

CITY OF  
**HAYWARD**  
HEART OF THE BAY

DEPARTMENT OF PUBLIC WORKS

**SPECIFICATIONS FOR  
THE CONSTRUCTION  
OF**

**WATER MAINS (12" DIAMETER OR LESS)  
AND FIRE HYDRANTS  
USING**

**POLYVINYL CHLORIDE (PVC)  
AND DUCTILE IRON (DI) PIPE**



July 2006-R1

**Note: Standard Detail SD-310 is superseded by SD-125**

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AND  
DUCTILE IRON (DI) PIPE

FOR USE IN CONNECTION WITH THE LATEST REVISIONS OF THE  
"STANDARD SPECIFICATIONS FOR CONSTRUCTION OF LOCAL STREETS AND  
ROADS" AND THE "STANDARD PLANS FOR CONSTRUCTION OF LOCAL STREETS  
AND ROADS" OF THE CALIFORNIA DEPARTMENT OF TRANSPORTATION,  
AND THE CITY OF HAYWARD STANDARD DETAILS

**Note: Standard Detail SD-310 is superseded by SD-125**

July 2006-R1

A handwritten signature in black ink, appearing to read "A. Ameri".

ALEX AMERI

Deputy Director of Public Works/Utilities

Prepared by:  
Utilities Administration  
Department of Public Works  
City of Hayward, CA

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CITY OF HAYWARD

DEPARTMENT OF PUBLIC WORKS

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**SPECIFICATIONS FOR THE CONSTRUCTION  
OF  
WATER MAINS (12" DIAMETER OR LESS) AND FIRE HYDRANTS  
USING  
POLYVINYL CHLORIDE (PVC) AND DUCTILE IRON (DI) PIPE**

July 2006-R1

**PART 1 - GENERAL REQUIREMENTS**

**1.01 SCOPE**

These Water Specifications cover the installation of polyvinyl chloride (PVC) and ductile iron pipe water mains to be installed by Applicants to the City for water and/or fire service, using materials provided by the Applicant. Pipe installations under these Water Specifications are limited in size to not more than twelve (12) inches diameter. In cases where pipe larger than twelve (12) inches is to be installed by the Applicant, additional and supplementary specifications will be provided by the City.

**1.02 DEFINITIONS AND TERMS**

Wherever in these Water Specifications, the Standard Specifications or Standard Details the following definitions and terms are used, the intent and meaning shall be interpreted as follows:

**ANSI** – American National Standards Institute. [www.ansi.org](http://www.ansi.org)

**Applicant** – The person, firm, company, or corporation that applies for water service from the City's Water System.

**ASTM** – American Society for Testing and Materials. [www.astm.org](http://www.astm.org)

**AWWA** – American Water Works Association. [www.awwa.org](http://www.awwa.org)

**City** – City of Hayward. [www.hayward-ca.gov](http://www.hayward-ca.gov)

**CalOSHA** – California Occupational Safety & Health Administration. [www.dir.ca.gov/dosh/](http://www.dir.ca.gov/dosh/)

**Caltrans** – State of California Department of Transportation. [www.dot.ca.gov](http://www.dot.ca.gov)

**Department** – Department of Public Works of the City of Hayward.

**Director** – The Director of the Public Works Department of the City of Hayward acting either directly or through properly authorized agents, such agents acting within the scope of the

particular duties entrusted to them. On all questions regarding applications, permits, design, layout, location, conditions of approval and acceptance of work, the decisions of the Director shall be final and binding upon all parties.

**Engineer** – The Deputy Director of Public Works/City Engineer or the Deputy Director of Public Works/Utilities who by definition are authorized agents of the Director of Public Works. The Engineer may act either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them. On all questions concerning the acceptability or classification of materials, the execution of the work, and conflicting interests of Contractors performing related work, the decisions of the Engineer shall be final and binding upon all parties.

**Hayward Municipal Water System** – All of the property, heretofore or hereafter constructed and/or owned by the City of Hayward, for the treatment, storage and distribution of water. It includes land, reservoirs, pipes and appurtenances, pumping stations, wells, and all other general property. Also known as Water System.

**Inspector** – A City inspector who by definition is an authorized agent of the Director and Engineer.

**NFPA** – National Fire Protection Association. [www.nfpa.org](http://www.nfpa.org)

**Plans** – Project plans that have been approved and signed by the Director of Public Works and are marked “Approved for Construction.”

**Senior Utility Services Representative (SUSR)** – A City Public Works Department employee who by definition is an authorized agent of the Director of Public Works. The SUSR assesses fees for connection to the City’s water distribution system and to discharge wastewater into the City’s wastewater collection system, completes water and sewer service applications, and provides requests to City field crews to install pipe and meters for water delivery.

**Special Provisions** – The special provisions are specific clauses setting forth conditions or requirements peculiar to the work and supplementary to the Standard Specifications.

**Standard Plans** – The Standard Plans for Construction of Local Streets and Roads, State of California Department of Transportation, latest revision, and the Standard Details of the City of Hayward, latest revisions. The Standard Details of the City of Hayward shall govern over both the State of California Department of Transportation Standard Plans and Standard Specifications.

**Standard Specifications** – The Standard Specifications for Construction of Local Streets and Roads, State of California Department of Transportation, latest revision, and Section 90, “Portland Cement Concrete” of the “Amendments to 2002 Standard Specifications.”

**Surveyor** – A City surveyor who by definition is an authorized agent of the Director and Engineer.

**Tap** – A connection to a water main established by drilling into the main by use of approved equipment and materials. A “Wet Tap” shall be defined as a tap performed on a sanitized, existing and/or active, water main. A “Dry Tap” shall be defined as a tap performed on an unsanitized, new or inactive, water main. Wet Taps may only be performed by Water System Staff. Dry Taps may be performed by Applicant.

**Water Service Materials** – Materials for water service which the Applicant must purchase from the Department, some of which must also be installed by Water System Staff.

**Water Specifications** – This document.

**Water System Staff** – A City Public Works Department employee who by definition is an authorized agent of the Director and Engineer. Water System Staff are the only persons allowed to operate valves and perform “wet taps” on active water mains.

### 1.03 CITY SERVICE CONTACTS

CONTACT	SERVICE DESCRIPTION	PHONE (510)	EMAIL
<b>Sr. Utility Services Representative</b> PW-Utilities Admin. Div., Water Engineering	Service connections & fees, permit plan reviews & conditions of approval	583-4727	<a href="mailto:Edith.Jacklin@hayward-ca.gov">Edith.Jacklin@hayward-ca.gov</a>
<b>Utilities Superintendent</b> PW-Utilities Operation and Maintenance	Water distribution & sewer collection preventative maintenance & repairs	881-7901	<a href="mailto:Mike.Higares@hayward-ca.gov">Mike.Higares@hayward-ca.gov</a>
<b>Storekeeper, Water Service Materials</b> PW-Utilities Admin. Div., Water Distribution	Materials for water service connections	881-7994	<a href="mailto:Justin.Thompson@hayward-ca.gov">Justin.Thompson@hayward-ca.gov</a>
<b>Water Pollution Control Administrator</b> PW-Utilities Admin. Div., Water Pollution Source Ctrl. & Stormwater Management	Water pollution prevention and investigation of illicit discharges or dumping	881-7900	<a href="mailto:Dije.Ndreu@hayward-ca.gov">Dije.Ndreu@hayward-ca.gov</a>
<b>Permit Center</b> , Community & Economic Development, Building Division	Building & Planning permits, inspections (non-Public Works)	583-4140	<a href="mailto:Permits.Counter@hayward-ca.gov">Permits.Counter@hayward-ca.gov</a>
<b>Development Services</b> PW-Engineering & Transportation Division	Encroachment Permits for work in City easements or right-of-ways.	583-4785	<a href="mailto:Jim.Lear@hayward-ca.gov">Jim.Lear@hayward-ca.gov</a>
<b>Survey &amp; Right-Of-Way</b> PW-Engineering & Transportation Division	Construction staking requirements, monument & elevation information.	583-4796	<a href="mailto:Norman.Payne@hayward-ca.gov">Norman.Payne@hayward-ca.gov</a>
<b>Construction Inspection</b> PW-Engineering & Transportation Division	Inspection of Public Works projects & utility improvements by Applicants.	583-4755	<a href="mailto:Jason.Whipple@hayward-ca.gov">Jason.Whipple@hayward-ca.gov</a>

### 1.04 CITY STANDARDS AND CODES

The City's currently adopted State of California, Department of Transportation (Caltrans) Standard Specifications for Construction of Local Streets and Roads and the City of Hayward Standard Details form a part of these Water Specifications and shall be followed in the construction and installation of water mains and fire hydrants by the Applicant. Wherever in the Standard Specifications the word "Contractor" is used, it shall mean Applicant. Any and all provisions in the Standard Specifications regarding compensation of the Contractor by the City and provisions of like import, are not applicable to work performed by an Applicant. In case of conflict between these Water Specifications and the Standard Specifications, the general requirements herein shall govern.

All water installations and services within the City shall comply with the minimum separation requirements set forth in the “California Waterworks Standards” which are contained in Section 64630, Title 22, of the California Administrative Code and incorporated herein (see Section 1.10). In addition, these Water Specifications comply with Chapter 11, Article 2 of the Hayward Municipal Code, “Hayward Municipal Water System”. Excerpts of the Municipal Code are presented and referenced below:

Section 11-2.03 Standard Service Connections. “Standard service connections shall consist of ¾-inch service pipe and 5/8 x ¾-inch meter.”

Section 11-2.08 Water Service Meters. Installation. “Water service meters shall be installed only in public streets, alleys or ways, or in areas designated by the Director of Public Works.”

Section 11-2.20 Fire Service Connections. "... commercial or industrial/multi-family residential fire service ... installations shall not be less than four (4) inches in size (diameter). ... residential fire service ... installations shall not be less than one (1) inch in size (diameter). ... Each fire service shall have installed therein a detector check valve of such pattern and design in accordance with City of Hayward Standard Details."

Section 11-2.27 Minimum Size of Water Mains. "The inside diameter of every water main to be installed shall not be less than eight (8) inches, except as may be determined by the Director of Public Works or authorized representative."

Section 11-2.09, Appendix 'A', Item d. Protection Requirements. "... Whenever backflow protection has been found necessary on a water supply line entering a customer's premises, any and all water supply lines from the City of Hayward's mains entering such premises, buildings, or structures shall be protected by an approved backflow assembly. (Exception: Class 1 and Class 2 Fire Sprinkler Systems)."

A copy of the Hayward Municipal Code is available via the Internet at: [www.hayward-ca.gov/municipal/hmcPDM.shtm](http://www.hayward-ca.gov/municipal/hmcPDM.shtm). Applicant's attention is directed to City of Hayward Standard Details SD-201, "Double Check Valve Assemblies," and SD-202, "Reduced Pressure Principal Backflow Prevention Devices". With the exception of Class 1 and Class 2 Fire Sprinkler Systems, all metered industrial, commercial and irrigation water services shall be equipped with an approved backflow prevention device.

## 1.05 DRAWINGS

- A. STANDARD PLANS: The Caltrans Standard Plans for Construction of Local Streets and Roads and the Standard Details of the City of Hayward, latest revisions, form a part of these Water Specifications and shall be followed in the installation of water mains and fire hydrants. The Standard Details shall govern over both the State of California Department of Transportation Standard Plans and Standard Specifications.
- B. PROJECT DRAWINGS OR PLANS: Drawings showing the size and location of the mains to be installed and other pertinent details will be provided by the Applicant for each project, and when approved will become a part of these Water Specifications in regards to the Applicant's project. Abbreviations and symbols shown on the Drawings shall be as shown on Standard Details SD-100 and SD-101.
- C. CONFLICTS: In case of conflict between the approved Project Drawings and these Water Specifications, including the Standard Plans, then the approved Project Drawings shall govern.

## 1.06 CHANGES

If, during the progress of the work, changes in design, material, or location are deemed necessary by the City for proper construction of the work, the City reserves the right to make such changes. The increase or decrease in cost of material and construction caused by such changes will be borne by the Applicant, unless the changes are made on mains installed for the convenience of the City, in which case the increase or decrease in cost will be borne by the City.

## 1.07 PERMITS, RIGHT OF WAY AND LICENSES

- A. PERMITS: The Applicant shall obtain all necessary permits for doing work and copies of the permits shall be provided to the Engineer. In the case where the requirements of a permit differ from those of the City Standards, the more stringent requirements shall apply. Where a main location is not public property, a right of way satisfactory to the City shall be obtained at the Applicant's expense by the City or by the Applicant, at the option of the Applicant, and the title shall be vested in the City.

An encroachment permit is required whenever work or an activity is to be performed within City easements or right-of-ways. For additional information regarding Public Works Encroachment Permits, see the City's Web Site at [www.hayward-ca.gov](http://www.hayward-ca.gov), then follow the links "City Services", "Permits", and "Encroachment Permit."

- B. CITY BUSINESS LICENSE: Any business operating within the City is required to possess a valid City Business License. Applicant shall verify that any consultant, contractor or subcontractor performing work on their behalf possesses a valid City Business License, and shall furnish satisfactory proof to the Engineer upon request. For additional information regarding City Business Licenses, contact the Revenue Division at (510) 583-4600 or see the City's Web Site at [www.hayward-ca.gov](http://www.hayward-ca.gov), then follow the links "City Services", "Licenses and Certificates", and "Business License Tax."
- C. CONTRACTOR'S LICENSE: The Applicant or his agent performing the work shall possess such State and local licenses as are required by law, and shall furnish satisfactory proof to the Engineer upon request that such licenses are in effect during the entire period of construction.

## 1.08 SUBMITTALS

Prior to delivery of materials to the job site, the Applicant shall furnish to the Engineer a complete list of materials by manufacturer and model number for approval and certificates of compliance where applicable.

## 1.09 INSPECTION

All work performed by the Applicant will be subject to thorough inspection to ensure full compliance with these Water Specifications. The Engineer shall have access to all parts of the work at all times. Work or material that does not conform to these Water Specifications may be rejected at any stage of the work. The Applicant shall remove and rebuild at his own expense any part of the work that the Engineer determines has been improperly executed.

For inspections on public streets and utilities (mains, hydrants, etc.), the Public Works Supervising Construction Inspector in the Design and Construction Services Section of the Engineering and Transportation Division should be contacted at 510-583-4755. For inspections on private utilities, the Building Inspection Division should be contacted at 510-583-4140. For additional information, see the City's Web Site at [www.hayward-ca.gov](http://www.hayward-ca.gov), then follow the links "City Services", "Building and Land Development", and "Inspections."

