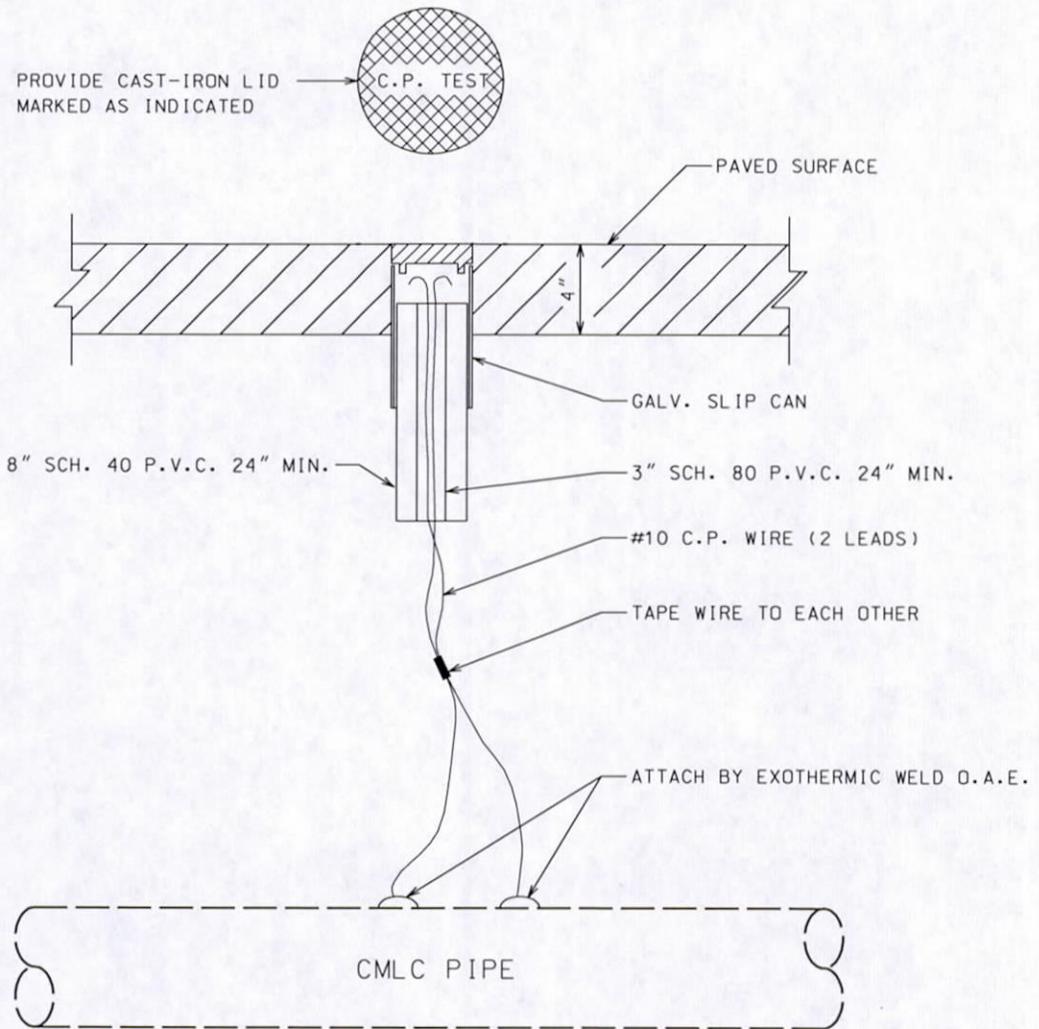
- ① REDUCED PRESSURE DETECTOR ASSEMBLY (RPDA) FEBCO MODEL 826YD O.A.E.
- ② 90° FLANGED ELBOW STL., C.M.L.C., CL150 FLG.
- ③ STL. PIPE 10 GA. MIN. C.M.L. & C. EXTEND NON-SHRINK MORTAR COATING WITH EXPANDED GALVANIZED LATH REINFORCEMENT TO MEET FLG. TAPER THICKNESS AND TO MEET FLG. HUB.
- ④ SLIP-ON ELD FLANGE CL 150.
- ⑤ FLG. GATE VALVE CL 150.
- ⑥ VALE BOX PER P.W.D. STD. W-5.
- ⑦ USE 2000 PSI MIN. CONCRETE FOR THRUST BLOCKS. PLACE CONCRETE ON UNDISTURBED OR COMPACTED SOIL. THRUST BLOCKS MUST MEET REQUIREMENTS OF P.W.D. STD. W-4.
- ⑧ ANCHOR ROD PER P.W.D. STD. W-4.

# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
 APPROVED:

REDUCED PRESSURE DETECTOR ASSEMBLY

W-24



KEY NOTES:

1. ALL VALVE BOXES LOCATED IN UNIMPROVED STREETS OR DIRT AREA SHALL BE ENCLOSED IN 24" x 24" x 12" THICK CONCRETE PAD.
2. PUT LARGE LOOP KNOT IN CABLE WITH HEAVY SLACK.
3. TEST BEFORE AND AFTER BACKFILL BY DISTRICT.

# PALMDALE WATER DISTRICT

DATE: DEC. 2019 MRW  
 APPROVED:

TYPICAL C.P. TEST STATION  
 (IMPROVED OR UNIMPROVED ROADS)

W-26

**P A L M D A L E   W A T E R   D I S T R I C T**  
**B O A R D   M E M O R A N D U M**

**DATE:** February 4, 2020 **February 11, 2020**  
**TO:** RESOURCE AND FACILITIES COMMITTEE **Committee Meeting**  
**FROM:** Mr. Scott Rogers, Engineering Manager  
**VIA:** Mr. Adam Ly, Assistant General Manager  
Mr. Dennis D. LaMoreaux, General Manager  
**RE:** ***AGENDA ITEM NO. 4.4 – CONSIDERATION AND POSSIBLE ACTION ON RECOMMENDATION TO AUTHORIZE STAFF TO ENTER INTO A CONTRACT FOR A WELL REHABILITATION PRIORITIZATION PROGRAM WITH KYLE GROUNDWATER. (\$139,992.00 – BUDGETED – BUDGET LINE ITEM NO. 1-02-5070-007 – CONSULTANTS – ENGINEERING/GRANT MANAGER ROGERS)***

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**Recommendation:**

Staff recommends that the Board authorize staff to enter into a contract with Kyle Groundwater for the hydrogeological services related to the development of a Well Rehabilitation Prioritization Plan, well rehabilitation master specifications, bid support, and baseline testing.

**Alternative Options:**

The Board’s only alternative is to continue with previous reactive maintenance.

**Impact of Taking No Action:**

The potential impact from taking no action is the reduction in water supply from the District’s groundwater wells, not fully utilizing the District’s water rights, and increased capital and operating costs.

**Background:**

The District owns, operates and maintains 23 active groundwater supply wells, which pump from the Antelope Valley adjudicated basin where the District is limited to just under 5,000 acre-feet per year (AFY). It is important to maximize this withdrawal each year due to the cost difference between pumped groundwater and the cost of State Project water and treatment. Having wells that can maximize the water right is an important goal of the District. A new well can cost over \$2 million and take up to 2 years to design and construct. This work will reduce capital and operating costs through proactive well rehabilitation. These wells were generally drilled between 1947 and 1992 and have depths from 400 to 1,000 feet with an average production capacity of a little over 550 gallons per minute (gpm), where flow rates range from 70 to 1,900 gpm. Over time, the capacities of these wells have generally decreased due to plugging of the well screens.

RESOURCE AND FACILITIES COMMITTEE  
PALMDALE WATER DISTRICT

ATTN: Mr. Adam Ly, Assistant General Manager  
Mr. Dennis D. LaMoreaux, General Manager

February 4, 2020

The program is to evaluate the District's existing wells to determine when a well has reached its useful life and a new well must be drilled to replace it. As part of the Well Rehabilitation Prioritization Plan, the plan will account for future wells near the future Palmdale Regional Groundwater Recharge and Recovery Project.

As a result, it is important that PWD establish a rehabilitation program to maximize the useful life of each well. The Well Rehabilitation Prioritization Plan project will provide an organized, comprehensive rehabilitation plan that will optimize the useful life of PWD's existing domestic water groundwater production assets, provide technical specifications, and development of a work plan for future well rehabilitation projects.

On January 15, 2020, staff received three proposals from Geoscience, Kyle Groundwater, and Wood Rodgers with Kennedy Jenks declining to submit a proposal. Proposals were independently evaluated by staff using evaluation criteria listed in the Request for Proposals. Based on the evaluations, Kyle Groundwater was selected as the top-ranked, most qualified firm.

**Strategic Plan Initiative/Mission Statement:**

This item is under Strategic Initiative No. 1 – Water Resource Reliability and No. 3 – Systems Efficiency.

This item directly relates to the District's Mission Statement.

**Budget:**

This item is budgeted under Budget Item No. 1-02-5070-007 – Consultants.

**Supporting Documents:**

- RFP Well Rehabilitation Prioritization Plan
- Kyle Groundwater Proposal



# PALMDALE WATER DISTRICT

A CENTURY OF SERVICE

December 19, 2019

## BOARD OF DIRECTORS

**ROBERT E. ALVARADO**

Division 1

**DON WILSON**

Division 2

**GLORIA DIZMANG**

Division 3

**KATHY MAC LAREN**

Division 4

**VINCENT DINO**

Division 5

---

**DENNIS D. LaMOREAUX**

General Manager

**ALESHIRE & WYNDER LLP**

Attorneys



## REQUEST FOR PROPOSALS FOR WELL REHABILITATION PRIORITIZATION PROGRAM

**TO: ATTACHED LIST**

**SERVICE REQUESTED: PREPARATION OF A WELL REHABILITATION PRIORITIZATION PLAN (PLAN) FOR PWD'S 25 WATER WELLS. THE PLAN WILL EVALUATE THE CONDITION OF EACH WELL, DEVELOP WELL REHABILITATION METHODS AND SPECIFICATIONS, PRIORITIZE THE REHABILITATION OF PWD'S ACTIVE WELLS AND ESTABLISH REHABILITATION GUIDELINES FOR EACH WELL.**

**PROPOSAL DUE DATE: JANUARY 10, 2020, 5:00 P.M. TO:**

**PALMDALE WATER DISTRICT  
ATTN: SCOTT ROGERS, ENGINEERING MANAGER  
2029 EAST AVENUE Q  
PALMDALE CA 93550**

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The Palmdale Irrigation District was formed in 1918 under the provisions of Division 11 of the Water Code of the State of California to supply irrigation water to the approximately 4,500 acres of agricultural land within its boundaries. Under this Code, the District's primary functions were, and continue to be, to acquire, control, conserve, store, and distribute water for the beneficial use of inhabitants and water users within the District.

The Palmdale Water District (District) is an independent special district governed by a five-member Board of Directors who serve the public by division. Special districts provide accountability and a means to vote selectively and provide customers the opportunity to express their preferences more precisely. The most basic virtue of a special district is to allow citizens to customize government to suit their needs.

REQUEST FOR PROPOSALS  
WELL REHABILITATION PRIORITIZATION PROGRAM

The District meets the demands of nearly 28,000 accounts or a population of 115,000 by providing water from groundwater wells and a 35 million gallon per day (MGD) surface water treatment plant that receives water from the State Water Project. The groundwater supply is an adjudicated basin where the District is limited to just under 5,000 acre-feet per year (AFY). It is important to maximize this withdrawal each year due to the price of State Project water and treatment. Having wells that can maximize the water right is an important goal of the District. The program is to evaluate the District's existing wells to determine when a well has reached its useful life and a new well must be drilled to replace it.

The District has also embarked on a significant project to start replenishing the groundwater basin with a combination of State Project water and recycled water. A joint powers authority was formed with the City of Palmdale to form the Palmdale Recycled Water Authority (PRWA). PRWA has worked with a consultant to determine the location of spreading basins and new wells to provide a potable water system into the future. Combining the objectives of the District and PRWA is another important project that must be considered in the evaluation of well placement in the future.

Attachments:

- Attachment 1 - Scope of Work
- Attachment 2 - Existing Well Profile Schematic
- Attachment 3 - Well Data Inventory Summary

Scope of Services:

The Palmdale Water District is seeking a firm to:

- Provide project management and quality control to produce the best quality product that can be used by the PWD in future years.
- Provide data analysis of existing PWD data and the necessary acquisition of data necessary to perform the data analysis.
- Provide the Well Rehabilitation Prioritization Plan and make recommendations.
- Develop well rehabilitation specification documents.
- Provide bid support services
- Initial Well and Performance Testing (Optional Services)

Proposals:

Proposals submitted shall include the following items:

- History of firm and qualifications of personnel assigned to the work
- Similar completed and current projects
- Project reference list with client contact information
- Fee estimate as identified in the scope of services

REQUEST FOR PROPOSALS  
WELL REHABILITATION PRIORITIZATION PROGRAM

- Timeline for completion of each task in the scope of services
- Additional value-added services

Evaluation of Proposals:

The following areas of evaluation will be considered, but not limited to, during review of the proposals:

- Experience and qualifications of assigned personnel;
- Approach and compliance with proposal requirements;
- Past record of performance on similar projects;
- Efforts related to project management, cost control, work quality, and ability to complete work timely;
- Previous project references.

Additional Information:

Additional questions to be directed to Scott Rogers, Engineering Manager:

(661) 456-1020  
srogers@palmdalewater.org.

Costs for developing proposals are the responsibility of the proposing firms. Palmdale Water District shall not be responsible for any costs associated with the development of proposals.

Palmdale Water District reserves the right to reject any or all proposals and to waive any informality or minor irregularity in any proposal.

**Well Rehabilitation Prioritization Program – RFP Company Distribution List:**

<b>Wood Rodgers, Inc.</b> Attn: Joshua Sobolew  (909) 670-7629 jsobolew@WoodRodgers.com	<b>Kyle Groundwater, Inc.</b> Attn: Russ Kyle  (626) 379-7569 Russel.kyle@kylegroundwater.com
<b>Geoscience</b> Attn: Chris Coppinger  ccopinger@geoscience-water.com	<b>Kennedy Jenks</b> Attn: Paul Chau  (626) 568-4311 PaulChau@kennedyjenks.com

**ATTACHMENT 1**  
**SCOPE OF SERVICES**

**Task 1 - Project Management and Quality Control**

The Consultant shall provide project management services, such as schedule management, budget management, sub-consultant coordination, and maintaining the quality of all work product consistent with applicable industry standards and the RFP.

The Consultant shall provide the following:

- Prepare for and attend the project kick off meeting.
- Prepare a Project Management Plan with team member contacts, schedule, fee/budget, and sample invoice.
- Prepare and submit monthly status reports including an updated project schedule, current status of the project tasks, and project financials.
- Prepare, schedule, and attend monthly progress meetings to review the current status of the Project.
- Prepare agendas and provide meeting minutes for all progress meetings. For each deliverable review, provide a review comment spreadsheet including Consultant's response and action on each review comment.
- Perform quality assurance and quality control (QA/QC) reviews for the Project.
- Coordinate and manage sub-consultant(s) as applicable

**Task 2 - Data Analysis and Data Acquisition**

The Consultant shall evaluate all PWD well records which may include:

- Well completion reports
- Well drilling logs
- Video survey logs
- Pump efficiency tests
- Pump curves
- Rossum sand tests
- Well spinner logs
- Water quality data
- Well maintenance records

A summary of available data for each well is included in Appendix B. The selected Consultant will be provided with this information after execution of a contract. The Consultant shall be responsible for the acquisition of any missing critical well data that is not currently available.

After the Data Analysis and Acquisition phase is complete, the Consultant shall prepare a condition assessment for each well. Finally, the Consultant shall submit a baseline efficiency and production summary report for each well. These findings will be further evaluated and summarized in the Well Rehabilitation Prioritization Plan report.

**Task 3 - Well Rehabilitation Prioritization Plan and Recommendations**

The Consultant shall develop a Well Rehabilitation Prioritization Plan to evaluate the condition of each well, develop well rehabilitation methods and specifications, prioritize the rehabilitation of PWD's active wells, and establish rehabilitation criteria and guidelines for each well. As part of the development of the plan, the Consultant shall develop criteria to rank the wells. The criteria can include, but not limited to,

**ATTACHMENT 1**  
**SCOPE OF SERVICES**

the following: well information, sand production, water quality, yield loss, increased capacity potential and supply significance to system operations.

This Plan will serve as the basis for the rehabilitation of PWD's wells in a proactive manner in order to maximize the useful life, production, and efficiency of each well. The Plan will also be used to develop and identify specific well rehabilitation methods and specifications for each well based on age, type of construction, water quality, and other related factors. The Plan will also provide recommendations for changes to PWD's current well design standards and specifications.

Based on the results of the condition assessment, the Consultant shall identify and prioritize wells for rehabilitation. The Consultant shall consider the feasibility of a successful rehabilitation method and provide a rehabilitation cost benefit analysis. The rehabilitation cost benefit analysis will consider the age of the well, condition of the screens, type of screen, water quality constraints, electrical equipment constraints, and well specific capacity constraints. Through discussions with PWD staff, specific well sites will be identified as critical to the PWD system.

Those well sites identified as not suitable for rehabilitation will be considered for future replacement based on criteria recommended by the consultant and approved by PWD staff. The Consultant shall also provide recommendations for preventative maintenance activities and schedule for each well.

The Consultant shall prepare a comprehensive Plan that includes all data collected, condition assessments, criteria used to determine the feasibility for rehabilitation and/or replacement, a ranked priority list for well rehabilitation, and a list of well site replacements. The Plan shall be structured in a way that it can be easily updated by PWD based on current well data, which would allow for an updated priority ranking to be generated after the project is completed. The report shall include a summary of rehabilitation methods and techniques that are applicable to PWD's well field.

