PALMDALE WATER DISTRICT

STANDARD SPECIFICATIONS

FOR

WATER DISTRIBUTION SYSTEM CONSTRUCTION

February 2023

PALMDALE WATER DISTRICT

2029 EAST AVENUE Q, PALMDALE, CA 93550

661-947-4111

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.

1-03 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 commencement of construction, all materials must be on-site, inspected, and approved by a District representative.

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 clearly showing 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 then 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 ask for your cooperation and 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 reached 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 empresa del contratista] llevará a cabo trabajos de construcción en su calle el [Día de la semana, mes, fecha] entre [XX a.m.- XX p.m] durante los próximos [X meses o días]. Como el trabajo comienza en [Nombre de la calle de intersección], continúa a lo largo de su calle y termina en [Nombre de la calle de intersección], le pedimos su cooperación y comprensión.

Le pedimos que por favor:

1. Permanezca alerta cuando conduzca / camine por el sitio de construcción.

2. Mantenga a los niños alejados del área de construcción.

3. Informe sus inquietudes al [nombre del superintendente de construcción] en [número de contacto].

El trabajo está siendo realizado por [Nombre de la empresa contratista] y supervisado por [nombre del superintendente], a quien se puede contactar en [dirección y número de teléfono]. [Nombre de la empresa contratista] está siendo contratado por Palmdale Water District (PWD) para este proyecto. El gerente de proyecto de PWD es [nombre], a quien se puede contactar en [número de teléfono].

Si tiene alguna inquietud después del horario normal de oficina comercial o tiene una emergencia de agua, llame a la línea de emergencia de PWD 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 Mortal 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 Mortal 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 flanges shall be flat faces. 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.*

c) Connections.

All connections including hot tap for water service shall be 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. Refer to Section 5-06.

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*. Water mains shall be Class 350 (or project requirements, whichever is greater).

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.

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.

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, refer to Section 5-07. Hot tapping instructions stated in Section 4-21.f)

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.

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 and shall be in hydrant pads where possible. Refer to PWD List of Approved Materials and 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 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. Hot tapping instructions stated in Section 4-21. Refer to PWD List of Approved Materials

e) Underground Marking Tape.

Underground marking tape shall be installed with all pipe materials. 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. Refer to PWD List of Approved Materials.

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.

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.

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.

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.

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. All valve operating stem ends shall be equipped with pentagonal dummy nuts the same size as the nozzle cap ends. Refer to PWD List of Approved Materials.

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. at the discretion of the District.

Fire hydrant risers and runners shall be a full six (6) inches inside diameter pipe. The 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 riser 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 Meter Boxes

Meter boxes shall be furnished and installed as shown on the plans or in the Standard Drawings.

Meter boxes shall be furnished according to the following schedule:

a) Three-quarter (3/4) inch water service and meter: Refer to PWD List of Approved Materials.

b) One (1) inch water service and meter: Refer to PWD List of Approved Materials.

c) One and one-half (1-1/2) inch or two (2) inch water service and meter: Refer to PWD List of Approved Materials.

d) Two (2) inch blow-off assembly: Refer to PWD List of Approved Materials.

e) Water sampling station: Refer to PWD List of Approved Materials.

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. Flanged couplings adapters, clamp type mechanical couplings are listed in PWD List of Approved Materials. Clamp type

mechanical couplings shall be for pipes with grooved ends for water service and able to withstand a pressure equal to the strength of the pipe to which they are attached.

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. RPDAs 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 3/8" aluminum diamond plated cover with a spring-loaded access cover;

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. See PWD List of Approved Materials.

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. Refer to PWD List of Approved Materials.

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 away from the excavation so that it does not reenter 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 District 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 pavements 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-eight (48) inches between top of pipe to top of curb or forty-two (42) inches between top of pipe to 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, the Contractor shall submit a letter accepting the liability of installing improvements by survey staking versus actual location of other improvements (i.e. curb, sanitary sewer, etc). 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 C600-17, *Installation of Ductile-Iron Mains and Their Appurtenances* and AWWA C605-13/C900, *Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride Pressure Pipe and Fittings*, of latest revisions . 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. Refer to PWD List of Approved Materials.

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 "buttered" 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 latest standards should be followed to calculate and determine the maximum allowable leakage rate:

Steel Pipe	AWWA C604-17
Ductile Iron Pipe	AWWA C600-17
PVC Pipe	AWWA C605-21

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 ensure 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. Contractor shall furnish and install at his own expense, all materials and labor needed to perform chlorination on all segments of newly installed pipes. 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 Pipeline Trench Restoration

a) 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%.

b) 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.

Existing roadway concrete structures like cross gutters, curbs and gutters, and similar shall have a minimum of 1-sack to 1 ½ slurry beneath the structure and remain in place for the installation of pipelines where boring is not possible. The concrete structure shall be removed and reinstalled to 5-feet on either side of the centerline of the pipeline unless a cold joint exists within the 5-ft. Slurry or cement-treated backfill material will not be allowed in trench unless approved by the General Manager.

c) Trench Backfill Compaction Tests.

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. Compaction re-tests will be required on re-compacted material and at the expense of the contractor. No compaction tests shall be spotted by the District until all utilities have been installed.

d) Asphalt Resurfacing.

Asphalt 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.

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 gate valves up to eight (8) inches shall be flanged. Valves greater than ten (10) inches shall be flanged butterfly valves.

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.

Approved tapping sleeves will be required for size-on-size taps and only allowed when approved by a District Inspector/Engineer. Tapping sleeves shall be installed in accordance with the manufacturer's instructions. The pipe barrel shall be thoroughly cleaned with a wire brush to provide a smooth, hard surface for the sleeve. The sleeve shall be independent of the pipe during the tapping operation. The sleeve shall be hydrostatic tested in the presence of the District representative prior to tapping. Thrust blocks shall be provided at the tapping sleeve after tap is completed.

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. Ductile iron and PVC hot tapping shall be made with mechanical tapping sleeves. Refer to PWD List of Approved Materials.

c) Asbestos Concrete Mains.

Mechanical tapping sleeves are required. The tapping sleeve shall be installed in accordance with the manufacturer's instructions and to the satisfaction of the District representative. Refer to PWD List of Approved Materials.

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 for ductile iron.

5-04 Fittings

All fittings shall have copper flare and/or compression 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 with double stainless-steel straps, positioned as shown on Standard Drawing W-1 and W-1A. Refer to PWD List of Approved Materials.

5-08 Connections to Ductile Iron Mains

All connections for water services shall be made as shown on Standard Drawing W-1 and W-1A.

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 Appendix F in the District's Rules and Regulations. 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.