Work under these Water Specifications can be performed on Saturday, Sunday, or holidays only if the conditions of approval allow work during these days and if a City construction inspector is available to inspect this work. Weekend work is discouraged. Requests to perform work or for inspections on weekends or holidays must be submitted during normal work hours a minimum of seventy-two (72) hours prior to the beginning of the work.

## 1.10 DESIGN & LOCATION OF WATER MAIN AND APPURTENANCES

All new water mains and appurtenances shall be designed to comply with these Water Specifications and shall be located and installed to the lines and grades shown and the approved Plans.

- Water mains shall be a minimum of eight (8) inches in diameter and located within street right-of-ways five (5) feet from the face of curb, to the extent practical.
- Valves are required at all branches, hydrant lines and right-of-way/easement transitions (i.e., from/to roadway to/from non-roadway area). The location of valves, blowoffs, air valves, and other installed appurtenances shall be clearly referenced by offset stakes or by marking the curb.

A. DEPTH OF COVER: Water mains shall be designed and installed at elevations which will provide the following minimum cover measured from the established street grade or the surface of the permanent improvement to the top of the pipe barrel:

- Forty-eight (48) inches for pipe with an I.D. of greater than six (6) inches
- Thirty-six (36) inches for pipe with an I.D. of up to six (6) inches.

In addition, the maximum cover shall be limited to 4.5 feet and 3.5 feet, respectively, as practical given local changes in surface features and obstructions. The only exceptions to these minimum and maximum coverage requirements are when:

1. The approved Plans indicate otherwise;
2. It is necessary to cross under an existing utility, in which case the maximum allowable cover will be increased for the minimum separation distance necessary for the crossing; or
3. The Engineer specifies or approves in writing a variance in the required cover.

B. CRITERIA FOR THE SEPARATION OF WATER MAINS, SANITARY SEWER AND STORM DRAIN PIPELINES: Section 64630, Title 22, of the California Administrative Code, "California Waterworks Standards," sets the minimum separation requirements for water mains and sewer pipelines. These minimum separation requirements, with the addition of storm drain pipelines, are as follows:

1. Basic Separation Standards:

- a) **Parallel Construction**: The minimum horizontal distance between water mains and sanitary sewer pipelines shall be ten ( $\geq 10$ ) feet. The minimum horizontal distance between potable water mains and storm drain pipelines shall be six ( $\geq 6$ ) feet, measured from the nearest edges of the facilities.
- b) **Perpendicular Construction (Crossing)**: Water mains shall be at least twelve ( $\geq 12$ ) inches above sanitary sewer and storm drain pipelines where these pipelines must cross, measured from the nearest edges of the facilities. (See Standard Detail SD-224, "Ductile Iron Drop".)

The required separation between sanitary sewers or storm drains and other utility pipes (except water mains) shall be greater than six ( $> 6$ ) inches. (See Standard Detail SD-303, "{Construction in the Vicinity of Other Utilities".)

- c) **Common Trench:** Water mains, sanitary sewer and storm drain pipelines must not be installed in the same trench.

Where local conditions create a situation where there is no alternative but to install water mains, sanitary sewer and/or storm drain pipelines at a distance less than that which is required by the Basic Separation Standards above. In such cases, the Alternative Criteria for Construction (item 2. below) shall be followed, subject to the Special Provisions (item 3. below).

2. **Alternative Criteria for Construction:** The construction criteria for water mains, sanitary sewer or storm drain pipelines where the Basic Separation Standards cannot be attained are detailed below in Case 1 and 2, and illustrated in Figures 1 and 2. There are two standard situations encountered:

**CASE 1 – New Sanitary Sewer or Storm Drain & New or Existing Water Main.**

The Alternative Construction Criteria shall apply to the sanitary sewer and/or storm drain pipelines.

**CASE 2 – New Water Main & Existing Sanitary Sewer or Storm Drain.**

The Alternative Construction Criteria may apply to the water main, sanitary sewer and/or storm drain pipelines.

*The Alternative Construction Criteria shall also apply to service laterals that cross above a potable water main, but not to service laterals that cross below a potable water main.*

3. **Special Provisions:** The Basic Separation Standards are applicable under normal conditions for sewer and storm drain pipelines and water mains. More stringent requirements may be necessary if adverse conditions, such as high groundwater, exist.
- a) **Low Pressure Water Mains.** Sanitary sewer and storm drain pipelines shall not be installed within (<) 25 feet horizontally of a low head ( $\leq 5$  psi) water main.
- b) **Pressure Testing of Pipelines.** New water mains, sanitary sewer and storm drain pipelines shall be pressure tested where the pipelines must be located ten ( $\leq 10$ ) feet apart or less.
- c) **Maintain Support of Existing Pipelines.** Measures must be taken during the excavation and installation of water mains, sanitary sewer or storm drain pipelines to prevent, or at least minimize, disturbance to existing mains or pipelines (i.e., shoring and/or bracing). Disturbance of the supporting base material of a main or pipeline could result in the pipeline's eventual failure.
- d) **Corrosive Conditions.** Special consideration shall be given to the selection of pipe materials if corrosive conditions are likely to exist. These conditions may be due to soil type and/or the nature of the fluid conveyed in the conduit, such as a septic sewage which produces corrosive hydrogen sulfide.
- e) **Force Mains (Sanitary Sewer and Storm Drain).**
- Force mains shall comply with the Basic Separation Standards above.

- When a force main must cross a water main, the crossing shall be perpendicular (90°) or as close to perpendicular as is practical. The force main shall be at least twelve (12) inches below the water main.
- When a new force main crosses under an existing water main, all portions of the force main within ten (10) feet horizontally of the water main shall be enclosed within a continuous sleeve or casing pipe.
- When a new water main crosses over an existing force main, the water main shall be constructed of pipe materials with a minimum rated working pressure of 200 psi or equivalent pressure rating.

## CASE 1 - NEW SANITARY SEWER OR STORM DRAIN PIPELINE

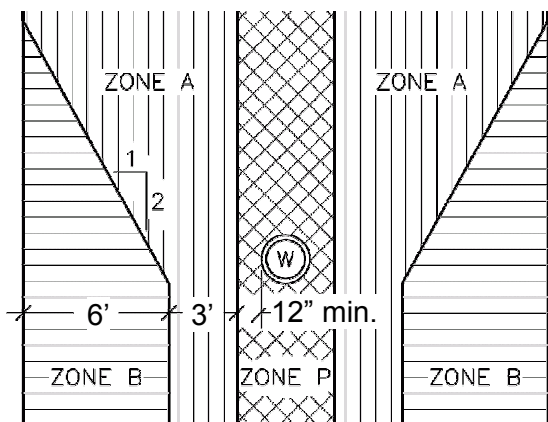
(See Figures 1 and 2)

ZONE	SPECIAL CONSTRUCTION REQUIREMENTS, SANITARY SEWER/STORM DRAIN
<b>A</b>	<b><u>PARALLEL</u></b> – No new sewer or storm drain pipeline to be installed parallel to an existing water main shall be permitted within <u>Zone A</u> without special approval from the Director.
<b>B</b>	<b><u>PARALLEL</u></b> – A new sanitary sewer or storm drain pipeline to be installed parallel to an existing water main and in <u>Zone B</u> shall be constructed of: <ol style="list-style-type: none"> <li>1. PVC SDR 26 with rubber ring joints (per ASTM D3034, D3212 &amp; F477);</li> <li>2. Ductile Iron pipe, polyethylene lined &amp; coated, with compression joints (per AWWA C150/A21.50, C151/A21.51, C104/A21.4 &amp; C105/A21.5); or</li> <li>3. Reinforced Concrete Pressure Pipe with compression joints (per AWWA C302, <i>Not for sanitary sewer, storm drain only</i>).</li> </ol>
<b>C</b>	<b><u>CROSSING</u></b> – A new sanitary sewer or storm drain pipeline to be installed crossing an existing water main and in <u>Zone C</u> shall be constructed of: <ol style="list-style-type: none"> <li>1. Ductile Iron pipe, polyethylene lined &amp; coated, with mechanical joints or continuous section (per AWWA C150/A21.50, C151/A21.51, C104/A21.4 &amp; C105/A21.5);</li> <li>2. A continuous section of Class 200 PVC SDR 14 (per AWWA C900), centered over the pipe being crossed; or</li> <li>3. A continuous section of Reinforced Concrete Pressure Pipe with compression joints (per AWWA C302), centered over the pipe being crossed ( <i>For storm drain only</i>).</li> </ol> <p style="text-align: center;"><i>Alternative piping systems may be proposed, subject to the review and approval of the Director.</i></p>
<b>D</b>	<b><u>CROSSING</u></b> – A new sanitary sewer or storm drain pipeline to be installed crossing an existing water main and in <u>Zone D</u> shall be constructed of: <ol style="list-style-type: none"> <li>1. Ductile Iron pipe, polyethylene lined &amp; coated, continuous section (per AWWA C150/A21.50, C151/A21.51, C104/A21.4 &amp; C105/A21.5);</li> <li>2. A continuous section of Class 200 PVC SDR 14 (per AWWA C900), centered over the pipe being crossed;</li> <li>3. A continuous section of Reinforced Concrete Pressure Pipe with compression joints (per AWWA C302), centered over the pipe being crossed (<i>For storm drain only</i>); or</li> <li>4. Standard sewer or storm drain pipeline materials separated from the water main by a ten (10) foot by ten (10) foot by four (4) inch thick reinforced concrete slab.</li> </ol> <p style="text-align: center;"><i>Alternative piping systems may be proposed, subject to the review and approval of the Director.</i></p>
<b>P</b>	<b><u>PARALLEL or CROSSING</u></b> – <u>Zone P</u> is a PROHIBITED zone. Water mains and sanitary sewer or storm drain pipelines must never be constructed within four (4) inches vertically and/or within twelve (12) inches horizontally of each other.

## CASE 2 - NEW WATER MAIN

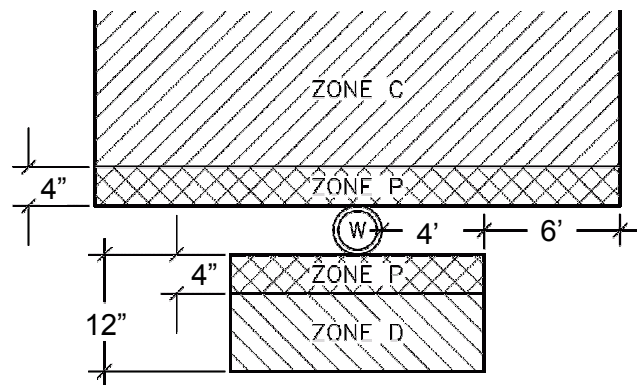
(See Figures 1 and 2)

ZONE	SPECIAL CONSTRUCTION REQUIREMENTS
<b>A</b>	<b>PARALLEL</b> – No new water mains parallel to existing sanitary sewers or storm drains will be permitted within <u>Zone A</u> without approval from the Director of Public Works.
<b>B</b>	<b>PARALLEL</b> – Existing sanitary sewer or storm drain pipeline paralleling a new water main and <u>does not meet the requirements of Case 1 - Zone B</u> : the new water main shall be constructed of either Ductile iron pipe or Class 200 PVC SDR 14, per these Water Specifications.
<b>C</b>	<b>CROSSING</b> – Existing sanitary sewer or storm drain pipeline crossing a new water main and <u>does not meet the requirements for Case 1 - Zone C</u> : the new water main shall have no joints in Zone C and shall be constructed of the same materials specified for Case 2 - Zone B, above.
<b>D</b>	<b>CROSSING</b> – Existing sanitary sewer or storm drain pipelines crossing a new water main and <u>does not meet the requirements of Case 1 - Zone D</u> : the new water main shall have no joints within four (4) feet from either side of the existing sanitary sewer or storm drain pipeline and shall be constructed of the same materials specified for Case 2 - Zone B, above.



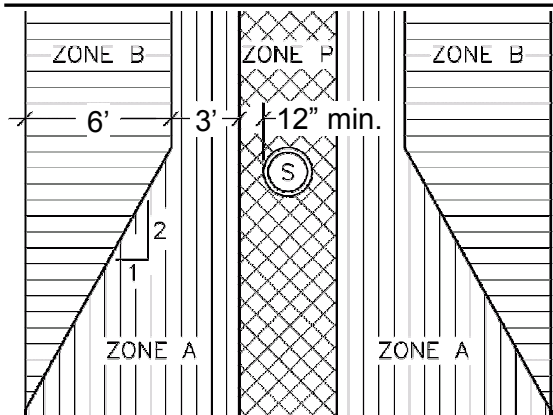
**PARALLEL**

**CASE 1**



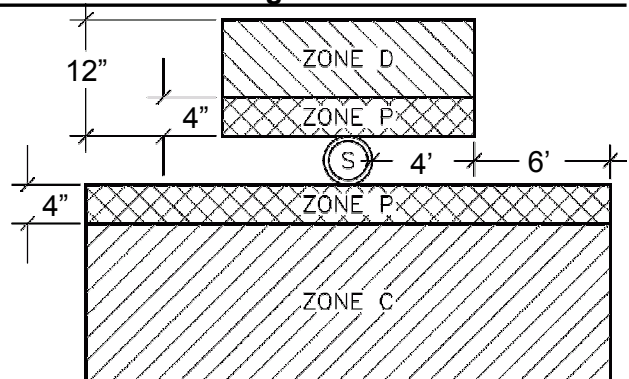
**CROSSING**

**NEW SANITARY SEWER OR STORM DRAIN – Figure 1**



**PARALLEL**

**CASE 2**



**CROSSING**

**NEW WATER MAIN – Figure 2**

## 1.11 DESIGN & LOCATION OF FIRE HYDRANTS

All new fire hydrants shall be designed to comply with these Water Specifications and shall be located and installed to the lines and grades shown and the approved Plans. Per Standard Detail SD-206, "Standard Hydrant Installation," fire hydrants shall be installed as follows:

- A. Only in locations approved by the Fire Chief:
  - 1. All fire hydrants shall be placed within five (5) feet of a curb return, where practical.
  - 2. If the distance to the next curb return exceeds the allowed distance to a hydrant, an additional hydrant shall be placed near that curb return and at mid-block.
- B. At least five (5) feet away from any of the following:
  - 1. Driveway or wheelchair ramp;
  - 2. Pole, luminaire or street sign; and
  - 3. Building entry sidewalk.
- C. At least ten (10) feet away from any sewer main or lateral.
- D. Aligned with a property line, whenever possible.
- E. At least ten (10) feet from the center of an existing parallel parking space.
- F. With protective retaining walls when subject to encroachment by an adjacent slope.
- G. Within a two (2) inch tolerance when installed at the standard 2'-0" distance from curb face.