The Plan shall also include a review of PWD's current domestic water well design standards and specifications and provide recommendations that will optimize future well operational efficiencies.

The Consultant shall provide a Draft Plan for PWD's review and comment. The Consultant will conduct three onsite workshop meetings at the 50%, 70%, and 90% completion levels to review the Draft Plan and obtain PWD's comments. After addressing PWD's comments, the Consultant shall prepare the Final Well Rehabilitation Prioritization Plan. The Consultant shall submit three (3) copies of the Final Plan along with the electronic working files (MS Word, Excel) and the final digital copy that allows PWD to update the well data and rankings. At the 90% level, Consultant will provide the necessary training to PWD staff to use the working files.

**Task 4 - Well Rehabilitation Specifications**

The Consultant shall prepare a set of technical specifications and associated details for each proposed well rehabilitation method. These methods may include mechanical rehabilitation methods such as surge block (single or double disk), brush, airburst, sonar-jet, etc., and/or chemical rehabilitation methods that use either mineral acids and/or organic acids. A protocol for removing the well from service and placing it back into service shall be included in the specifications.

The Consultant shall also prepare technical specifications for routine well maintenance activities that include, but are not limited to:

- Removal and inspection of pump and motor
- Pre-cleaning video inspection
- Cleaning alternatives

**ATTACHMENT 1**  
**SCOPE OF SERVICES**

- Post-cleaning video inspection
- Well pump and motor inspection with draft template report
- Re-assembly/re-installation of the pump and motor
- Pump test of well pump
- Other recommended activities

The Consultant shall provide three (3) copies of the Draft Specifications at the 70% and 90% completion phases for PWD's review and comment. The Consultant shall conduct two onsite workshop meetings at the 70% and 90% submittal phase to review the Draft Specifications and obtain PWD's comments. The Consultant shall submit three (3) copies of the Final Specifications along with the electronic files (both Microsoft Word and PDF format).

**Task 5 - Bid Support Services**

The Consultant shall prepare a complete set of technical specifications, bid schedule, and provide bid support services for the rehabilitation of the top three highest-priority wells as follows:

- Prepare Technical Specifications.
- Prepare the Project drawings, including all applicable standard drawings and other attachments
- Prepare Schedule of Pay Items
- Assemble the bid package
- Attend a pre-bid conference and assist PWD in conducting the conference
- If necessary, prepare addenda to interpret, clarify, and amend the bid documents.
- PWD will advertise the bid package through Planet Bids and will review and tabulate all bids. If necessary, the PWD Project Manager will prepare a Board Action Item and request Board approval.
- Consultant shall provide technical support throughout the duration of the well rehabilitation project on a Time and Materials basis.

**Task 6 - Baseline Testing Services (Optional Service)**

The consultant shall perform well and pump performance testing for up to six of PWD wells. The purpose of the testing is to collect and document the "baseline" condition of the wells, which were previously prioritized for rehabilitation and/or repair using the 90% well prioritization plan. The work shall consist of the following tasks.

- Consultant shall work with PWD to make a final decision on which six wells will be selected for performance baseline testing. Based on the preliminary results of the 90% submittal of the well prioritization plan, PWD will need to verify that the selected wells have operable pumping equipment, meters, gauges, a water sampling spigot, and a treaded port for a Rossum sand tester. In order to establish a representative static condition, the selected wells will not operate for a minimum of 12 hours prior to conducting the performance tests, and nearby wells that are known to influence water levels in the well being tested will not be pumped during the full duration of the performance test.
- Consultant shall collect data during well and pump performance testing for the six wells selected. The data will provide information about static and pumping water levels, sand production, and well and pump efficiency, which are necessary to document baseline conditions of the well and pump. Additionally, baseline water quality samples can be collected by PWD and submitted to the District's analytical laboratory if there are known water quality problems with a selected well. In order to complete the work for all six wells within two days (i.e., 3 wells per day), the pumping

**ATTACHMENT 1**  
**SCOPE OF SERVICES**

test will be one hour in duration. Consultant shall assume the PWD will coordinate and escort consultant's staff to each well site, perform all the tasks required to operate each well, and remain onsite during the duration of each performance test. Consultant shall provide the following equipment for testing: electric sounder, Rossum sand tester, and handheld water quality meters. The procedures for data collection during the well and pump performance test will include the following scenarios and steps:

**Under Non-Pumping Conditions**

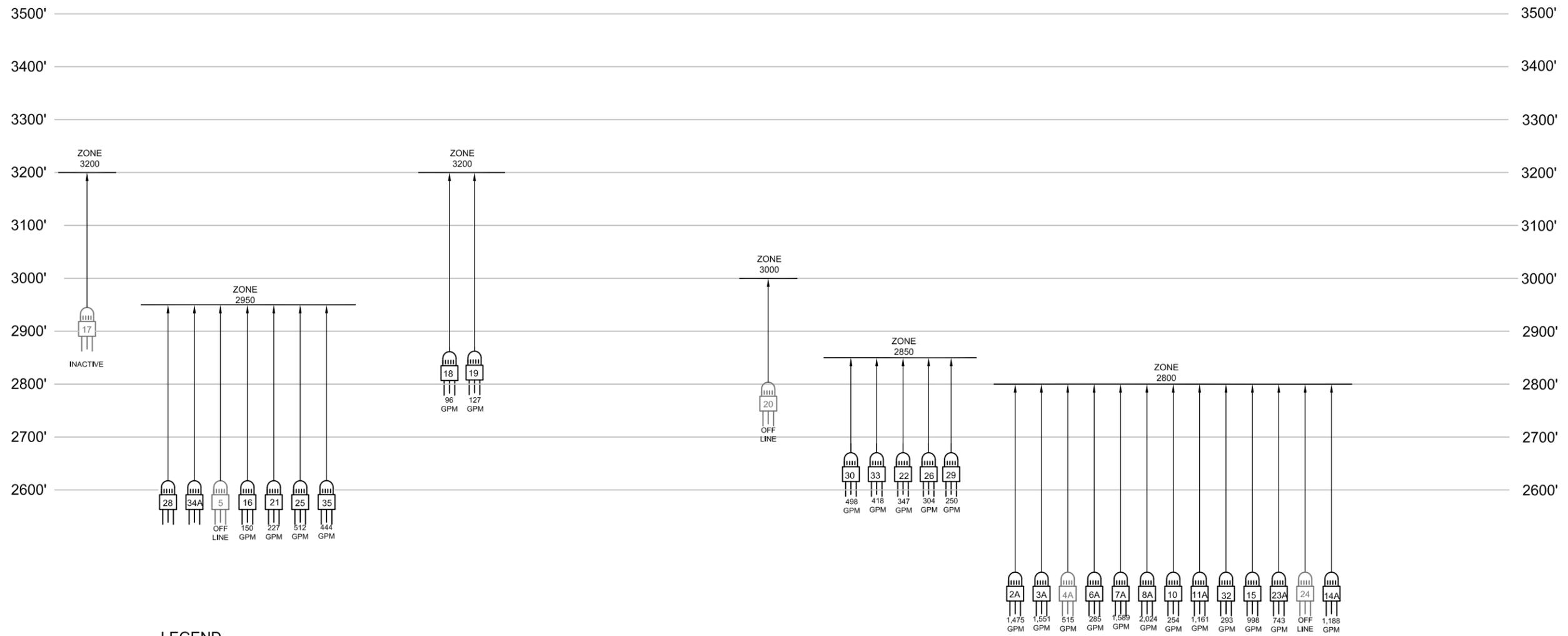
1. Verify that the well is not being operated.
2. Locate available port and install Rossum sand tester (clean and empty) onto the discharge pipe.
3. Identify an access tube (sounding or camera) that is suitable to collect static and pumping water levels in the well, and measure and record the stickup height to the nearest 0.01-foot.
4. Record depth to static water level to the nearest 0.01-foot.
5. Record flowmeter, discharge line pressure, and electrical meter values (under non-pumping conditions).
6. Locate water quality sampling port/spigot and verify that it is functioning properly.
7. Record recovering water levels (following 1-hour pump test).

**Under Pumping Conditions**

8. Measure and record elapsed time, pumping water levels, flow rate, flowmeter totalizer, drawdown from static water level, sand production, turbidity, discharge line pressure, revolutions per minute, and field water quality parameters.
9. If necessary, Consultant may need to collect water quality sample(s) and release to PWD for analysis.

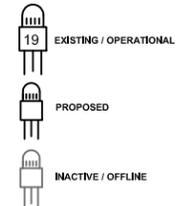
**Measurement Schedule**

- The times specified are elapsed times from when the pump is started or stopped.
- Elapsed time, water level (pumping and recovering), flow rate, and totalizer measurements will be collected. The anticipated measurements intervals will follow the schedule below:
  - 2, 4, 6, 8, 10, 15, 20, 25, 30, 40, 50, and 60 minutes.
- Sand production measurements will be made at the following times:
  - 5-minute intervals.
- Field parameters for electrical conductivity, total dissolved solids (TDS), pH, dissolved oxygen, temperature, and turbidity will be collected at the following times:
  - 15, 30, and 60 minutes.
- All measured data shall be recorded on field forms during each performance test and provided with all the calculation sheets to PWD.
- Upon completion of the well and pump performance testing, Consultant shall prepare a brief letter report summarizing the details of the work and results from the six selected wells. Data connected from the performance test will be analyzed to document the baseline condition of the well and pumping equipment.



**LEGEND**

**GROUNDWATER WELL**



Well No.	Location	Backup Power	hp	TDH	Normal Capacity (gpm)
2A	39400 20th Street East	Yes	400	733.9	1,475
3A	2163 E. Avenue P-8	Yes	500	747.4	1,551
4A	2475 E. Avenue P-8	Yes	200	733.5	777.5
5	1036 Barrel Springs Rd.	Yes	No SCE Tests Available		
6A	39455 10th Street East	No	125	727.6	285
7A	39395 25th Street East	Yes	500	752.0	1,589
8A	2200 E. Avenue P	No	600	763.3	2,024
10	3701 E. Avenue P-8	No	100	671.8	254
11A	39501 15th Street East	No		767.8	1,161
14A	39401 20th Street East	Yes	250	577.9	1,188
15	1003 E. Avenue P	No		793.5	998
16	4125 E. Avenue S-8	No	40	443.1	150
17	718 Denise Ave.	No	No SCE Tests Available		
18	4640 Barrel Springs Rd.	Yes	5	77.7	96
19	4640 Barrel Springs Rd.	Yes	5	87.9	127
20	5680 Pearblossom Hwy.	No	60	406.0	227
21	36525 52nd Street East	No	30	370.1	227
22	Avenue S/55th Street East	No	75	296.7	347
23A	2202 E. Avenue P-8	Yes	250	753.3	743
24	2701 E. Avenue P-8	No	No SCE Tests Available		
25	37520 70th Street East	Yes	75	406.4	512
26	4701 Katrina Pl.	No	50	434.1	304
28	Future Well				
29	37700 67th Street East	Yes	40	410.3	250
30	7392 E. Avenue R	No	150	453.2	498
32	37301 35th Street East	No	60	482.9	293
33	7160 E. Avenue R	No	75	497.2	418
34A	Future Well				
35	36549 60th Street East	No	75	453.5	444



**Palmdale Water District  
Existing Well  
Profile Schematic**

DECEMBER 2019

**Attachment 3  
Well Data Inventory Summary**

Well ID	Pressure Zone	Street Address	Pump & Motor Tests Records	Pump Curves and Motor Cut Sheets	Well Maintenance Records	Well Video Logs	Well Completion Reports	Well Design Drawings and Specs	Annual Operating Cost	Well Site Photos	Well Quality Data	Rossum Sand T. Data.	Well Spinner Log	Last Rehabilitation Year& Action Taken
2A	2800	39400 20 <sup>th</sup> St. East	12+	3	5	2 CD 4 VHS	1968	X	X	X	X	X	3	2010 Rehab pump and motor
3A	2800	2163 East Ave. P-8	12+	2	5	5 CDs 4 VHS	1960	X	X	X	X			2012 Rehab pump New motor 2016
4	2800	2475 East Ave. P-8	8+	1	1	7 VHS	1970	X	X	X	X		1	2001 Installed new pump & motor
5	2950	1036 Barrel Springs Rd.	2	4	1	1 VHS	Acquired in 1963							Removed from service in 2003
6A	2800	36455 10 <sup>th</sup> St. East	12+	2	6	6 CDs 4 VHS	1983	X	X	X	X	X	2	2018 Installed new pump and motor
7A	2800	39395 25 <sup>th</sup> St. East	12+	3	4	9 CD	1985	X	X	X	X	X	1	2018 installed new pump & column, Rebuilt motor
8A	2800	2200 East Ave. P	12+	2	4	7 CDs 1 VHS	1987	X	X	X	X	X	5	2017 Installed new pump & Rebuilt motor
9	2800	3347 East Ave. S.	2	1	2	3 VHS	Acquired in 1961 Abandon in 1997						Small part of a copy of 1	Abandoned
10	2800	3701 East Ave. P-8	12+	3	6	6 CDs 3 VHS	Org. 1928 to 297' 1947 to 696'	X	X	X	X	X	1	2017 Liner installed New pump & motor
11A	2800	39501 15 <sup>th</sup> St. East	2 SCG 2 SCE	2	6	10 CDs 5 VHS	1963	X	X	X	X	X		2011 Liner installed 2014 rebuilt pump & gearhead
12	2850	36824 N. 40 <sup>th</sup> St. East	1	2	0		Acquired in 1957? Abandon in 1991							Abandon / Tank is still onsite
14A	2800	39401 20 <sup>th</sup> St. East	10+	2	4	4 CDs	1965	X	X	X	X	X		2014 new pump w/ sand separator, rebuilt motor
15	2800	1003 East Ave. P	2 SCG 2 SCE	3	3	6 CDs	1960	X	X	X	X			2016/2017 rebuilt pump & gearhead
16	2850	4125 East Ave S-4	10+	3	4	3 CDs 4 VHS	1960	X	X	X	X	X		2010 new pump & motor
17	2900	718 Denise Ave.	4	3	2	2 VHS	1956		X	X				1997 Mineral fouling-removed from service
18	3000	4640 Barrel Springs Rd.	8+	2	3	2 CDs	1954	X	X	X	X	X		2016 New casing, pump & 3Hp motor
19	3000	4640 Barrel Springs Rd.	8+	2	1	2 CDs	1961	X	X	X	X	X		2013 installed new pump & 7.5hp motor
20	2950	5680 Pearblossom Hwy.	8+	1	1	1 VHS	Acquired in 1977 Drilled in 20's?	X	X	X	X			2010 casing failed during rehab
21	2950	36525 52 <sup>nd</sup> St. East	10+	3	3	2 CDs	1960	X	X	X	X			2013 new pump & motor
22	2850	5401 East Ave. S	8+	2	3	3 CDs 2 VHS	1974	X	X	X	X			2016 Installed new pump & motor
23A	2800	2202 East Ave. P-8	10+	1	4	3 VHS	1991	X	X	X	X	X	3	2012 Rebuilt pump & motor
24	2800	2701 East Ave. P-8	8+	2	2		1985	X		X			2	2004 Geological Plugging/ Drillers mud

**Attachment 3  
Well Data Inventory Summary**

Well ID	Pressure Zone	Street Address	Pump & Motor Tests Records	Pump Curves and Motor Cut Sheets	Well Maintenance Records	Well Video Logs	Well Completion Reports	Well Design Drawings and Specs	Annual Operating Cost	Well Site Photos	Well Quality Data	Rossum Sand T. Data.	Well Spinner Log	Last Rehabilitation Year& Action Taken
25	2850	37520 70 <sup>th</sup> St. east	10+	3	4	4 CDs	1989	X	X	X	X			2019 liner installed, 2016 New pump & motor
26	2850	4701 Katrina Place	10	2	3	3 CDs 6 VHS	1989	X	X	X	X	X	1	2016 Rebuilt pump & motor
27	2850	575' west of 70 <sup>th</sup> St. on R12				1 CD	1989			X			2	2008 Well Destruction
28	2850	1534' South of Ave. S / 650' West of 70 <sup>th</sup>	1				1989				X			Unequipped
29	2850	37700 67 <sup>th</sup> St. East	6	2	2	5 CDs	1989	X	X	X	X			2018 installed new pump & motor
30	2850	7392 East Ave. R	10	2	2	6 CDs	1989	X	X	X	X	X		2016 Rehab pump & Installed new motor
31		600' south of Palmdale / 50' West of 70th					1990			X	X		1	1991 Abandoned
32	2800	37301 35 <sup>th</sup> St. East	10	2	3	5 CDs	1990	X	X	X	X	X	1	2013 Installed new pump & motor
33	2850	7160 East Ave. R	10	2	2	5 CDs 1 VHS	1991	X	X	X	X		9	2008 Rebuilt pump, installed new motor
34	2850	3000' South of Ave. S / 101' West of Cannon Ct.			3		1992				X		2	Unequipped
35	2950	36549 60 <sup>th</sup> St. East	10	2	3	5 CDs	1992		X		X	X	10	2018 installed new pump & motor

Proposal  
**Professional Consulting Services  
to Develop a Well Rehabilitation  
Prioritization Program**



**PREPARED FOR:**  
**Palmdale Water District**  
**January 10, 2020**

 **KYLE Groundwater**  
557 E. Pasadena Street, Ste. 2  
Pomona, CA 91767 | 626-379-7569  
[www.kylegroundwater.com](http://www.kylegroundwater.com)



January 10, 2020

Mr. Scott L. Rogers, PE  
Engineering Manager  
Palmdale Water District  
2029 East Avenue Q  
Palmdale, CA 93550

**Re: Proposal to Provide Professional Consulting Services  
to Develop a Well Rehabilitation Prioritization Program**

Dear Mr. Rogers:

KYLE Groundwater, Inc. (KGI) is pleased to provide Palmdale Water District (PWD) with this proposal to provide professional consulting services to develop a well rehabilitation prioritization program. This proposal is in response to the Request for Proposal issued on December 19, 2019.

As principal-in-charge for this project, I can pledge that we are submitting this proposal as a statement of our commitment to provide the experienced leadership and expertise necessary to ensure successful development of a well rehabilitation prioritization program for the PWD. We have chosen DRP Engineering, Inc. (DRP) as our subconsultant to provide engineering support and quality assurance and control assistance for this project. Our team has a history of seamlessly working together on water infrastructure projects in Southern California, allowing for an efficient, integrated, and effective team.

We offer the PWD a group of highly qualified personnel with a deep understanding of this projects' needs, and possessing the know-how to successfully meet project goals. Our PIC/PM served as project manager during development of two (2) regional-scale well rehabilitation prioritization programs for the Long Beach Water Department and the City of Riverside which included thorough evaluation of approximately 90 wells. Additionally, he served as project manager and design lead for the Los Angeles Department of Public Works during installation of several municipal water supply wells in the Palmdale area.

We appreciate the opportunity to develop a mutually beneficial working relationship with Palmdale Water District and encourage you to contact our references to confirm the caliber of our work. Please do not hesitate to call should you require any additional information.

Sincerely,

Russell Kyle, PG, CHG  
President / Principal Hydrogeologist

KYLE Groundwater, Inc.  
557 E. Pasadena Street, Suite 2  
Pomona, CA 91767  
(626) 379-7569

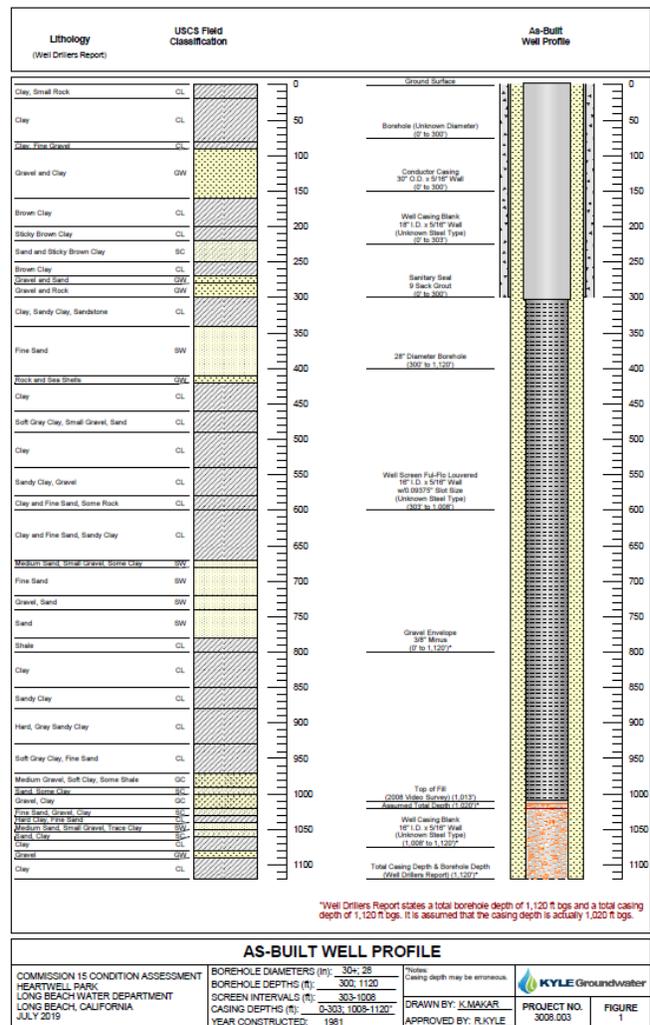
## SECTION I. PROJECT UNDERSTANDING AND APPROACH

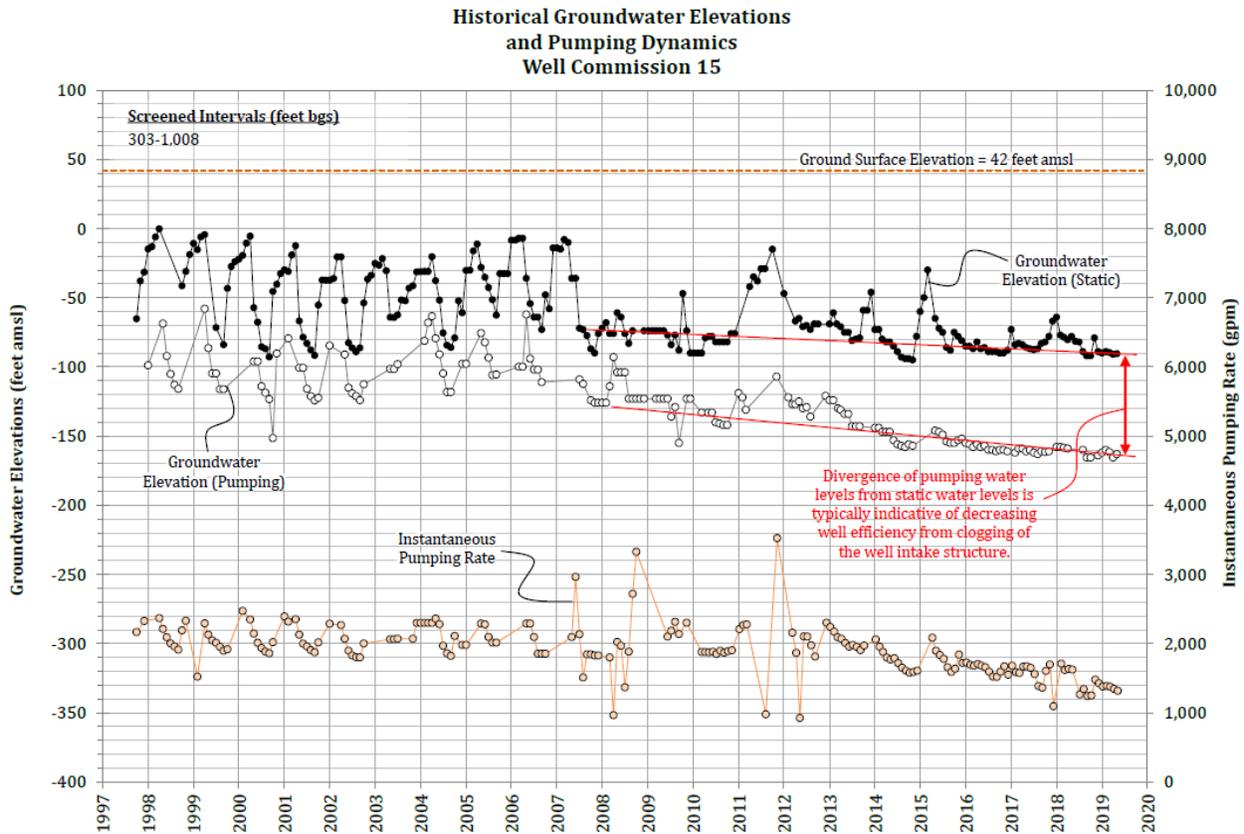
Palmdale Water District (PWD) meets the water demand of its almost 28,000 service connections through a combination of treated surface water from the State Water Project (SWP), and groundwater pumped from water supply wells. PWD's 23 active groundwater production wells account for approximately 40 percent of water supplied to its customers, the majority of which is pumped directly into the distribution system following disinfection. The remainder is disinfected, pumped into storage tanks, and boosted to nearby pressure zones. In addition to the wells, PWD's water storage and distribution system consists of 21 reservoirs, 17 booster stations, 14 pressure-reducing stations, and several hundred miles of pipeline.

Under the December 2015 adjudication of the Antelope Valley Groundwater Basin, PWD was assigned a groundwater production right of approximately 2,770 acre-feet per year (AFY), and a ramp down allowance through the year 2023. Additionally, PWD benefits from a share of unused water rights from the Federal Government in the amount of 1,370 AFY until the year 2025. Following 2025, PWD will be limited to pumping of the base water rights provided by the adjudication. However, PWD is also entitled to a return flow credit equal to 39.1% of all SWP water utilized by PWD, estimated to range from between 4,900 and 6,000 AFY.

It is our understanding that PWD's primary goal for this project is to prepare a roadmap to maximize local water supply sources and reduce reliance on costly imported water. This planning document will guide PWD in decision making for future well maintenance and well replacement projects designed to optimize and maintain production capacity. It will identify those wells that are in most need of rehabilitation and that stand the best chance for success at the lowest cost. It will also identify wells that should be operated to failure while planning for replacement.

Our systematic approach to well rehabilitation prioritization planning on a regional level is based on sound scientific principles and have been honed through years of experience with similar projects. The first step is to acquire all available well data from which to develop comprehensive histories for each well and pump, including tabular and graphical summaries of construction details, operational details, and historical performance dynamics. Additionally, it is critically important to meet with PWD's experienced operations personnel to query first-hand operational information that may not be available in written form. This is likely to include operational concerns such as sand or gravel production, air entrainment, breaking of suction, evidence of biofouling or encrustation on pumping components, structural issues, and past well rehabilitation efforts and results.



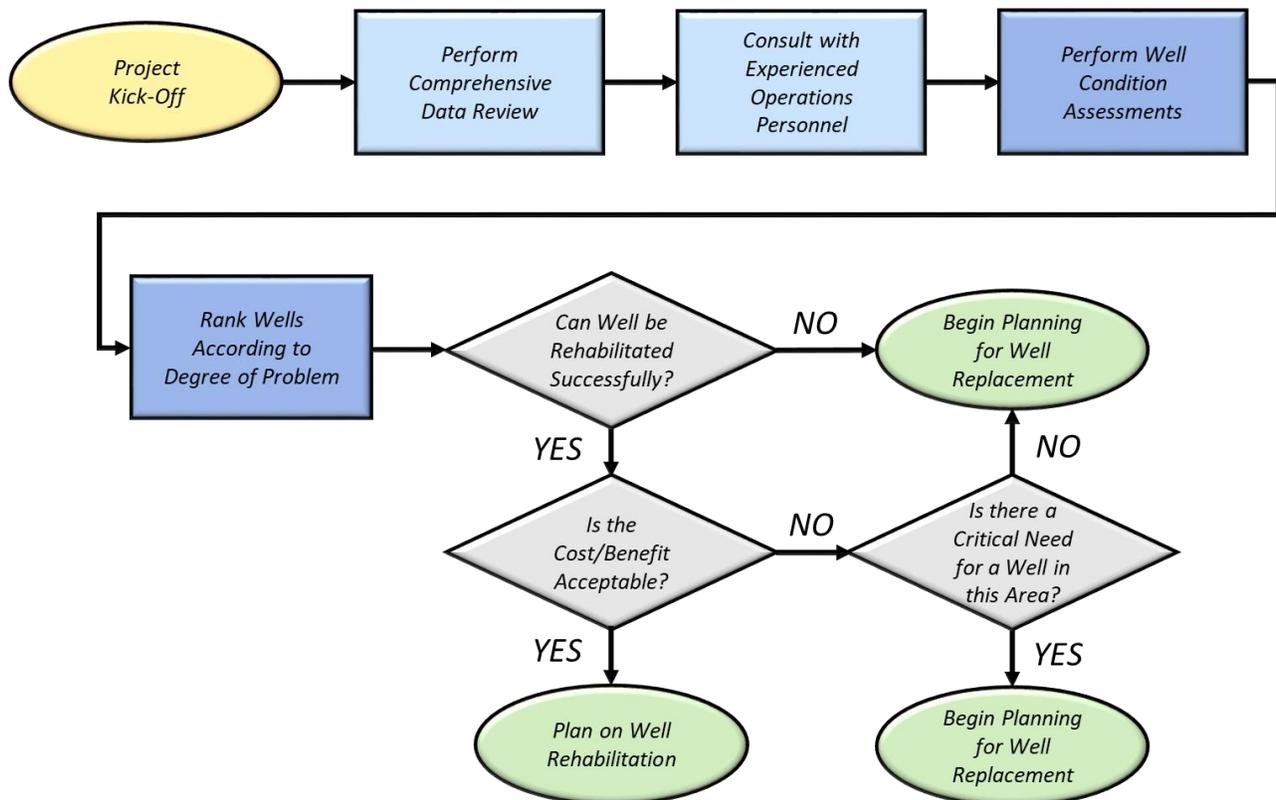


Condition assessments will then be prepared for each well based on the available information, primarily including visual information from historical downhole video surveys, and an evaluation of historical trends in well production parameters, including instantaneous pumping rate, specific capacity, and power consumption. The remaining useful life of each well will be estimated based on age, design, materials of construction, groundwater quality, pumping dynamics, and operational protocols. Pumping dynamics will be evaluated in the context of regional static and pumping groundwater elevations to identify causes of production loss and/or water level decline, as applicable. The three primary causes of declining well production are typically as follows:

1. Wells that exhibit stable static water levels, declining pumping water levels, and declining specific capacity are likely impacted by local degradation effects (i.e., well clogging, etc.).
2. Wells that exhibit declining static and pumping groundwater levels are likely impacted by regional groundwater level decline.
3. Wells that exhibit stable water levels and specific capacity, but declining production and/or increasing power consumption may be experiencing pump-related issues.

The process by which the wells are prioritized is summarized by the decision matrix shown on the following page. The condition of each well will be ranked relative to other wells based on a variety of criteria that will be assigned a raw criteria score and criteria weighting factor. The product of individual criteria scores and their respective weighting factors will result in a total weighted score and an overall ranking as to well condition. Those wells considered to be in the worst condition and with the greatest risk of structural failure would be ranked higher than wells in relatively good condition.

The wells will then be evaluated and ranked as to the probability of successful rehabilitation efforts and whether or not the benefit of rehabilitation outweighs the cost and risk. The probability of success will be based on many factors, including the degree of clogging, how long the condition has remained unchecked, suitability of the well design and condition to rehabilitation efforts, the degree of complexity and expense, and whether or not prior rehabilitation events have been successful. Those wells ranked higher on this list will be the wells most in need of rehabilitation that have the greatest probability of success at the least cost. A final consideration will be the importance of any particular well within the system, as determined by PWD, such as a well that serves as critical supply to a treatment plant and/or particular pressure zone. In these cases, wells ranked lower on the final ranked list may take precedence over other wells when considering plans for rehabilitation.



A subset of wells will ultimately be identified as having limited remaining useful service life, significant structural issues, and/or for which well rehabilitation efforts would be impossible or prohibitively expensive. In these cases, the recommendation would be to run the well to failure and proactively plan for replacement.

### ***Well Rehabilitation Considerations***

Each and every well is different, requires specialized care, and will respond differently to the various processes utilized during rehabilitation and redevelopment, and each well will undoubtedly present unforeseen complications during execution of the work. As such, well rehabilitation specifications should be tailored to each well on a case by case basis. We recognize however that there are major tasks that are generally included in the majority of well rehabilitation activities. These tasks will be included within our technical specifications with the intent that each task should be selected and refined to complement any particular well following a careful condition assessment.

Our recommended program of rehabilitation and redevelopment includes the following sequence of tasks that have been designed to effectively disperse mechanical and chemical energy throughout the well screen and near-well zone. In order to loosen and dislodge materials within the filter media and near-well zone, a mechanical brushing procedure is recommended. The brushes would consist of spirally-wound nylon, polypropylene or polyethylene bristles mounted on a 6-inch minimum diameter weighted core. It is recommended that the weighted brushes be attached to the sand line of a rig equipped with a variable-speed rotating arm capable of a minimum 6-foot continuous revolution (i.e., 12-feet of vertical movement) and 10 strokes per minute, thus providing a minimum of 120 feet of vertical movement per minute.

Following brushing, we recommend a program of pre-development through use of a focused intake pumping apparatus to open the gravel envelope and near-well zone in such a way as to allow effective penetration of chemicals. Following pre-development, a two-phase chemical cleaning program is employed, including application of chemical dispersant to further open up the gravel envelope and near-well zone, followed by chemical cleaning through use of acids and/or surfactants. All chemicals are applied to the well screen by injection into a surge block while simultaneously distributing the chemical. After an appropriate amount of contact time for the chemical, initial redevelopment will begin. Initial redevelopment will consist of focused-intake pumping through a 10-foot-long double surge block. This method has proven to be more effective than the more typical airlift development as high rates of continuous flow can be achieved through a relatively small interval of well screen.



Following initial redevelopment, the well will be redeveloped by pumping and surging with the goal of maximizing instantaneous production and specific capacity, and minimizing sand production.

The KGI team consists of local groundwater experts and have been successfully performing well siting, permitting, design, and inspection of well installation and rehabilitation projects for more than 20 years, including preparation of several regional-scale well rehabilitation planning documents. It is our mission to surpass project goals and exceed our clients' expectations by applying innovative thinking to develop optimal technical solutions for a project. Our general methodology is to combine our years of hard-earned experience with a scientifically based approach to produce a well rehabilitation planning document that will serve as a source of information and guidance for years to come, and developed in such a way as to become a living document that can be updated and revised as new information becomes available.