In Low To Medium Density Residential Areas, the maximum distance to a hydrant shall be 200 feet and the hydrants shall be of the Modified Steamer type; In High Density Residential, Commercial, Industrial, Civic and School Areas, the maximum distance to a hydrant shall be 150 feet and the hydrants shall be of the Double Steamer type.

## 1.12 DESIGN & LOCATION OF WATER & FIRE SERVICES

All new water and fire services (laterals) shall be designed to comply with these Water Specifications and shall be located and installed to the lines and grades shown and the approved Plans.

- A. WATER SERVICES: The standard water service connection is a  $\frac{3}{4}$ " service pipeline and a  $\frac{5}{8}$  x  $\frac{3}{4}$  inch meter. Applicants may request to have a larger connection if they desire or if required by the Fire Department. Applicant shall pay for the difference in cost between the standard service and a larger connection. Per Standard Details SD-213 thru SD-219:
  - 1. Water service piping shall be run in a straight line perpendicular (90°) to the curb from the meter location.
  - 2. Between the water main and the water meter, the water service piping shall constructed be a minimum of 30 inches below the curb & gutter finished aggregate subbase elevation or 42 inches below the top of curb, whichever is deeper.
  - 3. Between the water meter and the structure, the water service piping shall be constructed a minimum of 18 inches below the finished surface grade.

4. Where non-metallic water service piping is used, tracer wire shall be installed from tap to meter box.
  5. Where a meter will serve two lots, the service and meter box must be centered on the common property line.
  6. Water meter boxes shall be installed a minimum of two (2) feet from the top of driveway flare or any facility.
  7. Water service piping and meters shall be installed a minimum of six (6) feet horizontally from sanitary sewer laterals.
  8. Only Water System Staff shall perform taps on active water mains and install water meters. Applicant may install the water service line between the tap and water meter. Applicant is responsible to install the water service line between the meter and the structure.
- B. **FIRE SERVICES:** For residential fire service connections, the minimum size of the service shall be one (1) inch. For commercial, industrial and multi-family residential fire service connections, the minimum size of the service shall be four (4) inches. Per Standard Detail SD-204, "Standard Fire Service Lateral":
1. Each fire service shall be installed with a "detector check valve."
  2. Only Water System Staff shall install detector check valves and trim meters; and fire service laterals to be connected to active water mains.

### **1.13 CONNECTIONS OF NEW WATER MAINS TO EXISTING WATER MAINS**

Connections of new water mains to existing water mains will be made as shown on the approved Plans. When a "Wet Tap" is designated, or when it is determined by the Engineer that a "Wet Tap" is required, only Water System Staff may install the gate valve and split tee or nozzle, and will make the tap. The Applicant or his agent must submit a request for such work through the Senior Utility Services Representative at 510-583-4727. The Applicant shall perform all other work necessary to complete the connection including, but not necessarily limited to, excavation, backfill, pavement replacement, and connection of the new main to the gate valve. Standard Detail SD-203 "Standard Tapping Tee and Valve Installation" provides specific dimensions for the excavation work and shall be followed by the Applicant.

Where connections are to be made at an existing blowoff, Applicant shall remove the blowoff assembly and make the closure.

No new mains shall be connected to the City's active or sanitized water mains, except by an approved jumper, until the bacteriological tests on the new mains have been approved by the City. The jumper pipe installed shall be as shown on Standard Detail SD-231, "Standard Jumper Pipe For Testing Only". Standard Detail SD-229, "Collar Type Thrust Block for New Water Main Testing" depicts how the water main shall be terminated in the vicinity of existing water mains for testing purposes.

Only Water System Staff may close valves in making a shutdown, if required, and open the valves in restoring pressure to an existing main and initiating pressure in the new installation.

The Applicant shall notify the Engineer not less than seventy-two (72) hours prior to needing the closure so that advance notice of the shutdown can be given to all customers that may be affected and Water System Staff can plan for the valve closures. The Applicant shall stipulate the expected duration of the shutdown. In general, shutdowns shall be kept as short as

possible and shall be made at times when there will be the least interference to the customer. If, due to the nature of the demand on the system, a shutdown of the system is not possible during normal working hours, the Engineer shall specify the date and time when a shutdown can be made and Applicant shall adjust his schedule accordingly.

All costs of making connections of new mains to existing mains shall be borne by the Applicant and paid to the Senior Utility Services Representative, regardless of the day or time at which the connection work must be performed.

#### **1.14 GUARANTEE**

The Applicant hereby guarantees that:

- A. Any work performed by him under this project will be performed in a manner approved by the Engineer;
- B. Any material furnished by him will be materials listed upon the City's "Water System Approved Materials" list (included in Appendix 'A');
- C. Both the work and the materials will meet fully the requirements of these Water Specifications; and,
- D. The completed water main and appurtenances will be located in accordance with Section 1.10 of these Water Specifications.

The Applicant hereby agrees to promptly reinstall, at his own expense, any part of the water main or any appurtenance that has not been installed in accordance with these Water Specifications.

The City has sole responsibility for making repairs to the pipeline once it is placed in service. The Applicant further agrees that if, within a period of one (1) year after written final acceptance of any portion of the work done under the project, any part of the said pipelines or other structures furnished and installed or constructed by him shall develop leakage or fails to fulfill any of the requirements of these Specifications, or should the pavement or ground surface over the trench be damaged due to settlement of the backfill or due to poor material and/or workmanship, he will reimburse the City for all costs of said repairs (including 15% overhead).

The Applicant shall be responsible for the full expense incidental to making good any and all of the above guarantees and agreements. The above guarantees and agreements are covenants, the performance of which shall be binding upon the Applicant and his sureties.

#### **1.15 CLEANUP OF SITE**

During the progress of the work, the Applicant shall keep the premises occupied by him in a neat and sanitary condition and shall leave them so at the conclusion of the work. He shall dispose of refuse as often as directed by the Engineer or as may be necessary, so that at no time shall there be any accumulation of rubbish. In the event that known contaminants are encountered during the installation of a water main, Applicant shall provide and carry out a remediation plan at his own expense.

#### **1.16 RESPONSIBILITY OF THE APPLICANT**

The Applicant shall protect, restore or cause to be restored all damaged property, including sidewalks; curb and gutter; pipes; conduit; gas, water and other services; meter boxes; sewers;

monuments; stakes; trees; shrubs and other planting; and other public or private property to a condition as good as it was when he entered upon the work. The Applicant shall provide and maintain such fences, barricades, signs, warning lights, traffic control and flaggers as may be required to provide safety against accidents to the public. In no case shall the spacing between the warning lights be more than fifty (50) feet along the length of the trench where it is adjacent to or within the boundaries of a thoroughfare. No material or other obstruction shall be placed within fifteen (15) feet of fire hydrants. Convenient access to driveways, houses, and buildings along the line of work must be maintained at all times. Temporary approaches to, and crossings of, intersecting streets shall be provided and kept in good condition.

All safety orders, rules, and recommendations of the Division of Industrial Safety of the Department of Industrial Relations of the State of California applicable to the work to be performed under this contract shall be obeyed and enforced by the Applicant. The Applicant shall comply with all applicable City regulations, to include the current CAL-OSHA Standards.

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## **PART 2 - MATERIALS**

### **2.01 POLYVINYL CHLORIDE (PVC) PIPE, FITTINGS AND COUPLINGS**

PVC pressure pipe and fittings shall conform to AWWA C900 and shall be Class 150 unless otherwise indicated on the plans. PVC pressure pipe shall be JM, Pacific Western, Vinyl Tech, Diamond or approved equal.

One coupling with two rubber gaskets shall be furnished with each length of pipe. It shall be of the same material and by the same manufacturer as the pipe and conform to ASTM D3139.

Rubber gaskets shall conform to ASTM F477.

Couplings shall be designed to insure a watertight joint with the pipe when subjected to the same hydrostatic test as designated for the pipe.

All PVC pipe and couplings shall be designed and machined to the tolerances of, and be interchangeable with, pipe of other manufacturers meeting AWWA C900 standards.

Testing of the pipe and couplings shall be made in accordance with AWWA C900. Regardless of the place of manufacture, all pipe shall be tested within the Continental United States.

A Certificate of Compliance with all provisions of these Water Specifications shall be furnished by the manufacturer for all pipe furnished.

### **2.02 DUCTILE IRON (DI) PIPE**

Ductile Iron (DI) pipe shall conform to AWWA C150/A21.50 and AWWA C151/A21.51. Pipe shall be cement lined and seal coated in conformance to AWWA C104/A21.4. Thickness Class shall be Number 50 for pipe six (6) inches through thirty-six (36) inches and Number 51 for pipe four (4) inches and smaller. All DI pipe shall be polywrapped (see Section 2.13). DI pipe shall be U.S. Pipe, Pacific States or approved equal.

Mechanical joints shall conform to AWWA C111/A21.11 and be Star, Tyler, US Pipe, Union Foundry, Sigma or approved equal. Flanged joints shall conform to AWWA C115/A21.15. Gaskets for flanged joints shall be as recommended by the manufacturer. Couplings shall be designed to insure a watertight joint with the pipe when subjected to the same hydrostatic test as designated for the pipe.

A Certificate of Compliance with all provisions of these Water Specifications shall be furnished by the manufacturer for all pipe furnished.

### **2.03 DUCTILE IRON FITTINGS**

Ductile iron (DI) fittings shall conform to AWWA C110/A21.10. Fittings shall be Class 250. Fittings shall be cement lined and seal coated in conformance with AWWA C104/A21.4. Joints shall be designed to accommodate the pipe joints. DI fittings shall be Star, Tyler, U.S. Pipe, Union Foundry, Sigma or approved equal.

Flanged joints shall conform to AWWA C115/A21.15. Gaskets for flanged joints shall be as recommended by the manufacturer.

### **2.04 FLEXIBLE COUPLINGS**

Flexible couplings shall conform to AWWA C219, and shall be installed in accordance with the manufacturer's recommendations and tested for leaks. All bolts and nuts used on flexible couplings shall be Type 304 stainless steel. Flexible couplings shall be Power Seal, Ford, APAC, ROMAC, Viking-Johnson, Mueller or approved equal.

### **2.05 VALVES**

Valves shall not be installed in the City's Water System until approval for the particular brand name and model number has been granted in writing by the Engineer. Requests for approval shall be submitted in writing with two (2) copies of the manufacturer's drawings for each type of valve to be furnished, together with a certification from the manufacturer that the valves meet all the requirements of these Water Specifications. A minimum of two (2) weeks shall be allowed for review of submittals. Approval by the Engineer shall not constitute a waiver of any portion of these Water Specifications.

Valve ends shall conform to the requirements for bell, mechanical or flanged joints per Section 2.03, "Ductile Iron Fittings," of these Water Specifications.

All valves shall open counterclockwise (left).

Valves four (4) inches and larger shall be supplied with two (2) inch square wrench nuts as required in AWWA C509. All valves smaller than four (4) inches shall be supplied with handwheels.

All interior ferrous surfaces shall have an epoxy finish in accordance with AWWA C550 and all exterior ferrous surfaces shall have an asphalt varnish per AWWA C509.

- A. GATE VALVES: Shall be Resilient-Seat or Resilient-Wedge, used where valves four (4) inches through twelve (12) inches are shown on the plans and shall conform to AWWA C509. Gate valves shall be Mueller, Kennedy, American Flow Control, Clow, M&H, Pratt or approved equal.
- B. BUTTERFLY VALVES: Shall be used where valves larger than twelve (12) inches are shown on the plans, or where required by the Engineer, and shall conform to AWWA C504. If butterfly valves are to be used, additional and supplementary specifications are required and will be provided by the City.
- C. AIR VALVES: Air valve assemblies shall be as shown on Standard Detail SD-226 and shall conform to AWWA C512. Air valves shall be one (1) inch in size, of the

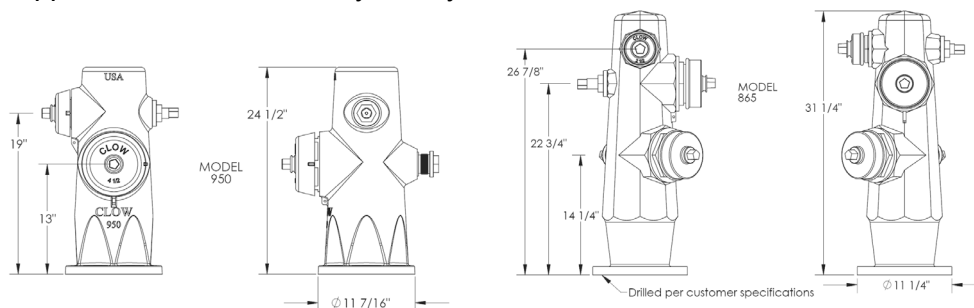
combination type, with a working pressure of 150 psi unless otherwise approved by the Engineer. Air valves shall be APCO (143C), Crispin (C-10) or approved equal.

## 2.06 RESTRAINED MECHANICAL JOINTS

If the approved Plans require restrained mechanical joints for pipe joints, fittings or valves, a ductile iron retainer gland shall be used that conforms to AWWA C111/A21.11, as manufactured by EBAA Iron (Megalug® Series 1100 or 2000PV, as appropriate) or approved equal.

## 2.07 FIRE HYDRANTS

Fire hydrants shall be Wet Barrel (California type) with individual valves on all outlets for general water work service. The location and type of hydrants shall be shown on the plans. The Fire Marshal and/or the Director of Public Works shall specify and/or approve the locations and configuration of fire hydrants to be installed. The required configuration of hydrants and models approved for use in the City of Hayward are as follows:



- A. Modified Steamer Hydrant: Clow Valve Co. Model LB 614 (similar to Model 950, 195 lb heavy duty hydrant) with one (1) 2-½" Outlet & one (1) 4-½" Outlet.
- B. Double Steamer Hydrant: Clow Valve Co. Model 865 with one (1) 2-½" Outlet & two (2) 4-½" Outlets

In addition, fire hydrants shall comply with AWWA C503 and the following additions or modifications:

1. Hose outlet and pumper outlet threads shall conform to NFPA No. 194 "National Standard Fire Hose Coupling Screw Threads";
2. Hydrant inlet flange shall be 6" with a 9-⅜" bolt circle for six (6) ⅝" bolts through ¾" diameter holes. All outlets shall open counterclockwise (left);
3. Outlet nozzle caps shall be furnished for all outlets. Caps shall be secure to the hydrant barrel by means of chain or stainless steel cable. A bleeder hole of not less than ⅛" in diameter shall be drilled in each outlet cap to eliminate pressure build-up due to a partially open or leaky valve;
4. Painting shall conform to AWWA Standard C503. Finish coat of hydrant top section shall be Equipment Yellow, Rustoleum V2148838 (can) or Rustoleum 3445402 (gallon). The Contractor shall apply an additional finish coat after installation.
5. Cast on each top and bury section shall be the casting date; and,
6. Cast on each hydrant top or barrel shall be the words "CITY OF HAYWARD" in raised letters ¾" in height.