## **SECTION II. SCOPE OF WORK**

### ***1.0 Project Management and Quality Control***

The KGI team will prepare for and attend a kickoff meeting with PWD personnel to discuss the proposed scope of work. The primary objective of the project kick-off meeting will be to meet face-to-face with key members of the project team to make sure that the intent, objectives, tasks, budgets, schedules, milestones, deliverables, and data needs are properly understood and addressed. The kick-off meeting also introduces and identifies those individuals responsible for implementing each part of the work and provides a forum for discussion of critical-path tasks, and how those tasks can be efficiently executed. A Project Management Plan will be presented at the meeting and will include a baseline project schedule, contact information, budget table, and sample invoice. Pertinent members of the project team will attend up to nine (9) monthly project progress meetings, as necessary, throughout the duration of the project. Meeting agendas will be prepared for all project meetings and meeting minutes will be provided to PWD within five (5) working days. Monthly project progress reports will be submitted with all invoices, including a discussion of task progress, anticipated issues, and project schedule.

Sound hydrogeological and engineering criteria will be used throughout administration of the project and all data, calculations, conclusions, and interpretations will be vetted through a rigorous multi-level QA/QC process. Our project manager and applicable team members will identify problems as they arise and will provide timely recommendations regarding an appropriate response. Essential factors which determine the success of any given project include scope, schedule, and budget. We will effectively manage these three fundamental factors to bring the project to a successful conclusion both on schedule and within budget. Comment spreadsheets will be provided with each deliverable as a means of tracking comments received and actions taken.

### ***2.0 Data Acquisition & Analysis***

KGI will acquire and review readily available well and pump data, reports, published literature, and models pertaining to PWD's well field, including location of facilities, details of well construction, static and pumping groundwater levels, instantaneous pumping rates, specific capacity data, historical plant efficiency tests, flowmeter surveys, groundwater quality data, and existing well pump curves. Details of prior well modification, repair, and rehabilitation efforts will also be reviewed. Historical video surveys will be reviewed in an effort to directly evaluate any biological and/or chemical processes that may be occurring, and any structural issues that may be present. Additionally, KGI will meet with and interview PWD's experienced operations personnel to query first-hand operational information such as sand or gravel production, air entrainment, breaking of suction, evidence of biofouling or encrustation on pumping components, structural issues, and undocumented well rehabilitation/repair efforts and results.

KGI will review all data in the context of developing operational and condition assessments for each well from which detailed well histories and baseline summaries will be developed. These well histories will be presented to PWD for review and comment prior to proceeding with preparing the well rehabilitation prioritization plan.

### ***3.0 Well Rehabilitation Prioritization Plan & Recommendations***

KGI will utilize information and conclusions from the data review in Task 2.0 to assess, prioritize and rank the wells according to the methodology described in Section I. The plan will include all data collected presented in tabular and graphical formats (e.g., historical charts and well as-built drawings), condition assessments for each well, a description of the ranking and prioritization process (including justification of scoring and weighting), ranked priority lists, and a summary of rehabilitation methods and planning level costs pertinent to PWD's well

field. Ranking lists will be designed to be updatable by PWD personnel as conditions change (i.e., wells are rehabilitated and/or replaced). The plan will also include a review of current PWD well design standards in the context of well efficiency and longevity and provide comments and recommendations.

KGI will submit three (3) bound copies and an electronic (i.e., PDF) copy of the prioritization plan at the 50%, 70% and 90% DRAFT stage for review and comment. Workshops will be held at the PWD offices following submittal of each draft report to field questions and address comments before moving forward with subsequent versions. Upon incorporation of comments, three (3) bound copies of the FINAL plan will be provided along with native and PDF formats. Following submittal of the final plan, KGI will conduct a workshop for PWD personnel to provide training on future update and refinement of the plan.

#### ***4.0 Well Rehabilitation Technical Specifications***

KGI will prepare a comprehensive set of technical specifications for common well rehabilitation, redevelopment, testing, and maintenance procedures. It is proposed that these specifications will be presented in a modular fashion such that a bid-ready set of specifications can readily be assembled and combined with front-end documentation with minimal modification. Typical items to be included in the technical specifications will include the following:

- Pump removal and inspection
- Diagnostics
  - Efficiency testing
  - Pre-rehabilitation video surveys
  - CITM surveys
  - Depth-specific water quality sampling
  - Sidewall sampling and analysis
- Well casing repair
  - Patches
  - Liners
- Mechanical cleaning
  - Brushing
  - Jetting
  - Percussive
  - Bailing/airlifting
- Chemical cleaning
  - Surfactants and dispersants
  - Acids
  - Application methods
- Well redevelopment
  - Pre-development (prior to chemical cleaning)
  - Initial redevelopment by swabbing and pumping
  - Final redevelopment by pumping and surging
- Aquifer testing
  - Step drawdown test
  - Constant rate drawdown test
  - Recovery test
  - Flowmeter survey
- Post-rehabilitation downhole video surveys
- Well disinfection
- Repair and reinstallation of pump
- Startup testing



KGI will submit three (3) bound copies and an electronic (i.e., PDF) copy of both the 70% and 90% DRAFT versions of the plans and specifications to PWD for review and comment. Workshops will be held at the PWD offices following submittal of each draft report to field questions and address comments before moving forward with subsequent versions. Upon incorporation of comments, three (3) bound copies of the FINAL technical specifications will be provided along with native and PDF formats.

### **5.0 Bid Support Services**

KGI will prepare technical plans and specifications for rehabilitation, redevelopment, and testing of the three (3) top ranked production wells, assist PWD with modification of front-end contractual documents, prepare detailed bid schedules with specific line items showing units and unit quantities for the work, and will assemble the completed bid package and ready it for bidding. Engineer's estimates of construction costs will be prepared based on recent winning bids and materials costs for similar work within the Southern California area. Critical items to be included in the technical specifications typically include the following:

- Site requirements (i.e., preparation, noise monitoring and mitigation, dust control, waste disposal, BMPs, power, lighting, construction water source, security, sanitation facilities, staging, parking, and traffic control)
- Regulatory and permitting requirements
- Discharge requirements
- Hydrogeologic conditions
- Mobilization, demobilization, site preparation, preservation, and site restoration
- Equipment, materials, and records to be furnished by the contractor
- Pump removal, assessment, and storage procedures
- Preliminary diagnostic procedures (i.e., video and CITM surveys)
- Well rehabilitation procedures (mechanical and chemical)
- Well redevelopment procedures (pre-, initial and final)
- Aquifer testing
- Post-rehabilitation downhole video surveys
- Well disinfection
- Pump repair, modification, and reinstallation

KGI will submit a 100% DRAFT version of the bid package to PWD for review and comment in electronic format. Upon incorporation of comments, a FINAL bid-ready version of the technical specifications will be provided to PWD in native and PDF formats, including professional stamps and signatures.

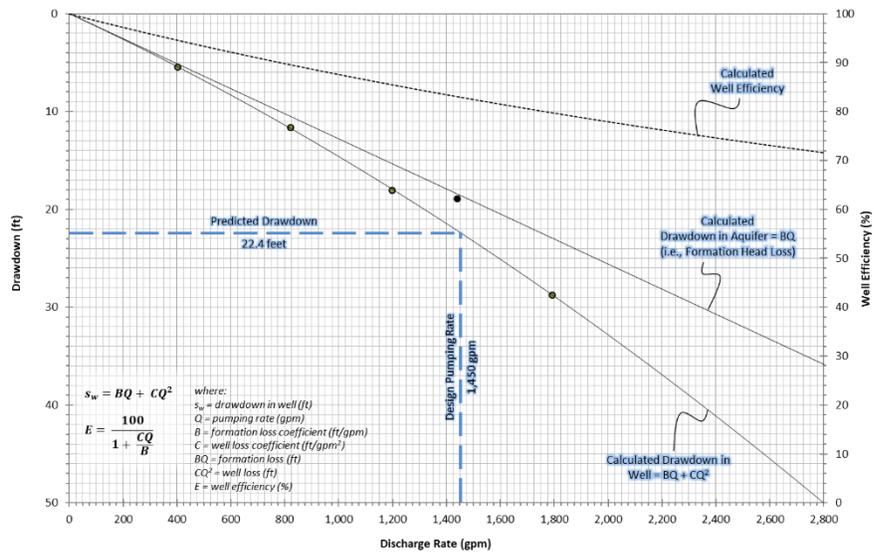
Upon entering the bid phase, KGI will prepare for and attend a pre-bid meeting with PWD and prospective drilling contractors to discuss key points within the technical plans and specifications, and to answer questions regarding site conditions, staging, preliminary well design, schedule and other hydrogeologic or contractual matters. During the bidding process, KGI will respond to bidder's questions and prepare bid addenda as necessary (assumes up to three [3] RFIs and addenda). Once the bidding process is complete, KGI will evaluate bids and will provide recommendations regarding award. KGI's project manager will be available to provide technical support throughout the duration of well rehabilitation on a Time and Materials basis.

### **6.0 Baseline Testing Services (Optional)**

KGI will provide optional services to conduct testing and data analysis (as described in the RFP) for up to six (6) wells identified by KGI and PWD within the 90% well rehabilitation prioritization plan. The purpose of this testing is to determine baseline well and pump efficiency from which gauge the success of any given well and/or pump rehabilitation event.

Well Efficiency

Well efficiency is a metric from which to judge well performance as measured by the ratio of actual specific capacity to theoretical specific capacity, and can be calculated by determining two components of head loss during pumping, 1) aquifer loss, and 2) well loss. The discovery by Henri Darcy in 1886 that groundwater flow within an aquifer is laminar and that head loss varies by the first power of the flow velocity and discharge rate allows for calculation of head losses within an aquifer during pumping at any given flow rate. Head loss from turbulent flow as groundwater moves through the gravel envelope and well screen openings is referred to as well loss and varies by the square of the velocity (i.e., discharge rate). Combining these terms results in the equation for total drawdown within an aquifer as follows:  $S_w = BQ + CQ^2$ , where  $S_w$  is total drawdown within the well,  $BQ$  is the head loss from laminar flow within the aquifer, and  $CQ^2$  is head loss from turbulent flow within the well intake structure. In order to calculate the aquifer and well loss coefficients, it is necessary to measure predictable drawdown trends in the well at differing pumping rates, as is accomplished through step drawdown aquifer testing. As such, it should be noted that the 1-hour test cycle stipulated in the RFP will not provide sufficient data from which to calculate well efficiency, and a test of approximately 2 to 3 hours will be needed. However, the goal of conducting three well tests in one working day is still achievable.



As such, it should be noted that the 1-hour test cycle stipulated in the RFP will not provide sufficient data from which to calculate well efficiency, and a test of approximately 2 to 3 hours will be needed. However, the goal of conducting three well tests in one working day is still achievable.

Pump Efficiency

The overall pumping plant efficiency (OPE) and is a measure of the efficiency of all pump components at the design pumping rate and total dynamic head. This parameter, sometimes referred to as wire-to-water, is calculated from the ratio of water horsepower to input horsepower. Water horsepower is the horsepower required to pump water against a specified head at 100% OPE. Input horsepower is calculated from data collected during efficiency testing. OPE testing can be conducted in conjunction with the well efficiency testing described above and will involve collecting an additional subset of data, including system pressures and power usage. OPE will be calculated for each of the step of the well efficiency testing described above.

Analysis and Reporting

KGI will provide field inspection and direction during testing and will provide the field equipment outlined in the RFP. We assume that the six (6) wells will be tested over a period of two (2) working days and that PWD will install the Rossum centrifugal sand tester (provided by KGI), and provide all necessary pumping equipment (i.e., flow control valves and system pressure meters), needed for testing. All data will be collected by KGI and recorded on standard field forms. Following testing, KGI will provide a brief letter report summarizing the work and presenting the calculated well and pump efficiency baselines.

### **SECTION III. STATEMENT OF QUALIFICATIONS**

**KYLE GROUNDWATER, INC.**  **KYLE Groundwater**

KYLE Groundwater, Inc. (KGI) is a California Corporation located in Pomona. Our company was founded in early 2018 by Mr. Russell Kyle in response to demand for experienced and innovative hydrogeological solutions from our Southern California clients. Since that time, we have established a local client base of seven water agencies and purveyors and are continuing to grow. We have a reputation of approaching each of our projects with fresh eyes and providing a superior and customized work product. Mr. Kyle, a Professional Geologist and Certified California Hydrogeologist, holds the philosophy that an honest, well-thought-out, innovative, and scientifically-based approach coupled with a high-quality work product, leads to successful projects. The number and variety of successful projects over the course of his career is testament to that fact. Over the course of his career, Mr. Kyle has provided hydrogeologic design, construction, and inspection services for over 145 new water supply wells and has successfully evaluated and rehabilitated dozens of wells to stabilize structural abnormalities, recover lost production and improve poor water quality.

#### **Water Wells**

- Siting
- Feasibility Studies
- Design
- Technical Plans & Specifications
- Construction Management
- Inspection
- Peer Review

#### **Groundwater Exploration**

- Exploratory Drilling
- Test Wells
- Monitoring Wells
- Depth-Specific Sampling
- Well Canvassing

#### **Permitting Support**

- Water Supply Studies
- Source Assessments
- Domestic Water Supply Permit
- NPDES
- Control Zone Compliance
- Setback Compliance

#### **Well Rehabilitation and Redevelopment**

- Well Condition Assessment
- Well Efficiency Testing
- Down-Hole Video Interpretation
- Flow Profiling
- Water Quality Assessment
- Mechanical and Chemical Treatment
- Well Modification
- Well Repair
- Liner Design
- Technical Plans & Specifications
- Construction Management
- Inspection

#### **Groundwater Basin Studies**

- Regional Studies
- Groundwater Quality Characterization
- Perennial Yield Estimates
- Artificial Recharge Feasibility
- Well Field Optimization
- Groundwater Protection

## **PROJECT EXPERIENCE**

Our team has the experience and expertise to deliver the highly-specialized hydrogeological and engineering services needed for this project. The following pages include a selection of reference projects that demonstrate a proven track record with recent project-relevant experience. Key members of our team outlined in this proposal held significant roles within these reference projects. The client references listed in this section can attest to the quality of our services, delivery capability, and our level of ownership. In addition to the projects presented on the following project summaries, key members of our project team were also instrumental in the following projects. This experience highlights the depth of knowledge and experience held by our team within southern California.

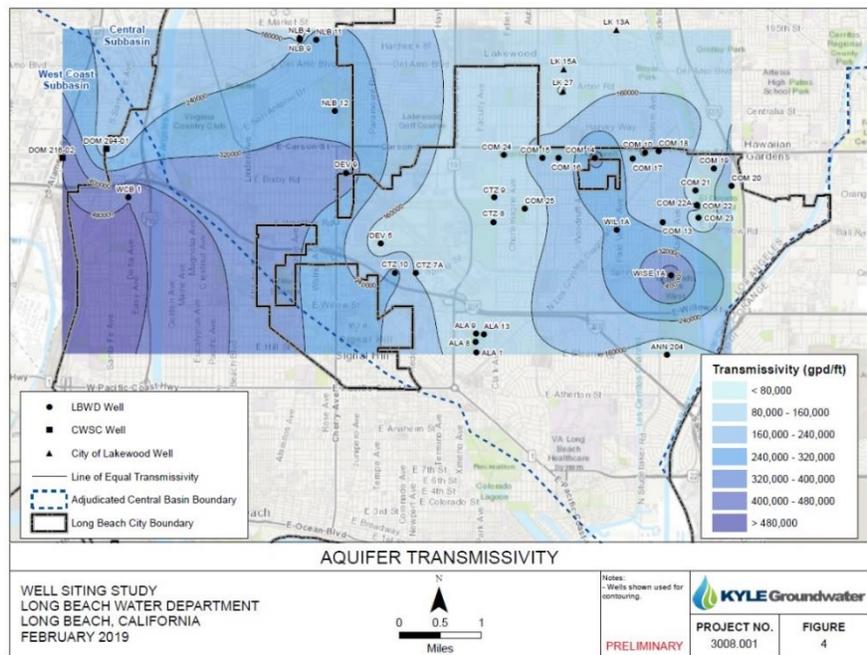
- **Development of a Well Rehabilitation Master Plan – Long Beach Water Department – Long Beach, California.** Mr. Kyle served as project manager and technical lead during development of a regional-scale well rehabilitation master plan which included condition assessment and prioritization ranking LBWD’s production well field, consisting of 31 active wells. This project identified those wells that were most likely to respond favorably to well rehabilitation at the least cost, in addition to identifying production wells that were at the end of their useful life and in need of replacement. This project was integral to a subsequent regional-scale well siting study and identification of well sites needed for replacement wells.
- **Development of a Well Rehabilitation and Replacement Program – City of Riverside Public Utilities - City of Riverside, California.** Mr. Kyle served as project manager and technical lead during development of a regional-scale well rehabilitation prioritization program for the City of Riverside Public Utilities well field, consisting of 55 actively pumping wells. This project involved a thorough evaluation and ranking of each well as to rehabilitation feasibility and estimated remaining well life. An additional component of the project was preparation of a standard well rehabilitation specification document, an evaluation of the City’s current monitoring network and protocols, and development of a ground water monitoring program.
- **Well Assessments – City of Riverside Public Utilities – Riverside, California.** Mr. Kyle performed well condition assessments and developed well rehabilitation recommendations for three (3) production wells for RPU (Van Buren 1 and 2, and the Stiles well). The well condition assessments included review of historical data, including multiple downhole video surveys, static and pumping groundwater levels, instantaneous pumping rates, specific capacity, and sand production. The data were analyzed to effectively evaluate the current condition of the three wells and develop programs for rehabilitation and redevelopment.
- **Rehabilitation of Citizens Well 7A and Commission Well 20 – Long Beach Water Department – Long Beach, California.** LBWD performed rehabilitation and redevelopment of two municipal water supply wells to restore lost production and improve efficiency. Mr. Kyle and Ms. Makar were key in providing construction management and inspection during the project. Rehabilitation of Well 20 was very successful and restored production to levels greater than when the well was first constructed, despite significant structural issues with the aging and corroded well casing and screen.
- **Downey Wells 2, 8, 11, 17, 18, and 29 Condition Assessment – City of Downey – Downey, California.** Mr. Kyle and Ms. Makar were key in performing condition assessments for three water supply wells and developing tailored well rehabilitation and retrofit programs. The evaluation included a review of well construction details, video surveys, performance characteristics, hydrogeological conditions, and well and pumping plant efficiency testing. Well rehabilitation consisted of mechanical and chemical cleaning followed by redevelopment and testing. Ms. Makar provided field inspection for successful rehabilitation of three (3) wells. In particular, Well 11 responded well and demonstrated a significant increase in plant efficiency and an estimated annual electrical savings of \$69,000 per year.

# LONG BEACH WATER DEPARTMENT

## COLLECTION MAIN AND NEW WELL SITE STUDY

Location:	Long Beach, CA
Personnel:	Russell Kyle, Project Manager Kimberly Makar, Hydrogeology/GIS
Client:	Long Beach Water Department
	Patrizia Hall, PE
	Patrizia.hall@lbwater.org
	562-570-2332
Completion Date:	Ongoing (Est. Completion: February 2020)

The Long Beach Water Department (LBWD) provides potable drinking water to the City of Long Beach from both groundwater and imported water sources. The majority of imported water is treated surface water sourced from the Metropolitan Water District of Southern California (MWD). The remaining portion, more than half of that supplied, is produced from groundwater wells that deliver water to the Long Beach Groundwater Treatment Plant (GWTP) via LBWD’s Groundwater Collection System, consisting of approximately 23 miles of pipeline. LBWD currently owns and operates 27 groundwater supply wells located throughout the city, not including two (2) recently constructed wells in the process of equipping.



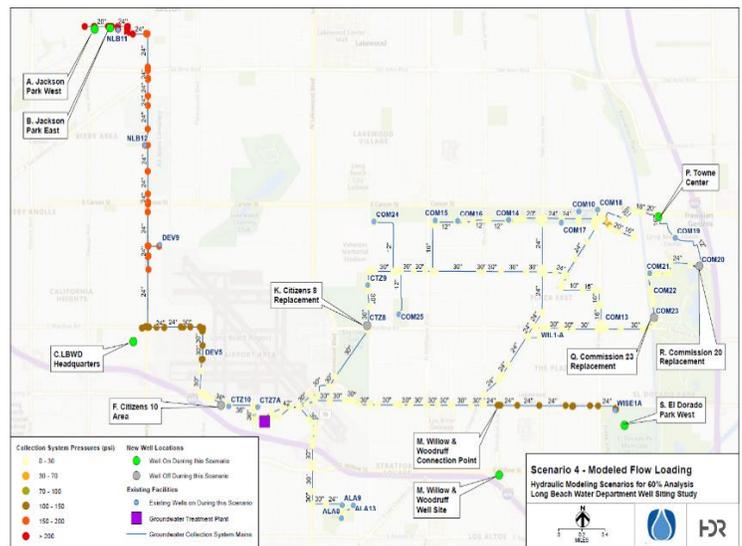
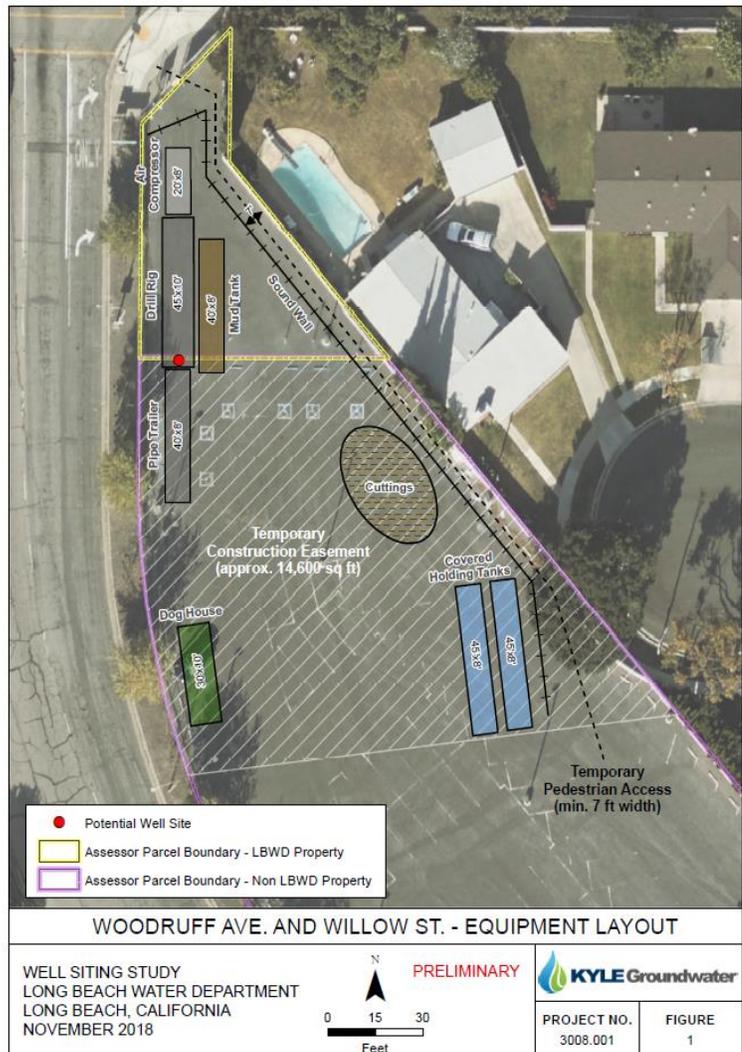
In an effort to increase water supply reliability, LBWD is seeking to optimize local water supply sources and maintain a production well field capacity of 32,692 acre-feet per year (AFY) by the year 2032. This represents LBWD’s current water rights allocation within the Central Basin. Optimization of these water rights will require rehabilitation of 19 existing wells to increase production from existing sources of supply, and construction of at least seven (7) new groundwater wells, not including LBWD’s two (2) most recent wells, both of which have been drilled and constructed, and are in the well equipping phase.

The purpose of this well siting study was to evaluate areas favorable for installation of new production wells within the Central and West Coast Basins and relatively close to existing LBWD collection mains, performing an

assessment of hydrogeologic and engineering feasibility, and an evaluation of how new wells can be incorporated into the groundwater collection system.

Groundwater quality and elevation data from nearby monitoring and production wells were analyzed, including five groundwater quality constituents. Buffers around sites of environmental concern, existing wells, and active hazardous liquid pipelines were used to eliminate possible areas for a new potable well. Potential sites were identified within areas that did not fall within those buffers and were within a one-mile radius of the collection main pipeline. Field reconnaissance will be performed to identify construction constraints at each potential well site. The sites were ranked based upon a scientific approach and weighted decision matrix. A short list of potential well sites were further assessed using by incorporating anticipated well locations and capacities into LBWD's hydraulic model to assess the ability of the system to accommodate additional flow from the new wells, including minimum and maximum capacity scenarios.

LBWD further requested KGI provide specific well siting and permitting support for a select group of wells such that construction and permitting feasibility could be assessed in more detail, and the possibility of moving the sites forward toward construction could be accelerated. This included field meetings with DDW representatives to discuss specific well location parameters, including sanitary setbacks, control zone requirements, and nearby potentially contaminating activities. A total of four (4) well sites have been budgeted by LBWD and two (2) well sites were immediately pushed forward to the design and construction phase. KGI is currently providing follow-on support to assess construction and permitting feasibility for a number of additional well sites.



## LONG BEACH WATER DEPARTMENT REHABILITATION OF WELLS CITIZENS 9 AND WILSON 1A

Location:	Long Beach, CA
Personnel:	Russell Kyle, Project Manager/Hydrogeologist Kimberly Makar, Field Inspection
Client:	Patrizia Hall, PE
	Patrizia.hall@lbwater.org
	562-570-2332
	Patrizia Hall, PE
Completion Date:	Est. ~ June 2020
Total Cost:	\$219,502

In an effort to increase local water supply reliability, the Long Beach Water Department (LBWD) is seeking to optimize local water supply sources and maintain a production well field capacity of 32,692 acre-feet per year (AFY) through the year 2032. This requires ongoing rehabilitation of existing wells to increase production from existing sources of supply, and construction of several new groundwater wells.

Rehabilitation of Wells Wilson 1A and Citizens 9 is part of the ongoing effort to maintain and optimize the capacity of local resources. The KGI team was tasked with resident engineering, and providing full-time construction management and inspection services. This included development of a well rehabilitation and redevelopment plan, evaluation of the existing pump and motor, and electrical and site upgrades.



Well Citizens 9 has been successfully rehabilitated and redeveloped from a historical low pumping rate of 166 gpm to approximately 1,000 gpm, a 500% increase. Likewise, the specific capacity of the well at those pumping rates has increased by 400% from approximately 2 gpm/foot to 10 gpm/foot.

## CITY OF RIVERSIDE PUBLIC UTILITIES WELL CONDITION ASSESSMENTS AND PEER REVIEW

Location:	Riverside, CA
Personnel:	Russell Kyle, Project Manager Kimberly Makar, Hydrogeology
Client:	City of Riverside Public Utilities
	Leo Ferrando
	Lferrando@riversideca.gov
	951-826-5694
Completion Date:	December 2018

KGI has recently performed well condition assessments and developed well rehabilitation recommendations for three (3) production wells for the City of Riverside Public Utilities (RPU). The well condition assessments included review of historical data, including multiple downhole video surveys, static and pumping groundwater levels, instantaneous pumping rates, specific capacity, and sand production. The data were analyzed to effectively evaluate the current condition of the two wells. Based on the findings and conclusions of the well condition assessments, a mild to moderate programs of well rehabilitation and redevelopment were recommended for two wells, while it was recommended to leave the third well alone due to severe structural issues.

One of the wells was found to be producing appreciable quantities of sand and gravel material which subsequently eroded holes within the pump column piping. Recommendations were provided to help assess the problem and modifications to the pump were recommended to mitigate sand production.

Additionally, KGI has provided professional peer review and served as RPU's representative during siting and design of a

new municipal water supply well in San Bernardino. Two pilot boreholes have been drilled and tested to determine a location and design adequate to meet water quality standards and production capacity. KGI has borehole lithology, geophysical borehole survey logs, isolated aquifer zone testing results, and well design recommendations provided by another consultant. Recommendations have been made regarding an appropriate well design that serves the best interest of RPU while minimizing capital cost.



## SUBURBAN WATER SYSTEMS

### PLANT 409 WELL 3 REHABILITATION, REDEVELOPMENT, AND TESTING

Location:	La Mirada, CA
Personnel:	Russell Kyle, Project Manager/Hydrogeologist Kimberly Makar, Field Inspection
Client:	Suburban Water Systems
	Jorge Lopez, PE
	jlopez@swwc.com 626-543-2518
Completion Date:	August 2018

Suburban Water Systems Plant 409 Well 3 has undergone repeated rehabilitation events to restore declining instantaneous production rates, although the exact nature of well and/or pump rehabilitation was not clear. KGI was tasked with assessing the condition of the well, developing a rigorous well rehabilitation and redevelopment plan, and providing recommendations for a well maintenance and operations plan to optimize pumping efficiency and minimize down time due to rehabilitation events.

Results of the evaluation revealed that the specific capacity of the well had declined from 32 gpm/foot to 7 gpm/foot. Bacterial growth was found to be a contributing factor to declining production and was likely exacerbated by both poor well screen design and continuous operation of the well under high drawdown conditions. A full rehabilitation program was developed and executed, including mechanical and chemical cleaning, redevelopment, and testing.

The project was completed successfully, on time and within budget, while coordinating with Suburban, and multiple contractors and regulatory requirements. The well rehabilitation and redevelopment program resulted in an increase in both instantaneous pumping rate and well efficiency.



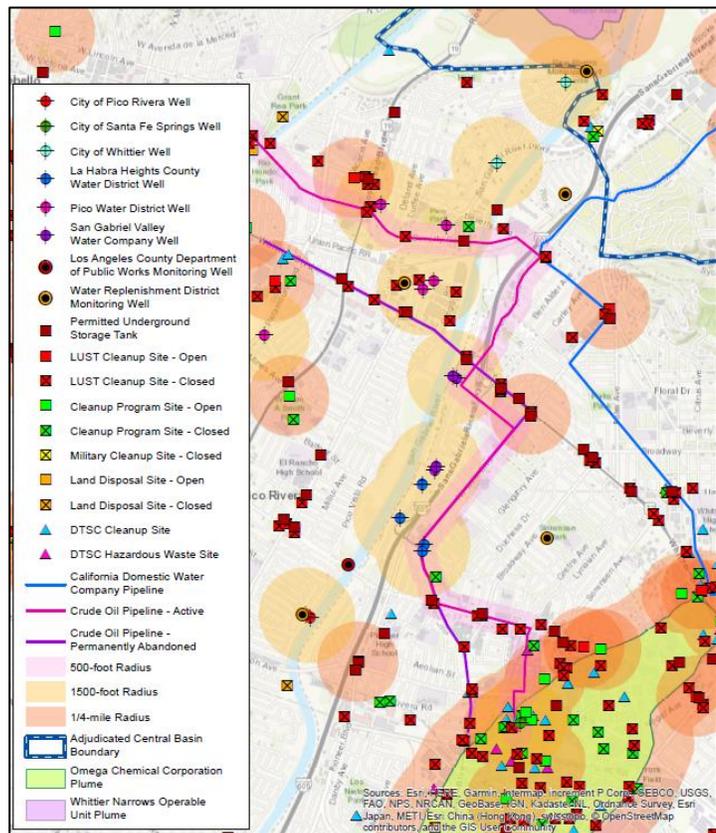
## PUENTE BASIN WATER AUTHORITY CENTRAL BASIN WELL SITING STUDY

Location:	Carson, CA
Personnel:	Russell Kyle, Project Manager/Hydrogeologist Kimberly Makar, Permitting/GIS
Client:	Puente Basin Water Agency
	Tom Coleman
	tcoleman@rowlandwater.com 562-697-1726
Completion Date:	December 2019

The Puente Basin Water Agency (PBWA) is a Joint Powers Authority consisting of Rowland Water District and Walnut Valley Water District that was formed to coordinate the development, utilization, and protection of water supply, with an emphasis on supply reliability and diversity. PBWA is seeking to develop a source of potable groundwater supply in the Whittier area of the Central Basin. This water will be conveyed through an existing California Domestic Water Company (Cal Domestic) transmission pipeline.

A Well Siting Study was conducted Spring 2018 to evaluate areas favorable for installation of new production wells within the Central Basin, and within relative proximity to the existing Cal Domestic pipeline.

Groundwater quality and elevation data from nearby monitoring and production wells were analyzed, including eight groundwater quality constituents. Buffers around sites of environmental concern, existing wells, active and abandoned oil pipelines, and known contaminant plumes were used to eliminate possible areas for a new potable well. Potential sites were identified within areas that did not fall within those buffers and were within a one-mile radius of the Cal Domestic pipeline. Field reconnaissance was performed to identify construction constraints at each potential well site. The sites were ranked based upon a scientific approach and weighted decision matrix. A detailed evaluation of the top two sites was performed and included a higher level of review for construction feasibility, design, and cost.



## **SOUTH MONTEBELLO IRRIGATION DISTRICT PERMITTING, DESIGN, AND INSTALLATION OF WELL NO. 8\***

Location:	Montebello, CA
Personnel:	Russell Kyle, Project Manager/Hydrogeologist Kimberly Makar, Permitting/GIS
Client:	South Montebello Irrigation District
	Jordan Betancourt
	j.betancourt@pacbell.net
	323-721-4735
Completion Date:	Ongoing (Est. Completion: February 2020)

Mr. Kyle was the technical lead for a new well installation to be located adjacent to the Rio Hondo Spreading Basins within the Montebello Forebay area of the Central Basin. An assessment of the proposed well site was conducted, including anticipated well capacity and groundwater quality, preliminary design, construction logistics, and identification of construction constraints and required permits.

Specific project tasks included preparation of a preliminary design report, technical plans and specifications, and comprehensive well permitting (including CEQA, NPDES, the Domestic Water Supply Permit Amendment, and DWSAP documents). Permitting proved challenging given that the well did not initially meet DDW's 50-foot control zone requirement but the well was ultimately permitted for drilling and operation and has entered the construction phase, for which KGI is currently providing construction management and inspection services.

Given the location of the well within the Montebello Forebay, PFOA and PFOS constituents are a very real problem. As such, KGI collected depth-specific samples during isolated aquifer zone testing such that an assessment of the concentration of these constituents from the completed well could be estimated. Sampling and analysis was successfully completed under very difficult conditions, resulting in representative results over a very short turn-around time. The well has been constructed and is anticipated to produce in excess of 3,000 gpm. Advanced knowledge of the presence of PFOA and PFOS within the groundwater has precipitated planning of a centralized treatment system.



\*Portions of preliminary design and permitting were performed by key team members while working with another firm.

## LONG BEACH WATER DEPARTMENT WEST COAST BASIN WELL 1\*

Location:	Long Beach, CA
Personnel:	Russell Kyle, Project Manager/Hydrogeologist Kimberly Makar, Field Inspection
Client:	Long Beach Water Department
	Patrizia Hall, PE
	Patrizia.hall@lbwater.org
	562-570-2332
Completion Date:	2017

The Long Beach Water Department (LBWD) installed a new potable water supply well in the westernmost portion of the City in an effort to take advantage of untapped groundwater rights within the West Coast Basin. This well is currently the only well within the system which will likely not be treated by LBWD's centralized water treatment facility as the well is located a significant distance from that facility. As such, the final well water quality was of paramount import.