7. The Applicant shall install and maintain the red "NOT IN SERVICE" signs furnished by the Engineer on all new hydrants until the hydrants are placed into service.

## **2.08 BLOW-OFFS**

Materials for blow-offs shall be as shown on Standard Details SD-211 & SD-212.

## **2.09 VALVE BOXES**

All valve boxes and covers shall be the Christy G-5 Traffic Valve Box or approved equal. Covers shall have "WATER" cast on the top, as shown on Standard Detail SD-205. Christy G-5 valve boxes and covers are available for purchase at the City's Water Service Materials store.

## **2.10 TRENCH TAPE AND TRACER WIRE**

Trench tape shall be a minimum of two (2) inch wide, blue with white lettering, and shall carry the following inscription: "CAUTION BURIED WATER LINE BELOW." Trench tape shall be Calpico, Allen Systems, or approved equal.

Tracer wire shall be blue, #12 (AWG) solid/single copper conductor strand with THWN or polyethylene insulation suitable for direct burial and wet conditions, as shown on Standard Detail SD-228. The tracer wire shall be continuous and splices shall be made with two copper or brass split bolt fasteners without encapsulation in epoxy. Continuity testing for tracer wire is at the discretion of the Engineer.

## **2.11 WATER SERVICE CONNECTIONS**

Materials for water service connections shall be as shown on Standard Details SD-213 thru SD-220, excluding SD-216. In addition, materials for fire service laterals shall be as shown on Standard Detail SD-204. Valves and fittings for water service connections shall also conform to AWWA C800. In general (and for design purposes only), the pipe materials for water service connections may be as follows:

- A. Service lines 2" or less can be Copper, Type K (Standard sizes  $\frac{5}{8}$ ",  $\frac{3}{4}$ ", 1", 1- $\frac{1}{2}$ " & 2");
- B. Service lines 1" or less can be Polyethylene (PE), Type 3408 NSF conforming to AWWA C901 (Standard iron pipe sizes  $\frac{5}{8}$ ",  $\frac{3}{4}$ " & 1");
- C. Service lines larger than 2" shall be PVC or ductile iron (DI) conforming to these Water Specifications; and,
- D. Polybutylene is no longer used or allowed for water service piping.

The Applicant shall purchase all Water Service Materials from Water System Staff at the Corporation Yard located at 24505 Soto Road. Call the "Store" at 510-881-7994 for additional information or to place an order a minimum of five (5) working days prior to pickup. 'Water Service Materials' include all materials required to connect a water (or fire) meter to a water main, as shown on SD-213 thru SD-220, excluding SD-216. Approved meter boxes may be purchased at either the Corporation Yard or any other supplier. For additional requirements, Applicant's attention is directed to Section 3.14, "Service Connections," of these Water Specifications.

## 2.12 BACKFLOW PREVENTION DEVICES

Backflow prevention devices are required on all metered industrial, commercial and irrigation water services, with the exception of Class 1 and Class 2 Fire Sprinkler Systems. (Fire service laterals, including residential fire services one (1) inch and larger, are installed by the Department with Double Detector Check Valve Assemblies with a Trim Meter, as shown on Standard Detail SD-204.)

Double Check Valve Assemblies shall be as shown on Standard Detail SD-201 and conform to AWWA C510. Reduced Pressure Principal Backflow Prevention Devices shall be as shown on SD-202 and conform to AWWA C511.

## 2.13 PROTECTION FROM CORROSION

Corrosion protection shall meet the requirements of these Water Specifications and as shown on the Plans. Where corrosion protection requirements for directly buried ferrous metal have not been shown on the Plans or specified in detail, a mastic or tape coating shall be applied. The determination of the type of coating to be applied in each instance shall be reserved to the Engineer. Ferrous metal items to be protected shall include, but not be limited to, valves, fittings, service lines, reinforcing steel, anchor rods, flexible couplings, bolts, and nuts, flanges, saddles, tapping sleeves, hydrant buries, and plugged end and blow off assemblies. Mastic and tape coated ferrous metal shall also be protected with polywrap. All copper piping or any copper or brass part shall not be permitted to contact steel or cast iron pipe at any point. If contact is unavoidable, the copper or brass part shall be mastic or tape coated. All cast iron, steel or other ferrous metal shall be insulated from any concrete structure, such as footings, anchor blocks, encasements or structure walls using mastic, tape coating or other specified coating system extending six (6) inches beyond the concrete. All coatings shall be continuous, unbroken, and pinhole free. Protective coatings shall only be applied over a properly prepared surface.

Metal harness or tie rods may be required at connections to existing hydrant runs and fire services to allow the mains to be put in service immediately after mains are connected. If required on the approved Plans, all metal harnesses, steel rods and clamps shall be galvanized or coated with Koppers Company Bitumastic No. 30 or EC 244, as manufactured by Minnesota Mining and Manufacturing Company or approved equal.

- A. POLYWRAP (Polyethylene Protective Wrapping): General purpose adhesive tape shall be two (2) inches wide by 10 mils thick, Scotchrap No. 50, Polyken No. 900, Tapecoat CT, Protecto Wrap No. 200, or approved equal.

Polywrap shall conform to AWWA C105/A21.5 for Type 1, Class C (black), Grade E1. Minimum tube sizes are listed below:

### POLYWRAP FLAT TUBE WIDTH (Inches)

<u>Nominal Pipe Diameter (Inches)</u>	<u>Ductile Iron Pipe with Bell &amp; Spigot Joints</u>	<u>Ductile Iron Pipe with Mechanical Joints</u>
4	14	16
6	17	20
8	21	24
10	25	27
12	29	30

If pipe sizes larger than 12 inches are to be installed, additional and supplementary specifications are required and will be provided by the City.

- B. MASTIC COATING: Protective mastic coating shall be a coal tar synthetic resin solvent release, cold applied coating. The mastic coating shall be Protecto Wrap CA 1200 Mastic or approved equal.
- C. TAPE COATING PRIMER: Primer for tape coating shall be Protecto Wrap No. 1170, or approved equal.

## 2.14 TRENCH SECTIONS

Materials for trench sections shall be as shown on Standard Detail SD-310 and per these Water Specifications.

- A. ASPHALT CONCRETE: Asphalt concrete (AC) for pavement replacement shall be Type A and shall conform to the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications and these Water Specifications. AC shall be produced from commercial quality virgin asphalt and aggregates and shall conform to the following requirements:
  - 1. Asphalt concrete shall be produced at a central mixing plant;
  - 2. Aggregate shall conform to the ½ inch maximum, medium grading specified in Section 39-2.02, "Aggregate," of the Standard Specifications, except that ¾ inch maximum medium grading may be used below the top 0.15 feet (i.e., final lift);
  - 3. The amount of asphalt to be mixed with the aggregate shall be between four (4) percent and seven (7) percent by weight of dry aggregate;
  - 4. The grade of asphalt to be mixed with the aggregate shall be PG 60-10;
  - 5. Paint binder (tack coat) shall conform to the provisions of Section 94, "Asphaltic Emulsions," of the Standard Specifications and shall be SS-1H, unless otherwise directed by the Engineer;
  - 6. Temporary pavement shall consist of asphalt concrete conforming to the requirements herein or cutback asphalt concrete consisting of a mixture of cutback asphalt and minimum sized aggregate as specified by the Engineer. The use of cutback asphalt for trenches will not be allowed during the months of April through October.
- B. AGGREGATE SUBBASES and AGGREGATE BASES: Aggregate subbase (ASB) shall be Class 2 and shall conform to the provisions in Section 25 of the Standard Specifications and these Water Specifications. Reclaimed asphalt concrete, portland cement concrete, lean concrete base, cement treated base, and/or glass may be processed and used as aggregate for aggregate subbase.

Aggregate Base (AB) shall be ¾ inch maximum Class 2 and shall conform to the provisions in Section 26 of the Standard Specifications and these Water Specifications. Reclaimed asphalt concrete, portland cement concrete, lean concrete base, cement treated base, and/or glass may be processed and used as aggregate for aggregate base.

Aggregate for ¾ inch maximum Class 2 AB shall conform to the following gradation requirements:

Note: Standard Detail SD-310 is superseded by SD-125

**PERCENTAGE PASSING (¾" Maximum)**

<b><u>Sieve Sizes</u></b>	<b><u>Operating Range</u></b>	<b><u>Contract Compliance</u></b>
2"	----	----
1-½"	----	----
1"	100	100
¾"	90-100	87-100
No. 4	35-60	30-65
No. 30	10-30	5-35
No. 200	2-9	0-12

- C. The 2<sup>nd</sup> paragraph in Section 26-1.02A, "Class 2 Aggregate Base," is waived.
- D. QUARRY FINES and DRAIN ROCK: Aggregate for quarry fines and drain rock shall conform to the following gradation requirements as shown on Standard Detail SD-310 "Standard Permit and Subdivision Trench Sections", Sheet 2 of 3:

**PERCENTAGE PASSING**

<b><u>Sieve Sizes</u></b>	<b><u>Quarry Fines</u></b>	<b><u>Drain Rock</u></b>
2"	----	----
1-½"	----	----
1"	100	100
¾"	95-100	95-100
No. 4	40-90	0-25
No. 30	15-40	0-5
No. 200	5-20	0

In addition, Drain Rock shall have a minimum durability of 40.

**2.15 PORTLAND CEMENT CONCRETE**

Materials for portland cement concrete shall conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications. (Note: Section 90, "Portland Cement Concrete," can only be found in Caltrans' "Amendments to 2002 Standard Specifications." A copies of Section 90 are available upon request).

The concrete Classes A, B, C and D specified in the City of Hayward Standard Details are defined as follows:

Class A Concrete (6-sack-mix): ≥ 564 pounds of cementitious material per cubic yard.

Class B Concrete (5-sack-mix): ≥ 470 pounds of cementitious material per cubic yard.  
(Typical for Valve Boxes, Manholes, Curb & Gutters and Sidewalks)

Class C Concrete (4-sack-mix): ≥ 376 pounds of cementitious material per cubic yard.  
(Typical for Thrust, Reaction & Support Blocks)

Class D Concrete (7-sack-mix): ≥ 658 pounds of cementitious material per cubic yard.

Materials for minor concrete shall conform to the requirements of Section 90-10, "Minor Concrete," of the Standard Specifications and these Water Specifications.

Reinforcing steel shall be Grade 40 or better and shall conform to Section 52, "Reinforcement," of the Standard Specifications.

## **2.16 REPLACE EXISTING SIDEWALK AND CURB & GUTTER**

Where the existing sidewalk or curb & gutter are damaged by the installation of water mains, service lines or water meter boxes, Applicant shall replace them in accordance to Standard Details SD-107 and SD-108. Base rock material shall be Class 2 Aggregate Subbase.

Concrete for sidewalk shall be Class B and shall conform to Section 90, "Portland Cement Concrete," of the Standard Specifications. In addition, concrete shall contain one (1) pound of lamb black per cubic yard.

## **2.17 SLURRY SEAL**

If the approved plans require slurry sealing of a street, slurry seal shall conform to the provisions in Section 37-2, "Slurry Seal," of the Standard Specifications and these Water Specifications.

Aggregate for slurry seal shall be Type II.

## **2.18 MARKER POSTS**

Marker posts shall be as shown on Standard Detail SD-222, "Standard Facility Reference" and shall be placed at the locations shown on the approved Plans except where location can be marked on curbs.

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# **PART 3 - INSTALLATION**

## **3.01 GENERAL**

All new water mains shall be in conformance with these Water Specifications and shall be installed to the lines and grades shown and the approved Plans. The alignment and elevation of the water main and appurtenances shall be established in the field by the Applicant either by measurements from curb and gutter or by surveying based upon and conforming to the approved Plans.

The location of valves, blowoffs, air valves, and other installed appurtenances shall be clearly referenced by offset stakes or by marking the curb. All installed appurtenances shall be protected from damage. Operating nuts (in the valve pots) of valves controlling live pipelines shall be accessible and operational at all times.

The Applicant is specifically cautioned as to the possibility of empty pipeline floating due to flooding of the trench by ground water, rain water or backfill consolidation. For this reason, "jetting" for backfill consolidation will not be allowed. Should any pipe sections be flooded by water in the trench, that reach of pipeline shall be removed, any damaged pipe repaired, the trench re-excavated, de-watered, and the pipe reinstalled at the Applicant's expense.

The interior of the pipe shall be kept free from dirt and debris as the pipe laying progresses. Care shall be taken to make certain that the pipe, after proper cleaning, remains clean. Open ends shall be plugged watertight when work is stopped, or for any other reason work is left

unattended. All openings in the pipeline shall be kept covered or plugged at all times. Care shall be taken to prevent trench water from entering the pipeline during all stages of construction.

### **3.02 GRADING AND CURBS & GUTTERS**

Prior to installing a water main, earthwork and rough grading shall be completed and approved cut-sheets of pipeline construction staking shall have been provided by the Construction Inspector. The pavement subgrade shall be acceptable to the City, or Alameda County if work is located in the unincorporated area, and curbs & gutters shall have been constructed.

Installation of a water main prior to curb & gutter construction may be considered for approval by the Engineer if the Applicant submits written verification to the Engineer that the following conditions are met and are available for inspection:

- A. The street area has been rough graded to the extent that the sanitary sewer main is installed with at least two (2) feet of cover from the grading plane to the top of pipe when ductile iron sanitary sewer main is used, three (3) feet of cover when PVC SDR-26 is used, and five (5) feet of cover when VCP is used. Placing the grading plane closer to the top of sanitary sewer pipe than is stated above is not allowed;
- B. Construction survey stakes have been placed indicating curb grade and alignment, water main alignment and cuts for excavation for the water main in accordance with City requirements;
- C. Cut-sheets indicating the elevation of the streets, curbs and the water main have been submitted to the City Survey Section and approved by the Engineer;
- D. The alignment and grade of the street area are in accordance with the improvement plans approved by the City;
- E. The main and appurtenances will be located in accordance with Section 1.10, "Design and Location of Main and Appurtenances," of these Water Specifications; and
- F. The Applicant agrees to promptly relocate the main and appurtenances at his own expense should the street grade or alignment be changed for any reason after the main is installed.