A preliminary groundwater quality assessment for the area surrounding the well site was performed and potentially problematic constituents were identified prior to construction. Design, construction management, and inspection services were provided during the project. Despite significant constructability and logistical issues (e.g., noise constraints, discharge limitations, and small construction footprint), the well was successfully completed and was tested at 2,000 gpm with a specific capacity of approximately 100 gpm/ft.

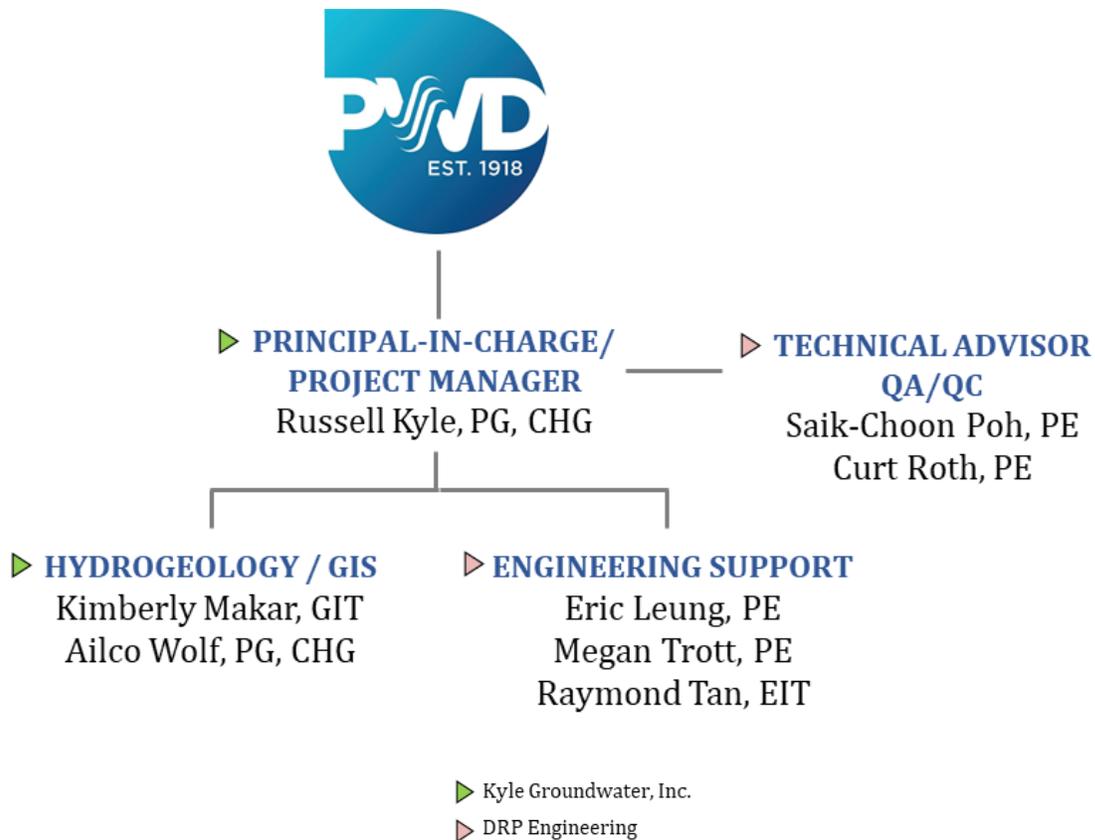


\*This project was performed by key team members while working with another firm.

## **SECTION IV. PROJECT TEAM**

This section outlines our team organizational structure, as well as the qualifications and responsibilities of our team's key members. Bringing more than 20 years of local water supply experience to this project, Mr. Russell Kyle will serve as our Principal-in-Charge (PIC) and Project Manager (PM) and will coordinate directly with PWD and other team members throughout the course of the project. Mr. Kyle has recent experience with successfully completing several regional-scale well rehabilitation prioritization projects and was the PM and lead during execution of similar projects for the Long Beach Water Department and City of Riverside. We have subcontracted with DRP Engineering for supporting project management. Mr. Curt Roth of DRP Engineering will serve along with Mr. Saik-Choon Poh as technical advisor and QA/QC review. All work will be conducted by or under the direct supervision of a California Professional Geologist (PG), Certified Hydrogeologist (CHG), and/or Professional Engineer (PE).

Each member of our project team is identified in the organizational chart below along with their respective roles for this project. Brief biographical sketches for key personnel are included in the following pages and resumes are included in Attachment A. Each member of our team will be available for the duration of the project and will not be reassigned without prior written approval from PWD.



## **RUSSELL KYLE, PG, CHG**

### ***PROJECT MANAGER (KYLE GROUNDWATER)***

*Project Responsibilities: Mr. Kyle will provide project management and be the contact with PWD's Project Manager throughout the entirety of the project. He will coordinate with staff and subconsultants on a regular basis to ensure the project is completed on time, within budget, and is of the utmost quality.*

Mr. Kyle has 20 years of experience with a wide variety of groundwater resource related projects for public and private clients within the western United States, Mexico, and Africa, with a focus on groundwater resources development in Southern California. The scope of his technical experience includes groundwater basin evaluations, water supply studies, well siting investigations, artificial recharge feasibility evaluations, well field condition assessments, well rehabilitation, desalination feedwater supply studies, and geophysical surveys. Over the course of his career he has been responsible for siting and installation of more than 145 water supply wells and 70 monitoring wells and exploratory borings, including management of field inspectors, coordination with drilling contractors and regulatory agencies, permitting, well design, and construction management. He served as PM and project lead during preparation of large-scale regional well rehabilitation prioritization studies for the Long Beach Water Department and City of Riverside and is currently working on a regional-scale well siting study for Long Beach Water Department. Mr. Kyle will bring that knowledge and proficiency to bear in support of this project.

*References: Ms. Patrizia Hall, PE  
Division Engineer  
Long Beach Water Department  
562-244-9195*

*Mr. Ronald A. Sorensen, PG, CHG, PGP  
Water Resource Manager  
California Water Service Company  
310-257-1487*

## **SAIK-CHOON POH, PE**

### ***TECHNICAL ADVISOR AND QA/QC (DRP)***

*Project Responsibilities: Mr. Poh will serve as technical advisor and will provide quality assurance to the project.*

Mr. Poh specializes in environmental and civil engineering and has experience in water, stormwater, and wastewater conveyance and treatment facilities. Mr. Poh has served as a senior manager in the water industry for 15 years and has successfully managed and led project teams that have developed and delivered a wide range of projects from feasibility studies, master plans, predesigns, detailed designs and services during construction. Mr. Poh, who is NASSCO certified, has substantial recent design and construction management experience and has recently served as project manager on two ongoing On-Call Water Main contracts.

## **KIMBERLY MAKAR, GIT**

### ***HYDROGEOLOGY / GIS / INSPECTION (KYLE GROUNDWATER)***

*Project Responsibilities: Ms. Makar will work with Mr. Kyle to provide supporting hydrogeology, GIS, and inspection.*

Ms. Makar is a geologist with seven years of experience in the water resource and mining industries. She began her career as a manager of the dewatering program at an open-pit copper mine in Nevada, for which she was responsible for developing and executing multi-million-dollar groundwater dewatering programs. Since 2014 she has been providing professional consulting services to the water resources industry in Southern California with an emphasis on new well installation and well rehabilitation. She is currently providing technical support for a regional well siting study in the Long Beach and Lakewood area, and is providing CMI during rehabilitation of two municipal water wells in Long Beach. She will bring that local knowledge and experience to bear on this project.



## **SECTION VI. FEE PROPOSAL & RATE SCHEDULE**

We pride ourselves on providing innovative hydrogeological and engineering solutions to our clients and are confident we can provide PWD with a successful well rehabilitation prioritization project that will result in a valuable planning document for years to come. Our cost proposal is inclusive of all anticipated costs, includes a work plan with a breakdown of labor by project task, and is included on the following page. The following rate schedule serves as the basis for our cost proposal.

<b>Labor Classification</b>	<b>Hourly Rate</b>
Technical Advisor / QA/QC	\$190
Principal Hydrogeologist	\$165
Principal Engineer	\$165
Project Hydrogeologist	\$135
Staff Hydrogeologist	\$125
Project Engineer	\$120
GIS Technician	\$115
Field Inspector	\$105
Clerical	\$75

### **Non-Labor Charges:**

Mileage = \$0.575 per mile (i.e., the allowable IRS rate)

Field visit (day) = \$30

Field visit (overnight) = \$120

Transducer rental = \$25 per day

Rates subject to change effective January 1, 2021.

**PALMDALE WATER DISTRICT**  
**Cost Proposal to Provide Professional Consulting Services to Develop a Well Rehabilitation Prioritization Program**

		Principal Hydrogeologist	Project Hydrogeologist	Staff Hydrogeologist	GIS Technician	Field Inspector	Clerical	Technical Advisor	Principal Engineer	Project Engineer	Labor	Direct Costs	Total Cost
<i>Hourly Rate:</i>		\$165	\$135	\$125	\$115	\$105	\$75	\$190	\$165	\$120			
<b>1.0 PROJECT MANAGEMENT AND QUALITY CONTROL</b>													
1.1	Prepare for and attend project kick-off meeting and up to nine (9) progress meetings.	40	20					12	12		\$ 13,560	\$ 1,220	\$ 14,780
1.2	Provide for project management, including monthly progress reports and QA/QC.	24	24	12				12			\$ 10,980	\$ -	\$ 10,980
<b>2.0 DATA ACQUISITION AND ANALYSIS</b>													
2.1	Acquire and review available well and pump data, interview operations personnel, prepare well histories for 23 wells.	24	40	40	24			8	16	16	\$ 23,200	\$ 122	\$ 23,322
<b>3.0 WELL REHABILITATION PRIORITIZATION PLAN</b>													
3.1	Prepare well rehabilitation prioritization plan (assumes 50%, 70%, 90% Draft and 100% Final).	40	40	60	24		8	12	16	16	\$ 29,700	\$ 400	\$ 30,100
3.2	Prepare for and conduct three (3) workshops at PWD for each draft report.	18		9					8		\$ 5,415	\$ 366	\$ 5,781
<b>4.0 WELL REHABILITATION TECHNICAL SPECIFICATIONS</b>													
4.1	Prepare well rehabilitation specifications (assumes 50%, 70%, 90% Draft and 100% Final).	40	60	80	16		8				\$ 27,140	\$ 400	\$ 27,540
4.2	Prepare for and conduct three (3) workshops at PWD for each draft specification.	18		9							\$ 4,095	\$ 366	\$ 4,461
<b>5.0 BID SUPPORT SERVICES</b>													
5.1	Assemble technical specifications for rehabilitation of three (3) wells.	20	24	24	12		4				\$ 11,220	\$ 200	\$ 11,420
5.2	Provide assistance during bidding, including attendance at pre-bid meeting, response to RFIs and RFCs, preparation of addenda, and recommendations of award.	12	16								\$ 4,140	\$ 122	\$ 4,262
<b>TOTAL HOURS AND COST (NON-OPTIONAL):</b>		<b>236</b>	<b>224</b>	<b>234</b>	<b>76</b>		<b>20</b>	<b>44</b>	<b>52</b>	<b>32</b>	<b>\$ 129,450</b>	<b>\$ 3,196</b>	<b>\$ 132,646</b>
<b>6.0 BASELINE TESTING SERVICES (OPTIONAL)</b>													
6.1	Conduct baseline well and pump efficiency testing and analysis, and prepare brief letter report.	12		16		24					\$ 6,500	\$ 846	\$ 7,346
<b>TOTAL COST (OPTIONAL):</b>		<b>12</b>		<b>16</b>		<b>24</b>					<b>\$ 6,500</b>	<b>\$ 846</b>	<b>\$ 7,346</b>
<b>TOTAL HOURS AND COST:</b>		<b>248</b>	<b>224</b>	<b>250</b>	<b>76</b>	<b>24</b>	<b>20</b>	<b>44</b>	<b>52</b>	<b>32</b>	<b>\$ 135,950</b>	<b>\$ 4,042</b>	<b>\$ 139,992</b>

KYLE Groundwater, Inc.  
 DRP Engineering, Inc.

# **ATTACHMENT A**

## **Resumes**



**TITLE**

Principal Hydrogeologist

**REGISTRATIONS/  
CERTIFICATIONS**Registered Professional  
Geologist, California  
No. 7648Certified  
Hydrogeologist,  
California No. 822**EDUCATION**MS, Environmental  
Hydrogeology,  
California State  
University – Los  
Angeles, 2006BS, Geology, California  
Polytechnic University –  
Pomona, 1996**PROFESSIONAL  
AFFILIATIONS**American Water Works  
Association – Chair of  
CA/NV Water Well  
Technology CommitteeVoting Member of the  
American Water Works  
Association National  
Well Standards  
Committee

Mr. Kyle has 20 years of experience with a wide variety of groundwater resource related projects for public and private clients within the western United States, Mexico, and Africa, with a focus on groundwater resources development in Southern California. The scope of his technical experience includes groundwater basin evaluations, water supply studies, well siting investigations, artificial recharge feasibility evaluations, well field condition assessments, well rehabilitation, desalination feedwater supply studies, and geophysical surveys. Over the course of his career he has been responsible for installation of more than 145 water supply wells and 70 monitoring wells and exploratory borings, including management of a team of field inspectors, coordination with drilling contractors and regulatory agencies, well design, and construction management. Recent notable projects include installation of a potable water supply wells for California Water Service Company, Golden State Water Company, and Long Beach Water Department, and development of well rehabilitation, replacement, prioritization plans for the Long Beach Water Department, California Water Service Company, and City of Riverside. He is also active within the water resources community and is currently serving as Chair to the AWWA CA-NV Water Well Technology Committee, and as a voting member of the AWWA National Well Standards Committee.

**SELECTED EXPERIENCE**

**Development of a Well Rehabilitation Master Plan – Long Beach Water Department – Long Beach, California.** Mr. Kyle served as project manager and technical lead during development of a regional-scale well rehabilitation master plan which included condition assessment and prioritization ranking LBWD’s production well field, consisting of 31 active wells. This project identified those wells that were most likely to respond favorably to well rehabilitation at the least cost, in addition to identifying production wells that were at the end of their useful life and in need of replacement. This project was integral to a subsequent regional-scale well siting study and identification of well sites needed for **replacement wells**

**Development of a Rehabilitation and Monitoring Program – Riverside Public Utilities - City of Riverside, California.** Mr. Kyle provided project management and technical support for development of a rehabilitation program for the City of Riverside Public Utilities well field, consisting of 55 actively pumping wells. This project involved a thorough evaluation and ranking of each well as to rehabilitation feasibility and estimated remaining well life. An additional component of the project was an evaluation of the City’s current monitoring network and protocols, and development of a ground water monitoring program.

**Rehabilitation of Citizens Well 9 and Wilson Well 1A – Long Beach Water Department – Long Beach, California.** Mr. Kyle is serving as project manager to provide construction management, inspection, and engineering services during rehabilitation of two municipal water supply wells. The project includes physical and chemical cleaning of each well, redevelopment and testing, and retrofitting of the well pump, motor, and electrical.

**Rehabilitation of Citizens Well 7A and Commission Well 20 – Long Beach Water Department – Long Beach, California.** Mr. Kyle served as project manager provide construction management, inspection, and engineering services during rehabilitation of

two municipal water supply wells. The project included physical and chemical cleaning of each well, redevelopment and testing, and retrofitting of the well pump, motor, and electrical. Rehabilitation of Well 20 was successful despite significant structural issues with the aging and corroded well casing and screen, and resulted in greater performance than when the well was constructed.

**Well Assessments – City of Riverside Public Utilities (RPU) – Riverside, California.** Mr. Kyle performed well condition assessments and developed well rehabilitation recommendations for three (3) production wells for RPU (Van Buren 1 and 2, and the Stiles well). The well condition assessments included review of historical data, including multiple downhole video surveys, static and pumping groundwater levels, instantaneous pumping rates, specific capacity, and sand production. The data were analyzed to effectively evaluate the current condition of the three wells and develop programs for rehabilitation and redevelopment.

**Wells W and Z – Indio Water Authority – Indio, California.** Mr. Kyle an evaluation of Wells W and Z with the goal of assessing the feasibility of reducing hexavalent chromium concentrations below the California MCL through well modification rather than application of expensive water quality treatment. The work involved time-series, variable-flow, and depth-specific water quality and flow profile testing. Results suggested that well modification may result in a positive outcome which led to follow-on verification testing through use of inflatable pneumatic packers. This testing also indicated that favorable results could be achieved but further work was placed on hold due to revocation of the MCL.

**Wells 3B and U – Indio Water Authority – Indio, California.** Wells U and 3B had been out of service and idle for several years due to elevated hexavalent chromium. IWA decided to put the wells back in service when the 10 ug/L MCL was rescinded and Mr. Kyle was tasked with evaluating the wells and preparing a recommended course of action and associated work plan to rehabilitate and redevelop the wells. A plan for evaluating depth-specific water quality was also developed as it is the desire of IWA to evaluate the wells as to feasibility of improving water quality by well modification should the hexavalent chromium MCL be reinstated. Both wells have been successfully rehabilitated.

**Well No. 9 Efficiency Testing – City of Torrance – Torrance, California.** Mr. Kyle conducted well and pumping plant efficiency testing on a well which was exhibiting a decline in production capacity. Results of the testing revealed the pumping plant to be operating efficiently but a low well efficiency, likely due to clogging of the well intake structure, gravel envelope, and near-well zone. Recommendations were provided regarding an appropriate course of action.

**Plant 409 Well 3 Rehabilitation and Redevelopment – Suburban Water Systems – La Mirada, California.** Mr. Kyle provided groundwater expertise to evaluate historical well data and develop a plan for rigorous well rehabilitation and redevelopment of an important water source in La Mirada, California. Results of the evaluation revealed that the efficiency of the pumping plant had declined significantly, likely due to clogging of the gravel envelope and near-well zone due to bacterial growth, poor design, and continuous operation of the well under high-drawdown conditions. Recommendations were provided regarding an appropriate course of action. A full rehabilitation and

redevelopment program was developed, including mechanical and chemical cleaning, redevelopment, and testing. Well rehabilitation resulted in an increase in instantaneous pumping rate and well efficiency.

**Well No. 9 Rehabilitation and Redevelopment – City of Torrance – Torrance, California.** Mr. Kyle conducted well and pumping plant efficiency testing on a well which was exhibiting a decline in production capacity. Results of the testing revealed an efficiently operating pump but very low well efficiency, likely due to clogging of the well intake structure, gravel envelope, and near-well zone. A full rehabilitation and redevelopment program was developed, including mechanical and chemical cleaning, redevelopment, testing, and pump refurbishment, and is currently underway at the direction of Mr. Kyle. Well rehabilitation resulted in a doubling of well efficiency from 31% to 69% and a 33% increase in specific capacity.

**Santa Maria Mira Flores Well No. 2 – Golden State Water Company – Santa Maria, California.** Mr. Kyle performed a detailed assessment of a water supply well that developed several holes within the blank well casing adjacent to a coarse-grained aquifer. The purpose of the evaluation was to assess possible water quality changes in the well due to the casing holes, and to develop a cost effective plan for a long-lasting repair. The evaluation includes a review of well construction details, performance characteristics, hydrogeological conditions, historical groundwater quality, downhole video surveys, and CITM surveys. Ultimately, the recommendation was to leave the well in its current condition as the risk of damage through the repair process was too great.

**Los Osos Rosina Well No. 1 – Golden State Water Company – Los Osos, California.** Mr. Kyle conducted a detailed assessment of a water supply well that has suffered from a sharp decline in specific capacity. The assessment includes an evaluation of well condition, historical performance data, water quality, and well and pump efficiency testing. The purpose of the assessment is to develop a well rehabilitation and redevelopment scope of work suitable for obtaining contractor cost estimates.

**Lancaster Wells 1-01 and 1-03 Condition Assessment – California Water Service Company – Lancaster, California.** Mr. Kyle performed a condition assessment for two water supply wells with the goal of developing a tailored well rehabilitation and retrofit program. The evaluation includes a review of well construction details, performance characteristics, hydrogeological conditions, and well and pumping plant efficiency testing.

**Downey Wells 2, 8, 11, 17, 18, and 29 Condition Assessment – City of Downey – Downey, California.** Mr. Kyle performed condition assessments for three water supply wells and developed tailored well rehabilitation and retrofit programs. The evaluation included a review of well construction details, video surveys, performance characteristics, hydrogeological conditions, and well and pumping plant efficiency testing. Well rehabilitation consisted of mechanical and chemical cleaning followed by redevelopment and testing, for which field inspection was provided for three (3) of the wells. In particular, Well 11 responded well and demonstrated a significant increase in plant efficiency and an estimated annual electrical savings of \$69,000 per year.

**Rehabilitation and Redevelopment of Dominguez Well 294-01 – Carson, California.** Mr. Kyle served as technical lead, providing project management and support

during rehabilitation and redevelopment of a well that was to provide raw water to an onsite treatment plant. The well had sat idle for many years due to groundwater contamination and had lost significant production capacity. This time-critical project involved evaluation and development of a rehabilitation program, acquisition of contractor bids, coordination of schedule, and inspection during rehabilitation of the well. Ultimately the well was returned to a production capacity in excess of the original capacity, on-time, and within budget.

**Municipal Well Water Quality Evaluation – City of Santa Fe Springs, California.**

Mr. Kyle provided technical support to the City to evaluate a recently equipped municipal water supply well which was exhibiting changes in groundwater quality from when it was initially constructed. A program of field testing suggested passive vertical groundwater flow between aquifers and possible issues with sampling protocols.

**Rehabilitation and Redevelopment of Rialto Well 6 – West Valley Water District - Rialto, California.**

Provided project management, technical support, contractor coordination, and inspection services during evaluation, rehabilitation and redevelopment of a well contaminated with perchlorate. The purpose of the rehabilitation was to reduce problematic entrained sand to minimal levels such that the well could be provide a sediment-free source of feedwater to a fluidized bed reactor treatment plant. This project was challenging due to its time-critical nature and the need for water treatment prior to discharge.

**Evaluation of Potential Impacts to Nearby Water Wells from Operation of Well Nos. 21 and 22 – Irvine Ranch Water District – Orange County, California.**

Irvine Ranch Water District (IRWD) Well Nos. 21 and 22, located in the City of Tustin, were constructed in 1992 but due to the prohibitive cost of treatment for elevated concentrations of total dissolved solids and nitrate, the wells were never equipped or utilized. As a result of increased growth in southern California since the time of drilling, and because of the need to increase its local water supply, IRWD decided to evaluate the production capability and water quality characteristics of the wells in order to assess the cost effectiveness of placing the wells into service. Rehabilitation and redevelopment of the wells took place from 2008 to 2009 and it was determined that the groundwater produced was unsuitable for potable use without treatment, resulting in construction of groundwater production, conveyance, and treatment facilities such that the impaired groundwater could be put to beneficial use. As a result of putting the wells into service, IRWD would be pumping above their allocated baseline pumping for the Orange County Basin and would potentially impact the production capacity and cost of production for nearby water purveyors. Mr. Kyle was tasked with identifying and quantifying these potential impacts from operation of the wells. This study included a validation and evaluation of existing OCWD groundwater flow model results, coordination with IRWD, OCWD, and impacted water purveyors, acquisition and review of data, interviewing of water operations staff, review and evaluation of current operating conditions for impacted wells, and analysis and determination of physical and financial impacts under numerous operational scenarios.

## Curt Roth, PE | Project Manager



### EDUCATION

MS, Environmental Engineering, University of California Berkeley

BS, Civil Engineering, Loyola Marymount University

### REGISTRATION

PE Civil, CA, No. C61087

### YEARS EXPERIENCE

20 years

### BENEFIT TO CLIENT

- ✓ Engineering expertise in conveyance pipelines
- ✓ Specialized expertise in designing, constructing and operating Pilot treatment facilities
- ✓ Experience interfacing between multiple agencies
- ✓ Extensive knowledge and familiarity with stormwater treatment

### AVAILABILITY

Curt will be available upon award of contract

Curt specializes in environmental and civil engineering. He is experienced in water, storm water, recycled water and wastewater conveyance as well as all aspects of water and storm water treatment. Mr. Roth adds tremendous experience designing, constructing and operating new and innovative systems for the treatment of water.

**Long Beach Water Department (LBWD) - On-Call Engineering Design Services for Water Main Replacement Program** Curt is the Project Manager providing as needed engineering design services for the replacement of water mains as part of the LBWD Capital Improvement Program. Curt provides general project management, technical review of designs, and coordination with the LBWD staff.

**Golden State Water Company - Capital Improvement Program Region 2 and 3** Curt acted as the Project Manager for various pipeline replacement projects within the Capital Improvement Program (CIP), including approximately 20,000 linear feet of 12-inch, 8-inch, and 6-inch water main located throughout the Client's water system in Southern California. Involvement included the design of fifty water main replacement projects, four backwash drain lines, four wellhead designs, and two well treatment systems within a period of 12 months. Also provided a technical support role on several other facility upgrade designs and planning studies.

**Long Beach Water Department - S-18 Sewer Lift Station Rehabilitation Upgrade** DRP provided project management, field assessment and engineering/CAD design support services for S-18 Sewer Lift Station rehabilitation project (1-3 MGD).

**City of Los Angeles, Bureau of Sanitation - Integrated Resources Plan for the City of Los Angeles** Curt was the wastewater treatment task lead for the facility plan portion of the Integrated Resources Plan.

**Los Angeles Department of Water and Power - Onsite Recycled Water Retrofit Program** Curt was the Project Engineer for multiple recycled water retrofit design projects within the overall LADWP program. Curt's responsibilities included site evaluation, assisting with system shut downs, producing drawings for submission to Department of Public Health, and technical assistance and coordination for client meetings.

**Metropolitan Water Districts of Southern California (MWD) - Distribution System Infrastructure Protection Program for Western San Bernardino County Region** Curt was the lead Project Engineer (subcontractor to prime consultant) for the completion of the Preliminary Design Report for DSIPP for Western San Bernardino County. Curt provided technical review of site conditions; provided recommendations of solutions; assisted with the development of project costs; assisted with the hydraulic analysis of site runoff and stream flows and assisted with drawing and report development.

**Los Angeles Department of Public Works, Watershed Management Division - Sun Valley Park Project** Lead design engineer for Sun Valley Park Project which consisted of the design of an underground stormwater infiltration basin, small storm drain collection system, collection inlets, monitoring system, and several structural BMPs (swirl concentrators and media filters) for the removal of solids, trash, oil, and certain other constituents of concern, including heavy metals.

**Los Angeles County Department of Public Works, Watershed Management Division - Dominguez Gap and DeForest Park Wetlands Project** Lead design engineer and project manager for Dominguez Gap and DeForest Park Wetlands for the LACDPW Watershed Management Division and the City of Long Beach, Parks Department.



## **Eric Leung, PE | Vice-President, Director of Engineering**

With more than 35 years of experience in the water and wastewater industry, Mr. Eric Leung serves as the Director of Engineering at DRP. He oversees company-wide operations and manages the internal departments that support DRP's project teams. He is a proven leader, recognized for his innovative thinking and wealth of expertise in the water/wastewater industry, a key factor in his ability to improve business processes and enhance productivity. Prior to retiring as Deputy General Manager/Chief Engineer of Long Beach Water Department, Mr. Leung spent 20 years managing large-scale assignments, providing him the characteristics that have contributed to his success.

Mr. Leung focuses on streamlining efficiencies and optimizing client satisfaction. He has developed excellent client relationships and built a strong track record of success. He has worked hand-in-hand with both public and private owners and has extensive knowledge of the project life cycle.

### **EDUCATION**

M.S. Civil Engineering,  
California State University,  
Long Beach

BS, Civil Engineering, Loyola  
Marymount University

### **REGISTRATION**

PE Civil, CA, No. C39711

Water Treatment Operator  
T4, CA No. 1689

Water Distribution Operator  
D5, CA No. 22071

### **US PATENT**

Sewer Pipe Inspection and  
Diagnostic System and  
Method (No. 504352644)

### **YEARS EXPERIENCE**

36 years

### **BENEFIT TO CLIENT**

- ✓ Extensive knowledge and familiarity with implementing and managing Capital Improvement Programs
- ✓ Specialized expertise in designing, constructing, operating, and managing water related facilities and infrastructure
- ✓ Engineering expertise in conveyance pipelines

### **Long Beach Water Department (LBWD) - Deputy General Manager / Chief Engineer**

Mr. Leung had a variety of responsibilities, including planning, directing, managing, and supervising the programs and activities of the Department's Engineering Bureau. He also developed and implemented objectives, strategic plans, and programs for the Department's water, reclaimed water, and sanitary sewer systems, including the Capital Improvement Program (CIP), Business Development, GIS/automated mapping, and construction services.

#### **Key Responsibilities Included:**

- Oversaw over 200 miles of water pipeline improvements with various sizes and pipe materials.
- Overseeing annual budget of \$15 million and capital improvement projects for water, sewer, and recycled water projects
- Developed and implemented first of its kind 0.5 MGD Prototype Seawater Desalination Testing Facility. This program consisted of the design/build of a prototype facility to test a new and innovative two pass two-stage nanofiltration process for seawater desalination. In addition, this program included a sub-surface intake and discharge system, and Ultraviolet Light and Chlorine Dioxide Seawater Pretreatment Systems for Biogrowth Control and Pathogen Inactivation.
- Developed Project Portfolio Management (PPM) program to track CIP project schedules and financials.

- Oversaw preparation and update of Water and Sewer Master Plans
- Developed smart phone apps to track City-wide engineering and construction projects, as well as standard engineering calculations for field uses
- Developed and implemented Los Angeles River Pilot Treatment System Program. This program consisted of designing and constructing a small pilot treatment plant to investigate the opportunity of treating the low flow of the Los Angeles River for use in augmenting the Long Beach water supplies. The pilot system is located at the Dominguez Gap Wetlands site, which has an existing river connection.
- Oversaw rehabilitation and replacement of city-wide existing sanitary sewer pipeline program. Rehabilitation methods included trenchless repairs for full or sectional pipe lengths using cured-in-place pipe (CIPP), UV CIPP, carbon fiber reinforced polymer (FRP), glass FRP, top hats, and other alternative methods.
- Oversaw rehabilitation of system-wide existing sanitary sewer lift station program. Lift Station (ranging from 0.5 to 5 MGD) Rehabilitation Program consisted of field assessment of existing odor control units, Corrosion of Electrical Gear caused by H<sub>2</sub>S, VFDs & pump clogging, condition of wet well (concrete degradation and lining) and dry wet., FOG and groundwater intrusion. Design and construction design included replacing/upgrading the odor control unit, wet well rehab, installation of new lining to the wet well and electrical gear.
- Oversaw preparation of Sewer System Management Plans (SSMP) for City of Long Beach which included over 700 miles of sanitary sewer and 28 sewer lift stations.

### **City of Anaheim- Project Manager**

Mr. Leung had a variety of responsibilities, including planning, directing, managing, and supervising the projects and activities of the City of Anaheim's Public Utilities Water Services Department.

Key Responsibilities Included:

- Project manager for major enhancements to the Lenain Filtration Plant. Incorporated full treatment capabilities, including ozone disinfection technology
- Project manager for major new infrastructure, including 10MG partially buried water tank, pump stations, disinfection and transmission pipelines in East Anaheim Hills area

## Saik-Choon Poh, PE | Project Manager



Saik-Choon Poh specializes in environmental and civil engineering. He is experienced in water, stormwater, and wastewater conveyance and treatment facilities. As a key member of project teams, he has been responsible for directing work and coordinating closely with clients, subcontractors, contractors, and staff in multiple offices.

### **Long Beach Water Department (LBWD) - S-1 Sewer Lift Station Rehabilitation**

**Upgrade** Project Manager for field assessment, engineering design, and construction management for this lift station rehabilitation project (2-3 MGD) consisting the field assessment of the existing odor control units, corrosion of electrical gear caused by H<sub>2</sub>S, VFDs & pump clogging and condition of Wet well (concrete degradation and lining) and Dry well. The engineering design included replacing/upgrading the odor control unit, wet well rehab, installation of new lining to the wet well and electrical gear.

### **Long Beach Water Department (LBWD) - S-12 Sewer Lift Station Rehabilitation**

**Upgrade** Project Manager for field assessment, engineering design, and construction management for this lift station rehabilitation project (3-5 MGD) consisting the replacement of the existing odor control units, Corrosion of Electrical Gear caused by H<sub>2</sub>S, VFDs & pump clogging, rehabilitation of Wet well (concrete repair and lining) and repair existing dry wet, and new FOG system.

### **Long Beach Water Department - S-18 Sewer Lift Station Rehabilitation Upgrade**

DRP provided project management, field assessment and engineering/CAD design support services for S-18 Sewer Lift Station rehabilitation project (1-3 MGD).

### **Long Beach Water Department - North Long Beach Sewer Improvement Project**

**Phase 1 and Phase 2** Project Manager/ Resident Engineer for the design and construction management services for the rehabilitation of approximately 19,600 linear of existing sewer lines.

### **Long Beach Water Department (LBWD) - Orange Avenue/Del Amo Blvd/ Walnut**

**Ave Street Sewer Upgrade** Resident Engineer for the project which consisted of approximately 1,019 LF of 12-inch sewer to be upsized to a 15-inch sewer along Walnut Avenue between Market Street and Jackson Street (located in a built-out, high-density residential/commercial area) the installation of a 10-inch double barrel HDPE siphon with steel casings, and the rehabilitation of nine (9) brick manholes.

### **Long Beach Water Department (LBWD) - Orange Avenue/7th Street Sewer**

**Upgrade** Deputy Project Manager/Resident Engineer for the design and performed construction management services for the construction of approximately 1,300 linear feet of 12- inch Extra Strength VCP within 7th Street and 1,775 linear feet of 30-inch Extra Strength VCP within Orange Avenue.

### **Long Beach Water Department (LBWD) - Prototype Seawater Desalination Testing Facility Construction**

Project Resident Engineer for the construction of a prototype facility to test an innovative two-pass, two-stage nanofiltration process for seawater desalination. In addition, this project included the installation of approximately 2,000 feet of influent and effluent piping. Responsibilities included submittal review; coordination with the contractor, designer, and local agencies; review of change order requests; providing responses to requests for information (RFIs); inspecting the construction site; and coordination with the client.

### **Golden State Water Company - Pipeline Replacement Projects, Southern California**

Mr. Poh acted as the Project Engineer for various pipeline replacement projects within the Capital Improvement Program (CIP), including approximately 20,000 linear feet of water main located throughout the Client's water system. Responsibilities included supervision of a team of engineers and designers to prepare design drawings; conducting utility research and field verifying locations; and performing hydraulic analysis of water systems.