### **3.03 ALIGNMENT**

All pipes shall be laid and maintained to the lines and grades shown on the approved Plans. Fittings, valves and hydrants shall be set at the required locations and with joints centered, spigots home and all valves and hydrant stems plumb. No deviation shall be made from the required line or grade except with written consent of the Engineer.

Water mains shall not be run or laid in the same trench with other utilities. Where existing sanitary sewer or storm drain pipeline parallels the path of the water main, horizontal separation shall conform to the requirements in Section 1.10 of these Water Specifications. Where existing sanitary sewer or storm drain pipeline crosses the path of the water main, vertical separation shall be a minimum of twelve (12) inches shall be constructed in accordance with the requirements in Section 1.10 and as shown on Standard Details SD-224 and SD-303.

Water service lines or any underground water pipes shall not be run or laid in the same trench with building sewer or drainage service lines, except as provided in this section and specifically

approved by the Director of Public Works. If approved, the water service pipe may be placed in the same trench with such building drain and building sewer, provided it complies with the requirements in Section 1.10 and both of the following conditions are met:

- A. The bottom of the water service pipe, at all points, shall be at least twelve (12) inches above the top of the sewer line; and
- B. The water service pipe shall be placed on a solid shelf excavated at one side of the common trench. It should be noted that this may require excavating a trench more than twice as wide as that for a single utility trench.

### **3.04 OPERATION OF VALVES ON WATER LINE IN USE**

Valves on existing water mains in the Hayward Municipal Water System or new valves introducing water to new mains are to be operated only by an authorized employee of the Department. Applicant's employees shall not open or close these valves. The Applicant shall give a minimum 2 working days notice to the Engineer prior to need for valve operation.

### **3.05 MAINTAINING TRAFFIC**

Attention is directed to Sections 7-1.08, "Public Convenience," 7-1.09, "Public Safety," and 12, "Construction Area Traffic Control Devices," of the Standard Specifications. Nothing in these Water Specifications shall be construed as relieving the Applicant from his responsibility as provided in said Section 7-1.09.

#### **A. STANDARD REQUIREMENTS:**

1. "No Parking" signs must be posted at no greater than 50 foot intervals at least 48 hours prior to effective time of parking restriction. Applicant must clearly indicate on the signs the day, date(s), and hours that "No Parking" is necessary.
2. Adequate traffic warning and control devices shall be provided and maintained by the Applicant during the contract period, in accordance with the current "Manual of Traffic Controls for Construction and Maintenance Work Zones," issued by the State Department of Transportation. When inadequate traffic warning and control devices have been installed, the City shall provide whatever facilities are deemed necessary and will charge the Applicant for the costs thereof, as provided in Chapter 7, Article 2 of the Hayward Municipal Code.
3. Personal vehicles of the Applicant's employees shall not be parked on the traveled way at any time, including any section closed to public traffic. When entering or leaving roadways carrying public traffic, the Applicant's equipment, whether empty or loaded, shall in all cases yield to public traffic. Safe and convenient pedestrian access shall be provided, at all times.
4. Flaggers are mandatory at locations where equipment is intermittently blocking a traffic lane, or where only one lane is available for two-directional traffic. One flagger is required for each direction of traffic affected where only one lane is available for over 100 feet, or when required by the Engineer. When less than 20 feet of street width is available for two-directional traffic, one lane control shall be imposed with appropriate flaggers. Flaggers shall wear approved distinctive clothing.

5. Applicant shall cooperate with local authorities relative to handling traffic through the area and shall make their own arrangements relative to keeping the working area clear of parked vehicles.
6. Police services for traffic control are available upon request and shall be coordinated through the City of Hayward Police Department, Traffic Division, (510) 293-7011, 48 hours in advance. If excessive traffic congestion occurs at any time during the period of project construction due to the neglect of the contractor to provide adequate controls, the Engineer will arrange the services of the Police Department. The traffic control services of the Police Department shall be at the Applicant 's expense.
7. On all streets, the full width of the traveled way shall be open for use by public traffic on Saturdays, Sundays, and designated legal holidays, after 4:00 p.m. on Fridays, and when construction operations are not actively in progress. Any exceptions will be described in the "Special Requirements" of this Section.
8. For the purpose of maintaining traffic, designated legal holidays mentioned above are: January 1st, the third Monday in January, the third Monday in February, the last Monday in May, July 4th, the first Monday in September, November 11th, Thanksgiving Day and December 25th. When a designated legal holiday falls on a Sunday, the following Monday shall be a designated legal holiday. When November 11th falls on a Saturday, the proceeding Friday shall be a designated legal holiday.

**B. SPECIAL REQUIREMENTS:**

1. Traffic control for lane closure shall conform to the details shown on the on State Standard Plans T-11, T-12, and T-13.
2. A minimum of one traffic lane, not less than 10 feet wide, shall be maintained in all areas. If only one lane is available for two way traffic, appropriate flagmen shall be used as specified in this section of these Special Provisions.
3. Safe and convenient pedestrian access shall be provided at all times.
4. Applicant shall install and maintain all construction signs conforming to State of California Standards and as directed by the Engineer.
5. Applicant shall place new striping in kind for lane lines and pavement markings that have been removed by excavation.

**3.06 DUST CONTROL AND STORM DRAIN POLLUTION PREVENTION**

- A. DUST CONTROL: Applicant shall implement dust control measures conforming to the provisions in Section 10, "Dust Control," of the Standard Specifications.
- B. STORM DRAIN POLLUTION PREVENTION: Applicant shall comply with the requirements of Chapter 11, Article 5 of the Hayward Municipal Code, "Stormwater Management And Urban Runoff Control."

"Where best management practice guidelines or requirements have been adopted by any federal, State of California, regional, and/or City agency, for any activity, operation, or facility which may cause or contribute to stormwater pollution or contamination, illicit discharges, and/or discharge of non-stormwater to the stormwater system, every person

undertaking such activity or operation, or owning or operating such facility, shall comply with such guidelines or requirements.”

### 3.07 WATERING

Watering shall conform to the provisions in Section 17, "Watering," of the Standard Specifications, except that no compensation for water supply shall be considered.

Water is available from the City of Hayward fire hydrants at or near the site of work. The Applicant shall make application to the Hayward Water Department and make payment of the appropriate fee or deposit for a construction water meter. The Applicant shall meter all water taken from the Hayward Water System and pay the current rates for water consumed.

### 3.08 OBSTRUCTIONS

Attention is directed to Sections 8-1.10, "Utility and Non-Highway Facilities," and Section 15, "Existing Highway Facilities," of the Standard Specifications.

Applicant shall show the approximate location of all existing utilities on the Plans. Five (5) working days prior to the start of work, the Applicant shall request the applicable utility companies to mark the appropriate locations of their facilities.

It shall be the Applicant's responsibility to locate all utilities at least 10 days before working in any area where other utilities are located. All utilities should be remarked every 14-days.

Prior to performing any excavation one (1) foot or more in depth, the Applicant shall notify Underground Services Alert at least two (2) working days prior to the beginning of any excavation.



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Where required on the approved Plans, Applicant shall pothole existing utilities to determine their exact location and depth prior to performing any excavation operations in the subject area. Applicant shall submit to the Engineer drawings indicating the location and depth of all utilities encountered during potholing and/or trenching operations.

### 3.09 TRENCH EXCAVATION AND BACKFILL

All trenching and backfilling shall conform to the provisions in Section 19, "Earthwork", of the Standard Specifications and these Water Specifications.

The Applicant shall notify adjacent property owners of the work schedule and necessary access restrictions a minimum of 5 working days prior to start of operations.

The Applicant shall verify the location of existing underground utilities before trenching in accordance with Section 3.08, "Obstructions," of these Water Specifications.

Surplus excavated material shall become the property of the Applicant and shall be disposed of outside the street right-of-way and water, sewer, or storm drain easements in accordance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right-of-Way," of the Standard Specifications.

The Applicant shall make his/her own arrangements for a staging area for the temporary stockpiling of material and equipment storage. The Applicant will not be allowed to use public streets or property for such purpose.

Prior to using any property as a staging area, the Applicant shall submit to the Engineer a written release from the property owner absolving the City of any and all responsibility in connection with the use of such property in accordance with Section 7-1.13 "Disposal of Material Outside the Highway Right of Way".

Excavation for pipes shall be by open trench unless otherwise specified, or shown on the plans, or permitted by the Engineer. No excavated material will be allowed to be stockpiled overnight in or adjacent to public right-of-ways.

Existing concrete and bituminous pavement to be removed for installation of a pipeline, before being broken and removed, shall be neatly sawed along the edges of the area to be removed to a depth of two (2) inches minimum, with a concrete pavement saw. This shall be in straight lines parallel to the trench and in the case of bituminous pavement twelve (12) inches outside the sides of the pipe trench.

Except by permission of the Engineer, the maximum length of open trench shall be 200 feet or the distance necessary to accommodate the amount of pipe installed in a single day, whichever is greater. The distance is the collective length at any location, including open excavation, pipe laying and appurtenant construction and backfill which has not been temporarily resurfaced.

All excavation limits, backfill materials and compaction shall conform to the requirements shown on Standard Detail SD-310, "Standard Permit and Subdivision Trench Sections," or as shown on the approved Plans and as directed by the Engineer. In the event trench width exceeds the indicated maximums, the Applicant shall provide special bedding or extra strength pipe, as required by the Engineer. Backfill shall be replaced around exposed existing utilities to the same conditions as existed prior to excavation.

All trenches in State Highways or in unincorporated areas of Hayward shall be backfilled strictly in accordance with the provisions of the encroachment permits issued by the respective agencies.

Permanent pavement shall be placed to the finish grade on the same work day temporary pavement is removed. Testing, backfilling, compacting to the required relative compaction, and placing of temporary pavement shall be performed immediately after placing pipe.

- A. **DEWATERING:** All water encountered in constructing the water line shall be disposed of by the Applicant in such manner as will not damage public or property or create a nuisance or health menace. The Applicant shall furnish, install, and operate pumps, pipes, appliances, and equipment of sufficient capacity to keep all excavations and accesses free from water until the excavation is backfilled, unless otherwise authorized by the Engineer. The Applicant shall provide all means of facilities necessary to conduct water to the pumps. Water, if odorless and stable, may be discharged into an existing storm drain, channel, or street gutter in a manner approved by the Engineer. When required by the Engineer, Applicant shall provide a means for desilting the water before discharging it at Applicant's expense. If water has an odor or appears contaminated, immediately contact City's Water Pollution Source Control Division at 510-881-7900 for further information regarding discharge requirements and notify the Engineer.
- B. **EXCAVATION:** The trench shall be excavated to a depth required to allow for placement of bedding material. Bedding material shall provide a uniform and continuous bearing and support for the pipe at every point between bell holes or joints unless otherwise shown on the Plans. It will be permissible to disturb the finished bedding

surface over a maximum length of eighteen (18) inches near the middle of each length of pipe by the withdrawal of pipe slings or other lifting tackle.

Any part of the bottom of the trench excavated below the specified grade shall be backfilled with approved material thoroughly compacted as directed by the Engineer. The finished grade of the bedding material shall be prepared accurately by means of hand tools.

Where the bottom of the trench at subgrade is found to be unstable or to include ashes, cinders, all types of refuse, vegetable or other organic material or large pieces or fragments of inorganic material which in the judgment of the Engineer should be removed, the Applicant shall excavate and remove such unsuitable material to the width and depth ordered by the Engineer. Before the pipe is laid, the subgrade shall be made by backfilling and compacting in two (2) inch layers with material as specified on Standard Detail SD-310, "Standard Permit and Subdivision Trench Sections," or as specified by the Engineer.

All excavated materials shall be exported off-site. The delivery site must be approved by the Engineer prior to use.

All excavated material shall be removed from the project site concurrent with the excavation operations. Hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, fire and police call boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Gutters and drainage channels shall be kept clear at all times. All excavated material shall be piled in a manner which will not endanger the work and which will avoid obstructing sidewalks and driveways.

- C. MECHANICALLY COMPACTED BACKFILL: Backfill shall be mechanically compacted by means of tamping rollers, sheepsfoot rollers, pneumatic tire roller, vibrating rollers, or other mechanical tampers. All such equipment shall be of a size and type approved by the Engineer. Impact-type pavement breakers (stompers) will not be permitted.

Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will not result in damage to adjacent ground, existing improvements, or improvements installed by Applicant. The Applicant shall make its own determination in this regard.

Material for mechanically compacted backfill shall be placed in lifts which, prior to compaction, shall not exceed the thickness specified below for the various types of equipment:

1. Vibratory equipment, including vibratory plates, vibratory smooth-wheel rollers, and vibratory pneumatic-tired rollers – Maximum lift thickness of one (1) foot.
2. Rolling equipment, including sheepsfoot (both vibratory and nonvibratory), grid, smooth-wheel (nonvibratory), pneumatic-tired (nonvibratory), and segmented wheels – Maximum lift thickness of eight (8) inches.
3. Hand-directed mechanical tampers – Maximum lift thickness of four (4) inches.

Regardless of the backfill materials and equipment used, the Applicant is responsible to achieve the required compaction in such a manner that the pipe is not damaged.

Mechanically compacted backfill shall be placed in horizontal layers of thickness (not exceeding those specified above) compatible to the material being placed and the type of equipment being used. Each layer shall be evenly spread, moistened (or dried, if necessary) and then tampered or rolled until the specified relative compaction has been attained.

Testing for relative compaction shall be performed by the City as outlined in Section 6-3, "Testing," of the Standard Specifications.

Relative compaction of trench backfill materials shall conform to the requirements shown on the Standard Detail SD-310, as shown on the Plans, and shall be done concurrently with pipe installation and placement of backfill materials. In unpaved areas backfill shall match to existing ground grade.

### **3.10 TRENCH SHORING AND TRENCH SAFETY**

Attention is directed to Section 5-1.02A, "Trench Excavation Safety Plans," and Section 7-1.01E, "Trench Safety," of the Standard Specifications, and to the applicable provisions of Sections 6422, 6423, and 6424 of the Labor Code of the State of California and these Water Specifications. The current CAL-OSHA trench shoring regulations shall be used as a guide for minimum shoring requirements.

No excavations shall remain open longer than is necessary to perform the work. If, in the opinion of the Engineer, the Applicant is not pursuing the work with diligence, the Engineer may require an excavation to be backfilled and protected with temporary paving or covered with steel traffic plates, even though that particular installation is not complete.