#### **EDUCATION**

M.Eng. Environmental and Water Quality Engineering, Massachusetts Institute of Technology

BS, Civil Engineering, Loyola Marymount University

#### **REGISTRATION**

PE Civil, CA, No. C69223

#### **YEARS EXPERIENCE**

15 years

#### **CERTIFICATION**

National Association of Sewer Service Companies (NASSCO) - PACP, MACP, LACP

#### **BENEFIT TO CLIENT**

- ✓ Extensive knowledge and familiarity with sewer pipeline construction and rehabilitation
- ✓ Experience interfacing between multiple agencies
- ✓ Engineering expertise in sewer rehabilitation

**PROJECT ROLE**

Field Inspection/  
Project Support

**REGISTRATIONS/  
CERTIFICATIONS**

Geologist-in-Training,  
California No. 863

**EDUCATION**

Bachelor of Science,  
Geosciences, University  
of Arizona, 2011

Ms. Makar is a geologist with seven years of experience in the water resource and mining industries. She began her career as a manager of the dewatering program at an open-pit copper mine in Nevada, for which she was responsible for developing and executing multi-million-dollar groundwater dewatering programs. Since 2014 she has been providing professional consulting services to the water resources industry in Southern California with an emphasis on new well installation and well rehabilitation.

**SELECTED EXPERIENCE**

**Rehabilitation of Citizens Well 9 and Wilson Well 1A – Long Beach Water Department – Long Beach, California.** Ms. Makar is serving as lead inspector during rehabilitation of two municipal water supply wells. The project includes physical and chemical cleaning of each well, redevelopment and testing, and retrofitting of the well pump, motor, and electrical.

**Rehabilitation of Wells 3B and U – Indio Water Authority – Indio, California.** Ms. Makar assisted in the preparation of two work plans to rehabilitate and redevelop Wells 3B and U. In addition to the work plans, a depth-specific water quality plan was prepared for IWA, should they decide to modify the wells if the hexavalent chromium MCL is reduced. Ms. Makar provided field inspection for Well U during chemical mixing and injection, swab and airlift development, pump development, aquifer testing, depth specific water quality sampling, and disinfection.

**Monitoring Network Evaluation – City of Riverside, California.** Ms. Makar inventoried more than 200 monitoring points, including monitoring wells and inactive production wells, literature review, identified groundwater production well fields by management zone, and recommended additional monitoring wells based on seasonal groundwater piezometric contours and xyz position in multiple groundwater models.

**Rehabilitation of Commission Well 20 – Long Beach Water Department – Long Beach, California.** Ms. Makar provided field inspection during rehabilitation of Commission Well 20. This included inspection during pump removal, brushing, bailing, downhole video surveys, installation of a liner, development utilizing pumping and surging, and step-drawdown aquifer test.

**Rehabilitation of Plant 409 Well 3 – Suburban Water Systems – La Mirada, California.** Ms. Makar provided field inspection during rehabilitation of Plant 409 Well 3. This included inspection during mixing, injection, and swabbing of chemical, neutralization and discharging of chemical, initial development using swab and airlift, final development utilizing pumping and surging, step-drawdown aquifer test, constant rate test, and final disinfection.

**Rehabilitation of Well No. 11 – City of Downey – Downey, California.** Ms. Makar provided field inspection during rehabilitation including during brushing, bailing, development using swabbing and airlifting, development utilizing pumping and surging, and aquifer testing.

**Rehabilitation of Well No. 17 – City of Downey – Downey, California.** Ms. Makar provided field inspection during rehabilitation including inspection during brushing and bailing.

**Rehabilitation of Well No. 8 – City of Downey – Downey, California.** Ms. Makar provided field inspection during rehabilitation including inspection during brushing, bailing, downhole video survey, development utilizing pumping and surging, step-drawdown aquifer test, and constant rate test.

**Siting of a New Municipal Water Supply Well in Whittier Narrows Area – Puente Basin Water Agency – Whittier, California.** Puente Basin Water Agency owns groundwater pumping rights within the Central Basin and is seeking to construct one or more wells in the Whittier area. The goal is to produce potable groundwater from the Central Basin and convey it to the Puente Subbasin through an existing California Domestic Water Company transmission pipeline. Several potential sites have been identified as candidates for the new well and Mr. Makar provided technical hydrogeological support during site evaluation and assisted with report development.

**Central Basin Well Siting Study – Puente Basin Water Agency – Los Angeles County.** Ms. Makar assisted in a well siting study in the Montebello, Pico Rivera, Whittier area. She researched and plotted groundwater elevations and groundwater quality of six constituents. She produced figures consisting of known contaminant plumes, sites of environmental concern, existing wells, and active and inactive oil pipelines. She assisted in the analysis of the data, ranking of eight potential well sites, and recommendations for the top two sites.

**Well Siting Study – Nuevo Water Company – Nuevo, California.** Ms. Makar provided project coordination and analyzed all available data including groundwater elevations and groundwater quality. She produced contour maps of TDS and nitrate concentrations which were used in determining a site for a new well. She provided field reconnaissance and recommended privately owned wells for additional sampling.

**Replacement Well Commission 22A – Long Beach Water Department – Long Beach, California.** Ms. Makar assisted in the preparation of the preliminary design report for the destruction of one existing production well and the construction of a replacement well. She was the lead on permitting matters, including coordinating various agencies to ensure full compliance with all permitting and environmental requirements, and assisted with the production of a bid package, including technical specifications.

**Gibbel Park Monitoring Well – City of Hemet – Hemet, California.** Ms. Makar assisted in field inspection for a new, multi-completion monitoring well in Gibbel Park for the City of Hemet. The well has been constructed using schedule 80 PVC, with a shallow, middle, and deep completion. This project is currently ongoing.

# Megan Trott, PE | Project Engineer

## EDUCATION

MBA, Finance, Loyola

Marymount University

BS, Civil Engineering, Loyola

Marymount University

## REGISTRATION

PE Civil, CA, No. C90723

## YEARS EXPERIENCE

5 years

## BENEFIT TO CLIENT

- ✓ Engineering expertise in conveyance pipelines
- ✓ Engineering expertise in sewer pipeline construction and rehabilitation
- ✓ Experience interfacing between multiple agencies

### **Long Beach Water Department (LBWD) – Alley Main Conversion, Daisy Avenue, Long Beach, CA**

Megan was the staff engineer for the relocation of approximately 3,900 linear feet of 6- and 8-inch piping to be replaced and/or removed from the alleyways and relocated into the streets. The project included relocating the connections to the existing water services, meters, fire hydrants, and valves from the existing mainlines to the proposed mainlines; installation of various ductile iron pipes and connections to water mains on lateral streets; installation of various valves, service laterals, and fire hydrants; reconnecting existing service lines and fire hydrants to the new water lines; abandoning existing water mains and service laterals; and designing and locating new on-site private customer service laterals for customers that required a meter relocation. Megan also coordinated with residents to secure Consent of Entry release forms for every property in the project scope.

### **Long Beach Water Department (LBWD) - On-Call Engineering Design Services for Water Main Replacement Program, Long Beach, CA**

Provides as needed engineering design services for the replacement of water mains as part of the LBWD Capital Improvement Program. Project tasks include utility research, base map creation, field investigations, determination of recommended alignments, completion of construction plans, and preparation of asbuilt drawings.

### **Long Beach Water Department (LBWD) - S-1 Sewer Lift Station Rehabilitation Upgrade, Long Beach, CA**

Project Engineer for construction management for this lift station rehabilitation project. DRP provided CAD and engineering design support (subconsultant to prime) and construction management services (prime) for the lift station rehabilitation project (2-3 MGD) consisting the field assessment of the existing odor control units, corrosion of electrical gear caused by H<sub>2</sub>S, VFDs & pump clogging and condition of Wet well (concrete degradation and lining) and Dry well. The engineering design included replacing/upgrading the odor control unit, wet well rehab, installation of new lining to the wet well and electrical gear.

### **Long Beach Water Department - S-18 Sewer Lift Station Rehabilitation Upgrade, Long Beach, CA**

DRP provided project management, field assessment, engineering/CAD design support services, and construction management for S-18 Sewer Lift Station rehabilitation project (1-3 MGD).

### **San Bernardino Municipal Water Department, Highland Avenue and Cedar Street Sewer Pipeline and Manhole Rehabilitation, San Bernardino, CA**

DRP is serving as the Lead Civil Engineer/Designer for the rehabilitation of a manhole and the surrounding 10-inch sewer pipeline that have settled in an area of pipe with a shallow slope. The pipeline and manhole need to be rehabilitated and potentially replaced to eliminate the current backup and to improve the capacity of the collection system. This project consists of the evaluation of options for the replacement or rehabilitation of these facilities, determining the exact method of rehabilitation, preliminary and final design, preparing Contract Documents, bid support, and engineering design services during construction.

### **Upper San Gabriel Valley MWD (Upper District) – Large Landscape Survey and Retrofit (LLSR) Program**

Assisted with the LLSR conservation program as part of staff extension for Upper District. The goal of the program is to help owners of large landscape irrigation systems conserve water and is an extension of the MWD BeWaterWise rebate program. For a given site, one of the Upper District's consultants will complete an irrigation survey that provides equipment upgrade recommendations and estimates of water savings. Once approved by Upper District and the site owners, the consultants then will complete the recommended upgrades (heads, controllers, leak repairs, etc.) at no cost to the owner. Responsibilities included identifying sites and scheduling work; tracking retrofit performance; and promoting irrigation conservation.



**KYLE Groundwater**

557 E. Pasadena Street, Ste. 2  
Pomona, CA 91767 | 626-379-7569  
[www.kylegroundwater.com](http://www.kylegroundwater.com)

# Raymond Tan | Staff Engineer

## EDUCATION

California State University,  
Long Beach  
Long Beach, CA

## Registration

Engineer-in-Training,  
#166431

## YEARS EXPERIENCE

2 years

## BENEFIT TO CLIENT

- ✓ Proficient in AutoCAD ,  
Microstation 2D & 3D ,  
WaterGEMS and ArcGIS
- ✓ Skilled in Microsoft Excel,  
PowerPoint, and Word
- ✓ Extremely detailed and  
organized team player

### **Suburban Water Systems - Various Pipeline Replacement Projects in Whittier-La**

**Mirada and San Jose Hills District for 2020**, Raymond is the Project Engineer for this project, which includes designing approximately 31,100 linear feet of new PVC piping to replace a range of 4- to 10-inch diameter AC and plastic pipe with 6- and 8-inch PVC piping for four separate water main replacement projects on an expedited schedule approximately one month per project. The DRP team performed utility research, base map creation, plotting of utility information on base map, field investigations, determinations and recommendations for new water main alignment location driven by utility separation requirements, system operations considerations/hydraulics, current fire department compliance codes, and plan sheet development.

### **Suburban Water Systems - Various Pipeline Replacement Projects in Whittier-La**

**Mirada and San Jose Hills District for 2019**, Raymond is the Project Engineer for this project, which includes designing approximately 5,900 linear feet of new piping to replace a range of 4- to 10-inch diameter AC and plastic pipe with 6- and 8-inch PVC piping for four separate water main replacement projects. The DRP team performed utility research, base map creation, plotting of utility information on base map, field investigations, determinations and recommendations for new water main alignment location driven by utility separation requirements, system operations considerations/ hydraulics, current fire department compliance codes, and plan sheet development.

**Liberty Utilities – Flatbush & Barnwall 12” Water Main Installation Plan** Raymond was the Project Engineer for this project, which consisted of designing approximately 2,400 linear feet of new ductile Iron piping ranging from 4- to 12-inch diameter. New water mains replaced old existing CI pipe that were unable to deliver Liberty Utilities' present and future water demand, and continue customer water service. The project also consisted of replacing water services, valves, and hydrants. The DRP team performed utility research, base map creation, topographic survey, and field investigations. Additionally, DRP made determinations and recommendations for the new water main alignment location driven by utility separation requirements, water pipe installations considerations, system operations considerations/ hydraulics, and current LA County fire department compliance codes.

**Liberty Utilities – Shoemaker 12” Water Main Installation Plan** Raymond was the Project Engineer for this project, which consisted of designing approximately 1,000 linear feet of new ductile Iron piping ranging from 12-inch diameter. The project also consisted of replacing water services, valves, and hydrants. The DRP team performed utility research, base map creation, topographic survey, and field investigations. Additionally, DRP made determinations and recommendations for the new water main alignment location driven by utility separation requirements, water pipe installations considerations, system operations considerations/ hydraulics, and current LA County fire department compliance codes.

### **Metropolitan Water District Of Southern California - Preliminary Design Of Prestressed Concrete Cylinder Pipe (PCCP) Rehabilitation Projects**

DRP is providing assistance to HDR for the completion of MWD's Sepulveda Feeder PCCP Rehabilitation Project, which consists of 42 miles of pipe ranging from 84- to 150-inch diameter and a working pressure up to 360 psi. The project includes preliminary design and the preparation of design reports for the rehabilitation of the four PCCP lines. The rehabilitation work will include relining or replacement of the pipeline, replacement of existing valves, flow meters, and appurtenant structures.

### **Long Beach Water Department (LBWD) - On-Call Engineering Design Services for**

**Water Main Replacement Program** Provides as needed engineering design services for the replacement of water mains as part of the LBWD Capital Improvement Program. Project tasks include utility research, base map creation, field investigations, determination of recommended alignments, completion of construction plans, and preparation of asbuilt drawings.



**P A L M D A L E   W A T E R   D I S T R I C T**  
**B O A R D   M E M O R A N D U M**

**DATE:** February 4, 2020 **February 11, 2020**  
**TO:** RESOURCE AND FACILITIES COMMITTEE **Committee Meeting**  
**FROM:** Mrs. Claudia Bolanos, Resource and Analytics Supervisor  
**VIA:** Mr. Peter Thompson Jr., Resource and Analytics Director  
Mr. Dennis D. LaMoreaux, General Manager  
**RE:** ***AGENDA ITEM NO. 4.6 – CONSIDERATION AND POSSIBLE ACTION ON A RECOMMENDATION TO APPROVE UPDATES TO THE WATER USE EFFICIENCY REBATE PROGRAMS INCLUDING THE IMPLEMENTATION OF A NEW SMART CONTROLLER REBATE PROGRAM AND INCREASES TO THE REBATE AMOUNTS FOR THE DISTRICT’S CURRENT HIGH EFFICIENCY TOILET REBATE AND HIGH EFFICIENCY CLOTHES WASHER REBATE PROGRAMS. (BUDGETED UNDER DEPARTMENT REBATE PROGRAMS – RESOURCE AND ANALYTICS SUPERVISOR BOLANOS).***

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**Recommendation:**

Staff recommends that the Committee recommend to the full Board the approval of updates to the Water Use Efficiency Rebate Programs including the addition of a new Water Smart Controller Rebate Program and increases to the rebate amounts for the District’s current High Efficiency Toilet Rebate Program and High Efficiency Clothes Washer Rebate Program.

**Alternative Options:**

Continue to move forward with the rebate programs that we currently have in place and not increase the rebate amounts.

**Impact of Taking No Action:**

Water Use Efficiency Rebate Programs will not be expanded or updated in 2020, but existing programs will continue to be offered to customers.

**Background:**

The Water Use Efficiency group continuously explores new programs being used in the water industry and determines if the programs could benefit our customers. The Water Use Efficiency group also periodically evaluates our current programs to ensure that we are offering the best options available to our customers.

RESOURCE AND FACILITIES COMMITTEE  
PALMDALE WATER DISTRICT

VIA: Mr. Peter Thompson Jr., Resource and Analytics Director  
Mr. Dennis D. LaMoreaux, General Manager

February 4, 2020

**Water Smart Controller-**

The water smart controller is also referred to as a weather-based controller that automatically adjusts irrigation based on local site conditions and weather feed. Once programmed properly, a water smart controller adjusts as necessary for current conditions. The Water Smart Controller Rebate Program will offer qualifying applicants a rebate for the cost of a So Cal Water Smart listed smart controller up to \$150 maximum rebate. This program would benefit multi-family residences as well as commercial customers. The water smart controller is the new wave of irrigation technology, and it is a great program to be able to offer our customers.

**High Efficiency Toilet Rebate-**

Our High Efficiency Toilet Rebate Program is one of our most popular rebate programs averaging over 100 rebates a year. We currently offer a \$60 rebate max, while most other water agencies offer a max of \$100. We propose to increase our rebate amount to a max of \$100.

**High Efficiency Clothes Washer Rebate-**

Our High Efficiency Clothes Washer Rebate Program is also a popular rebate program that averages right around 30 rebates a year. Our clothes washer rebate currently offers our customers up to \$100, while other water agencies offer up to \$150. We propose to increase the rebate amount to a max of \$150.

**Strategic Plan Initiative/Mission Statement:**

This item is under Strategic Initiative No. 6 - Customer Care, Advocacy and Outreach.

This item is directly related to the District's Mission Statement.

**Budget:**

We currently have enough budget in our rebates account to cover additional rebates.

**Supporting Documents:**

- Rebate Comparison chart

## Rebate Comparison

Agency	High-Efficiency Toilets	High-Efficiency Washers	Smart Controllers
Palmdale Water District (Current)	\$ 60	\$ 100	\$ -
City of Santa Barbara	\$ 100	\$ 150	50% of cost
Casitas Municipal Water District	\$ 100	\$ 150	\$ 250
Chino Basin	\$ 100	\$ -	\$ -
East Valley Water District	\$ 100	\$ 150	\$ 150
Desert Water	\$ 100	\$ 250	\$ 150
Ventura Water	\$ 100	\$ 150	\$ 150
California Water Service	\$ 100	\$ 150	\$ 125
Santa Clarita Valley	\$ -	\$ -	\$ 150

Palmdale Water District (Proposed)	\$ 100	\$ 150	\$ 150
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