At the close of work each day, all open trenches shall be backfilled or covered with steel traffic plates and full access to all roads and driveways shall be provided. In roadway areas, backfilled excavations shall be covered with a minimum three (3) inch layer of temporary asphalt conforming to the requirements of Section 2.14 of these Water Specifications. Trench plates shall be tightly butted to each other and fine graded asphalt concrete shall be compacted to form ramps, maximum slope of 8.5% with a minimum twelve (12) inch taper to cover all edges of the steel plates. Upon request of the Engineer, Applicant shall anchor the trench plates (if longitudinal, the approach and ending plates only) to the roadway with a minimum of two (2) dowels pre-drilled into the opposite corners of the plate and drilled two (2) inches into the pavement.

When close sheeting is required, it shall be so driven so as to prevent adjacent soil from entering the trench either below or through such sheeting. Where sheeting and bracing are used, the trench width shall be increased accordingly.

The Engineer reserves the right to order the sheeting driven to the full depth of the trench or to such additional depths as may be required for the protection of the work. Where the soil in the lower limits of a trench has the necessary stability, the Engineer, at his discretion, may permit the Applicant to stop the driving of sheeting at some designated elevation above the trench bottom. However, the granting of permission by the Engineer shall not relieve the Applicant in any degree from his full responsibility for the work.

Sheeting and bracing, which have been ordered left in place, must be removed for a distance of three (3) feet below the established street grade or the existing surface of the street, whichever is lower. Trench bracing, except that which must be left in place, may be removed when the backfilling has reached the respective levels of such bracing. Sheetting, except that which has been left in place, may be removed after the backfilling has been completed or has

been brought up to such an elevation as to permit its safe removal. Sheeting and bracing may be removed before backfilling the trench, but only in such manner as will insure the adequate protection of the completed structures and adjacent underground or surface structures, and prevent the disturbance of the adjacent ground. If the trench shields or any other type of sheeting system is needed under current CAL-OSHA regulations, the Engineer reserves the right to require using and installing the trench shields or other type of shoring system for the protection and safety of the workers.

The Applicant is responsible for maintenance of plates, shoring, and temporary pavement, and shall perform any necessary maintenance or repairs immediately upon request by Engineer.

### 3.11 PLACING PVC PIPE IN TRENCH

The Applicant is specifically cautioned as to the possibility of empty pipeline floating due to flooding of the trench by ground water, rain water or backfill consolidation. Should any pipe sections be "floated," that reach of pipeline shall be replaced, damaged pipe repaired, the trench re-excavated, de-watered, and the pipe reinstalled at the Applicant's expense.

The installation of PVC pipe shall conform to AWWA C605 and these Water Specifications. Pipe bedding, trench backfill and relative compaction shall be in accordance with Standard Detail SD-310, "Standard Permit and Subdivision Trench Sections." Pipe shall be uniformly supported throughout its length with no voids under or around the pipe.

Before joining bell and spigot polyvinyl chloride pipe, the plain end of the pipe shall be beveled to avoid damage to the rubber ring as the pipe is pushed home. The bell socket and the plain end of the entering pipe shall be absolutely clean and free of foreign material (e.g. sand, dirt, debris, etc.) prior to the seating of the rubber ring. Clean the ring groove and insert a clean rubber ring. The ring shall be seated evenly all around and be free from twists. Do not lubricate the rubber rings.

Lubricate the spigot end of the pipe with lubricant recommended by the pipe manufacturer. No other lubricant shall be used. Insert the spigot end into the bell so that it is in contact with the ring. Align the pipe sections and push the spigot end in.

Polyvinyl chloride (PVC) pipe may be used on curves only if:

- A. Approved deflection fittings or couplings are used;
- B. Pipe lengths are reduced to allow more angular joint deflection but within the maximum allowed by the pipe manufacturer; or
- C. By bending solid wall pipe without any application of heat or mechanical means (only by workers applying uniform forces along the pipe length) and subject to the following limitations (but within the specifications of the pipe manufacture):

#### **PVC BENDING RADII**

<b>Pipe Size (Inches)</b>	<b>Minimum Allowable Radius (Feet)</b>
6	150
8	200
10	250
12	300

The approximate force per 20 feet of pipe length to accomplish the above curvatures for Class 150 pipe and the offset per 20 feet of pipe length are tabulated below:

**PVC BENDING FORCES AND OFFSETS**

<u>Pipe Size (Inches)</u>	<u>Approximate Force (Pounds)</u>	<u>Offset (Inches)</u>
6	60	16
8	135	12
10	250	9
12	450	8

Offsets are calculated assuming no deflection at the joint and the bent pipe is curved uniformly throughout its length.

In the case where the manufacture’s specifications are more restrictive than the above values, the manufacture’s specifications will govern.

If pipe sizes larger than twelve (12) inches are to be installed, additional and supplementary specifications are required and will be provided by the City.

**3.12 PLACING DUCTILE IRON PIPE IN TRENCH**

The installation of Ductile Iron pipe shall conform to AWWA C600 and these Water Specifications. Pipe bedding, trench backfill and relative compaction shall be in accordance with Standard Detail SD-310, "Standard Permit and Subdivision Trench Sections." Pipe shall be uniformly supported throughout its length with no voids under or around the pipe.

Before joining bell and spigot of ductile iron pipe, the plain end of the pipe shall be beveled to avoid damage to the rubber gasket as the pipe is pushed home. The bell socket and the plain end of the entering pipe shall be absolutely clean and free of foreign matter, (such as mud, sand, cinders, gravel, frozen material, etc.) prior to the seating of the gasket. The gasket shall be wiped clean, flexed and then placed in the socket with the large round end entering first, so that the gasket is seated evenly around the inside of the socket with the groove fitted over the bead. As the gasket fits snugly in the gasket seat, it shall be necessary to smooth out the gasket around the entire circumference to remove any bulges which might interfere with the proper entry or the spigot end.

A thin film of clean lubricant shall be applied to the inside surface of gasket which will come in contact with the plain end of the pipe. If necessary, apply a thin film of lubricant to the outside of the plain end for about one (1) inch back from the end. Lubricant other than recommended by the manufacturer shall not be used.

All ductile iron pipe and fittings shall be polywrapped in accordance with Section 2.13, "Protection from Corrosion," of these Water Specifications.

The maximum allowable deflection of ductile iron pipe joints are tabulated below:

## MAXIMUM ALLOWABLE DEFLECTION FOR DUCTILE IRON PIPE JOINTS

Size of Pipe (Inches)	Mechanical Joint Pipe						Push-On Joint Pipe							
	Maximum Deflection Angle (Degrees)	Maximum Offset or Deflection per Length (Inches)			Radius of Curvature For Pipe Length (Feet)			Maximum Deflection Angle (Degree)	Maximum Offset or Deflection per Length (Inches)			Radius of Curvature For Pipe Length (Feet)		
		12 FT	18 FT	20 FT	12 FT	18 FT	20 FT		12 FT	18 FT	20 FT	12 FT	18 FT	20 FT
4	8°	20"	31"	35"	85'	125'	140'	5°	12"	19"	21"	135'	205'	230'
6	7°	18"	27"	30"	95'	145'	160'	5°	12"	19"	21"	135'	205'	230'
8-12	5°	13"	20"	22"	135'	195'	220'	5°	12"	19"	21"	135'	205'	230'

In the case where the manufacture's specifications are more restrictive than the above values, the manufacture's specifications will govern.

If pipe sizes larger than twelve (12) inches are to be installed, additional and supplementary specifications are required and will be provided by the City.

### 3.13 SETTING FITTINGS AND VALVES

Fittings, flexible expansion joints and valves shall be installed as shown on the approved Plans. Such fittings and valves shall be lowered into the trench and cleaned and jointed as specified in these Water Specifications and per the manufacturer's recommendations.

Reaction or thrust blocking shall be provided for all bends, tees, crosses, reducers and valves, and shall be constructed of Class C concrete, in accordance with Standard Details SD-205 through SD-212, inclusive. Thrust blocks shall be poured against undisturbed soil. Joints of fittings, valves and hydrant buries shall be kept free of thrust block concrete. When metal harness or tie rods are required on the Plans, all steel rods and clamps shall be galvanized or coated with Koppers Company Bitumastic No. 30 or EC 244, as manufactured by 3M or approved equal.

Where the approved Plans require restrained mechanical joints for pipe joints, fittings or valves, a ductile iron retainer gland shall be used that conforms to AWWA C111/A21.11, as manufactured by EBAA Iron (Megalug®) or approved equal, and installed in conformance with the manufacturer's recommendations.

All valves shall be installed complete with valve boxes and the required Class C concrete slab. Valve box extensions shall be machine cut or saw cut. Valve extension stems shall be installed when required. See Standard Detail SD-205 "Standard Valve Installation."

Where the approved Plans require a blow-off for future extension or water main to be dead ended, such installation shall be made in accordance with the blow-off Standard Detail SD-212 "Standard Blow Off for Future Extension."

All fittings and valves shall be protected from corrosion in accordance with Section 2.13 of these Water Specifications.

### 3.14 SERVICE CONNECTIONS

All installations and materials for service connections shall conform to the Standard Details SD-213 through SD-221, excluding SD-216, and these Water Specifications.

- A. TEMPORARY CAPS and PLUGS: Temporary line caps and fitting plugs shall be installed concurrently with water main installation at locations where connections will be

made in different work order. Temporary line caps or fitting plugs shall be installed in such a manner that it can be easily removed without disturbing the water mains or fittings. Adequate bracing shall be provided for supporting the line cap. No concrete shall be used to restrain cap or plug.

- B. **SERVICE TAPS:** Only Water System Staff may perform “Wet Taps” on active water mains. Applicant may perform “Dry Taps” on inactive, unsanitized water mains using a "Mueller," "Hays," "Dresser" drilling machine or approved equal. The machine shall employ a guiding mechanism for the drill-tap, which permits disengaging the pressure feed when drilling, and keeps the drill tap in alignment during the tapping operations. Applicant shall furnish the drilling machine(s) at his expense.

Written approval from the Engineer must be obtained prior to performing Dry Taps and the following requirements shall be followed:

1. Dry Taps shall be done above ground, that is, not in the pipe trench;
2. Service tap bit to be used shall have the capability of retaining the shavings of the tap outside the pipe;
3. If there are any shavings in the pipe, the pipe shall be blown clean until all shavings are taken out from the pipe; and,
4. All pipe openings, including corporation stops, shall be capped or taped to prevent debris from entering the pipe. The caps and tape shall remain in place until the opening is integrated into the new water system via other connections. At no time shall the Applicant allow the inside of the pipe to become contaminated with ground water or other debris. Any pipe which becomes contaminated shall be removed, cleaned, and replaced at Applicant's expense.

All taps (wet or dry) shall be made using service clamps and saddles. No direct taps into the pipe will be allowed. Double flat strap service clamps shall be used where the outlet size is larger than 1 inch.

For each size of pipe, the outlet shall not exceed the sizes shown in the table below. Where outlet sizes are greater, tees, tapping sleeves or threaded brass insert couplings shall be used.

**MAXIMUM SIZE OUTLET FOR USE WITH DOUBLE STRAP SERVICE CLAMPS OR SADDLES**

<u>Pipe Size (Inches)</u>	<u>Outlet Size (Inches)</u>
6	1-½
8	2
10 to 24	3

When ordering service clamp or accessories, one should specify the machined O.D. of pipe plus one-quarter (¼) inch.

The surface of the pipe shall be filed to clean off all loose materials before clamp or saddle is placed on the pipe. The corporation stop shall be placed in the outlet and drilling shall be done through the corporation stop.

- C. **DRILLING:** The drilling machine shall be in good repair. The machine and boring-bar shall not wobble. A new or sharp drill bit that is recommended for use with the type of

pipe to be tapped shall be used. The drill section of this tool must be long enough to go completely through the pipe wall. The drilling machine shall be clamped at a 45° angle toward the service line, or as specified by the Engineer.

A mixture of powdered graphite and linseed oil shall be used to lubricate the drill bit. Do not use any lubricant or sealant when inserting the corporation stop.

**AT NO TIME SHALL THE DRILL BE FORCED THROUGH THE PIPE WALL.** The boring-bar shall rotate freely at all times with only minimal pressure applied to the follower.

The ends of all new service pipe shall be kept sealed until the actual connections are made at the corporation stop, existing service pipe or meter.

- D. SERVICE LATERAL AND WATER METER: Applicant may install the service lateral from the main to the water meter only with materials purchased from the Department, or Applicant can arrange for Water System Staff to provide and install the service lateral at the Applicant's expense. Only Water System Staff may provide and install a water meter and will do so at the Applicant's expense. All materials and work necessary to connect the water meter to the structure, backflow prevention device and/or irrigation system shall be the Applicant's responsibility.

### 3.15 TRENCH TAPE AND TRACER WIRE INSTALLATION

Trench tape shall be installed along the line of pipe approximately one (1) foot above and along the center line of the pipe.

If the tape is not continuous, the tape ends at the discontinuity shall be overlapped a minimum of twelve (12) inches.

Install tracer wire on all PVC pipe installations in accordance with the Standard Detail SD-228, "Tracer Wire Installation."

Tracer wire shall form a mechanically and electrically continuous line throughout the jacked or drilled portion of the pipeline and across any ductile iron drop and shall then extend to the nearest valve or other pipeline appurtenance designated by the Engineer. At the valve or appurtenance the wire shall extend to the ground or pavement, and terminate in the valve box with a twelve (12) inch pigtail.

### 3.16 PROTECTION FROM CORROSION

Attention is directed to Section 2.13 of these Water Specifications for corrosion protection material requirements.

Where corrosion protection requirements for directly buried ferrous metal has not been shown on the plans or specified in detail, a mastic or tape coating shall be applied. The determination of the type of coating to be applied in each instance shall be reserved to the Engineer. Ferrous metal items to be protected shall include, but not be limited to, valves, fittings, service lines, reinforcing steel, anchor rods, flexible couplings, bolts, and nuts, flanges, saddles, tapping sleeves, hydrant buries, and plugged end and blow off assemblies. Mastic and tape coated ferrous metal shall also be protected with polywrap. All copper piping or any copper or brass part shall not be permitted to contact steel or cast iron pipe at any point. If contact is unavoidable, the copper or brass part shall be mastic or tape coated. All cast iron, steel or other ferrous metal shall be insulated from any concrete structure, such as footings, anchor blocks, encasements or structure walls using mastic, tape coating or other specified coating

system extending six (6) inches beyond the concrete. All coatings shall be continuous, unbroken, and pinhole free. Protective coatings shall only be applied over a properly prepared surface.

- A. **MASTIC COATINGS:** Mastic coating shall be applied with spray equipment or by hand with brush or rubber gloves. A two-coat system shall be applied. The metal surface shall first be cleaned of all loose scale, dirt and other foreign matter. No primer is required before application. Each coat shall be applied to produce a minimum wet film thickness of 15 mil. with a minimum cure time of two hours between coatings. The second coat shall be allowed to dry a minimum of three hours before beginning backfilling operations.
- B. **TAPE COATINGS:** Tape coatings shall be applied over a clean surface (no loose rust, scale, dirt, oil or grease). A minimum of two layers shall be applied with a minimum overlap of ½ inch, or half the width of the tape if the tape is less than one (1) inch wide. Tape shall be applied immediately following the application of the primer (wet) and pulled tight enough to conform to the surface being coated.

### **3.17 TESTING AND DISINFECTION OF WATER SUPPLY DISTRIBUTION MAINS**

Prior to testing and disinfection of water mains and connection to existing mains, a plan shall be submitted to the Engineer for approval indicating isolation valves, fill taps and discharge taps. The Standard Detail SD-231, "Standard Jumper Pipe," depicts a City approved temporary jumper assembly which connects from existing water main to the new water main.

- A. **PRESSURE TESTS:** Pressure tests shall be done per Standard Detail SD-229, "Collar Type Thrust Block for New Water Main Testing," and only after the following has occurred:
  - 1. Compaction of backfill and approval of backfill by Engineer;
  - 2. Before placement or replacement of permanent pavement; and
  - 3. A minimum of seven (7) days after last concrete thrust or reaction blocking has been cast with standard cement, or thirty-six (36) hours after the last concrete thrust or reaction blocking has been cast using High Early Strength cement.

The duration of the pressure test shall be a minimum of two (2) hours. The pipeline is required to maintain pressure within 10 psi of the 200 psi specified test pressure for the entire test period.

#### **Pressure tests shall not be conducted on existing water facilities.**

During filling of line and before applying the specified test pressure, all air shall be expelled from the line. To accomplish this, taps shall be made, if necessary, at the point of highest elevation; such taps shall be tightly plugged or capped upon completion of tests. Each section of pipe line shall be slowly filled with water and the specified test pressure shall be applied at the point of lowest elevation. Such application shall be by means of a pump connected to the pipe through a corporation cock or fire hydrant. The pump, pipe connection and all measuring apparatus shall be furnished by the Applicant and approved by the Engineer. Any cracked or defective material shall be replaced with sound material by the Applicant without cost to the City and to the satisfaction of the Engineer. The test shall then be repeated until no defects remain.

- B. **LEAKAGE TESTS:** After completion of pressure tests an overall leakage test shall be made of the completed pipeline. The pressure to be maintained shall be 150 psi at the highest point in the pipeline to be tested. The pipe shall be filled with water for 24 hours prior to starting test. The duration of the leakage test shall be 4 hours. As specified for pressure tests, all air shall be expelled from the pipe and the specified pressure shall be applied to the pipe line. The water lost due to leakage shall be replaced immediately by pumping water from a calibrated tank into the line. If the water replaced exceeds 15 gallons per mile of pipe per inch of diameter per day, the Applicant shall locate the defective pipe, joint or fitting and replace the defective material at no cost to the City. The maximum length of line to be tested shall be 1500 feet unless otherwise directed by the Engineer.

For pipe sizes commonly installed in the City, this maximum amount of water replaced during the four (4) hour leakage test shall not exceed the following amounts:

<b><u>ALLOWABLE PIPE LEAKAGE</u></b>	
<b><u>Pipe Diameter (Inches)</u></b>	<b><u>Maximum Leakage for 1000 Feet of Pipeline (Gallons)</u></b>
6	2.85
8	3.80
10	4.75
12	5.70

- C. **DISINFECTION OF PIPE LINES:** The Applicant shall take every precaution to keep the interior of the pipe lines clean during installation. Water mains and appurtenances must be completely installed, flushed, and disinfected by the Applicant. Disinfection shall be performed in accordance with AWWA C651, "Standard for Disinfecting Water Mains."
- D. **BACTERIOLOGICAL TESTS:** No permanent water connections shall be made to the active water distribution system until satisfactory bacteriological test results are received. Bacteriological tests shall be performed in accordance with AWWA C651, Section 7, "Bacteriological Tests."

Bacteriological tests shall be performed after final flushing and before the new water main is connected to the distribution system. Two consecutive sets of acceptable samples, taken at least 24 hours apart, shall be collected from the new main by the City's Inspector. The bacteriological tests will be performed by the City's laboratory. If the bacteriological tests results fail, any offending substance (i.e. debris, etc.) shall be removed and the pipe shall then be disinfected and tested again until it passes the bacteriological tests. All flushing water is to pass through the Applicant's construction meter.

- E. **FINAL CONNECTION:** After the new main's disinfection has been approved by the City, the main shall be flushed to remove high chlorine concentrations. Discharge of chlorinated water shall comply with the following procedures:
1. Discharge chlorinated water into existing sanitary sewer manholes. Maintain a minimum of one (1) foot vertical air gap between end of discharge pipe and manhole frame. Discharge shall be monitored and controlled such that there is no surcharging or disruption of sewer service.

- a) If discharge will be more than 50,000 gallons, receive approval from WPCF prior to discharge to sanitary sewer system.
  - b) Record flow rate, volume and duration of tests/flushing information. Submit discharge records to Engineer.
2. When sanitary sewers are not available, chlorinated water must be dechlorinated prior to discharge to storm drains or landscape areas.
- a) Use Dechlorination Flushing Diffusers (DFD). Below are assembly and use instructions for a DFD. Alternative methods may be used with the written approval of the Engineer:
    - i) Wrap eight (8) D-Chlor® sodium sulfite tablets in an 8 inch by 16 inch, top opening, nylon bag with 4 of the tablets pushed to each side of the bag. Alternate dechlorination products may be used, such as Vita-D-Chlor™ tablets (ascorbic acid), in accordance with the manufacturer's recommendations and the Engineer's written approval.
    - ii) Fold bag over tablets, twisting in center.
    - iii) Secure bag with rubber bands and position it firmly inside a fabricated four (4) inch diffuser.
  - b) Hydrant Discharge: Attach the DFD, prepared in accordance with a) above, to 2-½ inch side of hydrant using appropriate adaptors. Limit discharge to 120 gpm. Direct flow so discharge does not cause erosion or implement erosion control measures
  - c) Blowoff or Pump Discharge: Use standard fire hose and position DFD so discharge does not cause erosion or implement erosion control measures.
  - d) Record flow rate, volume and duration of tests/flushing information. Submit discharge records to Engineer.

Following the flushing of the new main, the final connection of the new main to the existing main will be performed by the City. Sanitary construction practices must be followed during the installation of the final connection, so that there is no contamination of the new or existing water main with foreign material or groundwater. The connection pipe and appurtenances required for the connection may be spray-disinfected or swabbed with a minimum one percent solution of chlorine just prior to being installed. When the connection pipe and appurtenances have been installed, they shall be visually inspected for at least 15 minutes with the existing water service pressure. All leaks must be repaired by the Applicant to the satisfaction of the Engineer or his representative before backfilling.

### **3.18 PAVEMENT REPLACEMENT AND TEMPORARY PAVEMENT**

Attention is directed to Section 2.14, "Trench Sections," of these Water Specifications for pavement material requirements.

- A. TEMPORARY PAVEMENT: Temporary pavement one (1) inch thick shall be placed in all trenches over compacted untreated base which is placed to one (1) inch below finish pavement in the trench area at all locations where existing pavement has been removed and final pavement replacement is not done.

Temporary pavement and base in all trenches shall be removed before final pavement replacement.

The use of cutback asphalt concrete for trenches will not be allowed during the months of April through October.

- B. PAVEMENT REPLACEMENT: After compaction of the trench backfill has been approved by the Engineer, the Applicant shall square the edges of the existing pavement and apply paint binder in accordance with Section 39-4 of the Standard Specifications. Prior to placing asphalt concrete, the Applicant shall apply paint binder (tack coat) to the edges of existing asphalt concrete and gutters, construction joints and driveway conforms. Paint binder shall be applied in one application at a rate from 0.02 to 0.10 gallons per square yard of surface covered. The Engineer will determine the exact rate of application.

When shown on the Plans or directed by the Engineer, aggregate base shall be installed in accordance with the requirements of Section 26 of the Standard Specifications. Asphalt Concrete shall then be installed to the depth and width per Standard Detail SD-310, or as otherwise specified on the approved Plans. The finished surface shall be true to the existing grade and free from open cracks or joints.

The spreading and compacting requirements in Sections 39-6.02, "Spreading," and 39-6.03, "Compacting," of the Standard Specifications will not apply.

When the total compacted thickness of asphalt concrete is 0.25-foot or less, the asphalt concrete shall be spread and compacted in one layer. All other asphalt concrete thicker than 0.25-foot shall be spread and compacted in layers. The top layer of asphalt concrete shall be not more than 0.20-foot nor less than 0.15-foot in compacted thickness. The next lower layer shall be not more than 0.25-foot nor less than 0.10-foot in compacted thickness, and any lower layers shall be not less than 0.15-foot nor more than 0.40-foot in compacted thickness.

The spreading and compacting of asphalt concrete shall conform to the following requirements:

1. Spreading and compacting shall be performed by methods that will produce an asphalt concrete surfacing of uniform smoothness, texture, and density.
2. Asphalt concrete shall be compacted flush to existing grades and not "humped".
3. Asphalt concrete shall be compacted to relative compaction of not less than 95 percent. Relative compaction will be determined by California Test 375. Laboratory specimens will be compacted in conformance with California Test 304. The asphalt concrete will be tested by lots, as specified in California Test 375. Any lot of asphalt concrete that has a relative compaction of less than 95 percent shall be removed and replaced by the Applicant at no cost to the City.

### **3.19 PORTLAND CEMENT CONCRETE**

Attention is directed to Section 2.15 of these Water Specifications for concrete material requirements.

### **3.20 REPLACE EXISTING SIDEWALK AND CURB & GUTTER**

Attention is directed to Section 2.16 of these Water Specifications for sidewalk and curb & gutter material requirements.

Where the existing sidewalk or curb & gutter are damaged by the installation of water mains, service lines or water meter boxes, Applicant shall replace them in accordance to Standard Details SD-107 and SD-108. Base rock shall be a minimum of four (4) inches thick, unless otherwise noted on the approved Plans. The concrete shall be at least four (4) inches thick for sidewalk and seven (7) inches thick for curb & gutter.

### **3.21 SLURRY SEAL**

Attention is directed to Section 2.17 of these Water Specifications for slurry seal material requirements.

If the approved Plans require slurry sealing of a street, slurry seal shall be spread at the rate of 12 pounds of dry aggregate per square yard. The actual spread rate shall be within 10% of the above-required rate. The applied slurry seal thickness shall be at least 0.125 inches at all locations.

The Applicant shall protect all utility manhole covers, gratings, valve covers, pavement markers, and monument covers from being coated with the slurry seal mixture by placing paper or plastic bags over them prior to placing slurry seal. Other methods may be used if approved by the Engineer in writing. Paper, plastic, and slurry shall be removed from water valve box covers, utility manhole covers, grating, and monument covers the same day that the slurry is placed including tape from pavement markers.

Care shall be exercised to prevent slurry from being deposited on any concrete surfaces and on existing pavement beyond the limits of work. The Applicant shall remove slurry from surfaces not designated to be sealed. The method and thoroughness of the slurry removal shall be approved by the Engineer. Additionally, no overlapping of slurry will be allowed along the pavement marker line. The slurry seal shall be placed in a neat line adjacent to the gutter line. The Applicant is responsible for wet slurry seal and shall rectify, at his own expense, any problems associated with wet slurry seal.

If the Applicant elects to use more than one spreader box, each additional spreader box to be used will require one additional inspector, at the Applicant's expense.

### **3.22 MARKER POSTS**

Attention is directed to Section 2.18 of these Water Specifications for marker post material requirements.

Marker posts shall conform to the marker post Standard Detail SD-222 "Standard Facility Reference" and shall be placed at the locations shown on the Plans except where location can be marked on curbs.

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## APPENDIX A

### City of Hayward Water System Approved Materials

MATERIALS	SPECIFICATION <sup>(1)</sup>	SUPPLIERS/PRODUCTS
WATER MAINS: <sup>(2)</sup> PVC Pipe, Fittings & Couplings	AWWA C900, Class 150; ASTM D3139, ASTM F477	JM, Pacific Western, Vinyl Tech, Diamond
Ductile Iron Pipe (DI)	AWWA C150/A21.50 ( $\leq 4" = \#51$ , $\geq 6" = \#50$ ), AWWA C151/A21.51, AWWA C104/A21.4	U.S. Pipe, Pacific States
DI Flanged Joints	AWWA C115/A21.15	U.S. Pipe, Pacific States
DI Mechanical Joints	AWWA C111/A21.11	Star, Tyler, U.S. Pipe, Union Foundry, Sigma
DI Fittings	AWWA C110/A21.10, Class 250; AWWA C104/A21.4 or AWWA C116/A21.16	Star, Tyler, U.S. Pipe, Union Foundry, Sigma
FLEXIBLE COUPLINGS	AWWA C219; Bolts & Nuts Type 304 SS	Power Seal, Ford, APAC, ROMAC, Viking-Johnson, Mueller
VALVES <sup>(3)</sup>	AWWA C509, AWWA C550 - Gate (4" to 12"), AWWA C509 - Air, AWWA C512, 1", Combination, 150 psi	Mueller, Kennedy, American Flow Control, Clow, M&H, Pratt APCO (143C), Crespin (C-10)
RESTRAINED MECHANIC. JOINTS	AWWA C111/A21.11	EBAA Iron (Series 1100, 2000PV Megalug <sup>®</sup> )
FIRE HYDRANTS	AWWA C503, NFPA No. 194, Marked "CITY OF HAYWARD", Additional Requirements <sup>(1)</sup>	Clow Model LB 614 (Modified Steamer) and Model 865 (Double Steamer)
VALVE BOXES	Traffic Type, covers marked "Water"	Christy Model G-5 Traffic Box
TRENCH TAPE <sup>(4)</sup> TRACER WIRE <sup>(5)</sup>	Blue w/ white lettering, 2" wide Copper, Single Strand, #12, THWN or polyethylene (Direct Burial & Wet), Blue	Calpico, Allen Systems Any
POLYWRAP, MASTIC & PRIMER	AWWA C105, Type I, Class C (black), Grade E1	Tape: Scotchwrap #50, Polyken #900, Tapecoat CT, or Protecto Wrap #200 Mastic: Protecto Wrap CA 1200 Primer: Protecto Wrap No. 1170
SUPPLY SERVICES (Main to Meter, including water meter)	City Standard Details SD-213 thru SD-219 <i>ONLY MATERIALS SUPPLIED BY CITY ARE ALLOWED</i>	Available at 24505 Soto Road. Call to arrange order min. 5 working days prior to desired pickup. PH: 510-881-7994
SERVICE METER BOXES	City Standard Details SD-213 thru SD-219	5/8" & 3/4": Christy Model B-9 1": Christy Model B-16 1-1/2" & 2": Christy Model B-36

<sup>(1)</sup> For complete specifications see the project specifications for the particular City contract or the Standard Details and the "Specifications for the Construction of Water Mains and Fire Hydrants" for permits and subdivision work.

<sup>(2)</sup> For main lines or fire services. Class 150 only.

<sup>(3)</sup> Gate Valves shall be Resilient Seat or Resilient Wedge only. If Butterfly Valves (>12") are to be used, additional and supplementary specifications are required and will be provided by the City.

<sup>(4)</sup> Required on all mains and services.

<sup>(5)</sup> Required on all non-metallic main line pipe and Hydrant runs.

## APPENDIX A

### City of Hayward Water System Referenced Standards

#### **AWWA Standards**

##### Ductile-Iron Pipe and Fittings

- C104/A21.4<sub>(03)</sub>: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
- C105/A21.5<sub>(05)</sub>: Polyethylene Encasement for Ductile-Iron Pipe Systems
- C110/A21.10<sub>(03)</sub>: Ductile-Iron and Gray-Iron Fittings for Water
- C111/A21.11<sub>(00)</sub>: Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
- C115/A21.15<sub>(99)</sub>: Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
- C116/A21.16<sub>(03)</sub>: Protective Fusion-Bonded Epoxy Coatings Int. & Ext. Surf. Ductile-Iron/Gray-Iron Fittings
- C150/A21.50<sub>(02)</sub>: Thickness Design of Ductile-Iron Pipe
- C151/A21.51<sub>(02)</sub>: Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids

##### Steel Pipe

- C219<sub>(01)</sub>: Bolted, Sleeve-Type Couplings for Plain-End Pipe

##### Valves and Hydrants

- C503<sub>(05)</sub>: Wet-Barrel Fire Hydrants
- C504<sub>(00)</sub>: Rubber-Seated Butterfly Valves
- C509<sub>(01)</sub>: Resilient-Seated Gate Valves for Water Supply Service
- C510<sub>(97)</sub>: Double Check Valve Backflow Prevention Assembly
- C511<sub>(97)</sub>: Reduced-Pressure Principle Backflow Prevention Assembly
- C512<sub>(04)</sub>: Air Release, Air/Vacuum, and Combination Air Valves for Waterworks Service
- C550<sub>(05)</sub>: Protective Epoxy Interior Coatings for Valves and Hydrants

##### Pipe Installation

- C600<sub>(05)</sub>: Installation of Ductile-Iron Water Mains and Their Appurtenances
- C605<sub>(05)</sub>: Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water

##### Disinfection of Facilities

- C651<sub>(05)</sub>: Disinfecting Water Mains

##### Service Lines

- C800<sub>(05)</sub>: Underground Service Line Valves and Fittings

##### Plastic Pipe

- C900<sub>(97)</sub>: Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 In.-12 In. (100 mm-300 mm), for Water Dist.
- C901<sub>(02)</sub>: Polyethylene (PE) Pressure Pipe and Tubing, ½ In. (13 mm) Through 3 In. (76 mm), for Water Service

#### **ASTM Standards**

- D3139<sub>(05)</sub>: Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
- F477<sub>(02)</sub>: Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- F1476<sub>(01)</sub>: Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications
- F1548<sub>(01)</sub>: Standard Specification for the Performance of Fittings for Use with Gasketed Mechanical Couplings Used in Piping Applications

#### **NFPA Standards**

- No. 194: National Standard Fire Hose Coupling Screw Threads

#### **California Test Methods**

- CA 304<sub>(99)</sub>: Preparation of Bituminous Mixtures for Testing
- CA 375<sub>(04)</sub>: Determining the In-Place Density and Relative Compaction of AC Pavement

## APPENDIX B

### City of Hayward Index of Standard Details

#### Abbreviations and Symbols

- SD-100<sub>(93)</sub> Abbreviations (2 sheets)  
SD-101<sub>(93)</sub> Street and Utility Construction Drawing Symbols (5 sheets)

#### Streets

- SD-102<sub>(93)</sub> Street Sections (4 sheets)  
SD-103<sub>(93)</sub> Cul-de-Sac and Right Angle Bend (2 sheets)  
SD-104<sub>(02)</sub> Building Setbacks and Slope Terraces  
SD-105<sub>(93)</sub> Median Tapers  
SD-106<sub>(93)</sub> Median Flares  
SD-107<sub>(02)</sub> Concrete Construction Special Provisions  
SD-108<sub>(02)</sub> Sidewalk, Curb & Gutter and Island Curb Sections (6 sheets)  
SD-109<sub>(02)</sub> Driveways - Local Streets (3 sheets)  
SD-110<sub>(02)</sub> Driveways - Arterial and Major Collector Streets (2 sheets)  
SD-110A<sub>(93)</sub> Street Opening  
SD-110B<sub>(02)</sub> Off-Street Parking  
SD-111<sub>(93)</sub> Stabilized Construction Entrance  
SD-112<sub>(93)</sub> Gutter Flare at Inlet  
SD-113<sub>(93)</sub> Tie-In Pavement  
SD-114<sub>(93)</sub> Steel Beam Barricade  
SD-115<sub>(93)</sub> Steel Beam Guard Rail  
SD-116<sub>(02)</sub> Monument (4 sheets)  
SD-117<sub>(02)</sub> Street Sign (5 sheets)  
SD-118<sub>(02)</sub> Area Drains (5 sheets)  
SD-119<sub>(93)</sub> Parking Meter Post  
SD-120<sub>(02)</sub> Standard Street Lighting (4 sheets)  
SD-120A<sub>(02)</sub> Ornamental Street Lighting (5 sheets)  
SD-121<sub>(93)</sub> Monitoring Well Box  
SD-122<sub>(02)</sub> Street Planting (2 sheets)

#### Water

- SD-201<sub>(02)</sub> Double Check Valve Assemblies  
SD-202<sub>(02)</sub> Reduced Pressure Principle Backflow Prevention Devices  
SD-203<sub>(93)</sub> Tapping Tee and Valve Installation  
SD-204<sub>(93)</sub> Fire Service Lateral (2 sheets)  
SD-205<sub>(02)</sub> Valve Installation (4 sheets)

#### Water (continued)

- SD-206<sub>(93)</sub> Hydrant Installation (2 sheets)  
SD-207<sub>(02)</sub> Thrust Blocks for Horizontal and Sag Bends - 22½° or more  
SD-208<sub>(93)</sub> Thrust Block – Crest Vertical Bends  
SD-209<sub>(93)</sub> Optional Thrust Block – D.I.P. Crest Vertical Bend  
SD-210<sub>(93)</sub> Thrust Blocks for Tees and Crosses  
SD-211<sub>(93)</sub> Blow Off for Dead Ends  
SD-212<sub>(02)</sub> Blow Off for Future Extension  
SD-213<sub>(93)</sub> Copper Single Water Service Connection  
SD-214<sub>(02)</sub> Plastic Single Water Service Connection  
SD-215<sub>(93)</sub> ¾" and 1" Consumer Water Service Connection – P.E. with Insta-Tite  
SD-217<sub>(93)</sub> Water Service Connection - 1½" and 2" Copper  
SD-218<sub>(93)</sub> Plastic Dual Water Service Connection  
SD-219<sub>(02)</sub> Service Manifold for Three or More Meters  
SD-220<sub>(93)</sub> Large Meter Water Service (2 sheets)  
SD-221<sub>(93)</sub> Water Main Connection  
SD-222<sub>(93)</sub> Facility Reference  
SD-223<sub>(93)</sub> Hydrant Guard Post Installation  
SD-224<sub>(93)</sub> Ductile Iron Drop  
SD-225<sub>(93)</sub> Temporary Service Backflow Assembly  
SD-226<sub>(93)</sub> Air Valve  
SD-227<sub>(93)</sub> Water Transmission Main Crossing at the Hayward Fault  
SD-228<sub>(93)</sub> Tracer Wire Installation  
SD-229<sub>(02)</sub> Collar-Type Thrust Block for New Water Main Testing  
SD-230<sub>(93)</sub> Collar-Type Thrust Block for Water Abandonment  
SD-231<sub>(02)</sub> Standard Jumper Pipe for Testing Only (2 sheets)

### **Sanitary Sewers**

SD-301 <sub>(05)</sub>	Building Court Sewer Main
SD-303 <sub>(93)</sub>	Sewer Construction in the Vicinity of Other Utilities
SD-304 <sub>(02)</sub>	Precast Concentric Sanitary Sewer Manhole
SD-305 <sub>(02)</sub>	Precast Eccentric Sanitary Sewer Manhole
SD-306 <sub>(02)</sub>	Sanitary Sewer Drop Connection (2 sheets)
SD-307 <sub>(93)</sub>	Manhole Frame, Cover, and Pan
SD-308 <sub>(93)</sub>	Sanitary Sewer Riser and Minimum Grades
SD-309 <sub>(02)</sub>	Industrial Waste Monitoring Structure
SD-310 <sub>(02)</sub>	Permit and Subdivision Trench Sections (3 sheets)
SD-311 <sub>(93)</sub>	Test Requirements for Sanitary Sewer (2 sheets)
SD-312 <sub>(93)</sub>	House Sewer
SD-313 <sub>(93)</sub>	Alteration to Existing House Sewer
SD-314 <sub>(93)</sub>	Backflow Preventor
SD-315 <sub>(93)</sub>	Septic Tank (3 sheets)

### **Storm Sewers**

SD-401 <sub>(93)</sub>	Storm Water Inlet Anchor, Frame, and Grate
SD-402 <sub>(93)</sub>	Type "A" Storm Water Inlet
SD-403 <sub>(93)</sub>	Type "C" Storm Water Inlet
SD-404 <sub>(93)</sub>	Type "D" Storm Water Inlet
SD-405 <sub>(93)</sub>	Type "E" Storm Water Inlet
SD-406 <sub>(93)</sub>	Conversion Type "A" and "C" SWI to Type "E" SWI
SD-407 <sub>(93)</sub>	Conversion Type "E" SWI to Type "A" SWI
SD-408 <sub>(93)</sub>	Type "F" Inlet (2 sheets)
SD-409 <sub>(93)</sub>	Junction Box
SD-410 <sub>(93)</sub>	Storm Drain Manhole (4 sheets)
SD-411 <sub>(93)</sub>	Side Connection
SD-412 <sub>(93)</sub>	Reinforced Concrete Pipe Joint
SD-413 <sub>(93)</sub>	Rip Rap Energy Dissipator
SD-414 <sub>(02)</sub>	Concrete Energy Dissipator (3 sheets)
SD-415 <sub>(93)</sub>	Energy Dissipator for Small Flows
SD-416 <sub>(93)</sub>	Lateral Pipe Entry to Earth Channel
SD-417 <sub>(93)</sub>	Lateral Pipe Entry to Earth Channel Type 1
SD-418 <sub>(93)</sub>	Pipe Entry
SD-419 <sub>(93)</sub>	Erosion and Sedimentation Control Measures (4 sheets)

**NORMAL SEQUENCE OF OPERATIONS FOR CONSTRUCTION OF ROADWAYS**

The following will be the normal sequence of operation for the construction of a roadway in the City of Hayward. Each operation will follow only the applicable that precedes it on this list and then only after specific permission of the City Engineer. This list is to be used in coordination with all other project documents.

1. Clearing and Grubbing
2. Common excavation or backfill to grading plane to within 6" of subgrade
3. Install wet utilities (water, sewer, storm drain) and jumpers – Cut sheets required
4. Install dry utilities (telephone, electric, fiber optic, gas, etc.) – Approved plans required prior to installation. Minimum 12" separation must be maintained at crossings between wet and dry utilities.
5. Test utility trenches for compaction – Trenches may be tested for compaction as each utility installed
6. Preliminary tests of sewers and water lines – unofficial
7. Compact subgrade
8. Compaction test on subgrade (written certification with seal by licensed engineer)
9. Grade check of subgrade (written certification with seal by licensed engineer or surveyor)
10. Place, grade, and compact aggregate subbase & aggregate base to curb & gutter grade (written certification with seal required for compaction and grade)
11. Place forms for curb and gutters, and valley gutters - Cut-sheets required
12. Grade check on curb and gutter forms (written certification with seal by licensed civil engineer or surveyor)
13. Place concrete for curbs and gutters
14. Place "back-up" material or concrete sidewalk and driveways against back of curbs
15. Complete placing roadway aggregate subbase and aggregate base
16. Compaction test on base material (written certification with seal by licensed engineer)
17. Grade check of base material (written certification with seal by licensed civil engineer or surveyor)
18. Complete hydrants, water services, and meter boxes to proper position and grade
19. Video of storm lines & sanitary sewer; air & deflection tests on sewers and pressure & leak tests on water lines
20. Disinfection and flushing of water lines
21. Remove jumper and blow off, and perform bacteriological test of water lines
22. Put water lines into service (coordinate with water company)
23. Remove and replace any damaged curbs and gutters or any concrete to abut new Hot Mix Asphalt (HMA)
24. Apply asphalt prime coat (if required)
25. Place first lift of Hot Mix Asphalt (HMA) - (written certification of compaction with seal by licensed engineer – HMA with compaction less than specified must be removed)
26. Place asphalt tack coat between HMA lifts as required by the State Standard Specifications
27. Place second lift of HMA (written certification of compaction with seal by licensed engineer – HMA with compaction less than specified must be removed)
28. Apply asphalt seal coat (if required)
29. Raise all utility structures to grade and install monuments
30. Clean and video storm and sanitary sewers
31. Install street name signs, traffic control signs, striping & pavement markings, barricades, and curb markings
32. Completion of "punch list" items
33. Final "walk-thru" inspection
34. Provide "As-Built" drawings, Engineer's Final Report, Soils Engineer's Final Report, and Surveyor's Final Report
35. Acceptance of Project

In the event of any conflict, the following order will prevail: 1) Special Provisions (City contract only), 2) Project Plans, 3) City Standard Details & Specification, 4) State Standard Plans, 5) State Standard Specifications.