



STANDARD SPECIFICATIONS FOR CONSTRUCTION OF WATER MAINS (POTABLE)

Updated: July 2026

City of Hayward
Department of Public Works & Utilities
777 B Street, Hayward, CA 94541

www.hayward-ca.gov/your-government/departments/engineering-division

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PART 1: GENERAL REQUIREMENTS

1.01 SCOPE

These Water Specifications cover the installation of polyvinyl chloride (PVC) and ductile iron pipe (DIP) water mains and appurtenances to be installed by the Applicant with materials provided by the Applicant. Pipe installations under these Water Specifications are generally limited to pipe diameters of 12 inches or less. For pipe installations greater than 12 inches in diameter, the City may provide additional specifications and requirements.

1.02 DEFINITIONS AND TERMS

Wherever in these Water Specifications, the Standard Specifications or the 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

Applicant: Any individual, firm, company, corporation, developer, or contractor that applies for a connection or for improvements affecting the City's sanitary sewer and/or water system.

ASTM: American Society for Testing and Materials. www.astm.org

AWWA: American Water Works Association. www.awwa.org

City: City of Hayward, California www.hayward-ca.gov

Cal OSHA: California Occupational Safety & Health Administration. www.dir.ca.gov/dosh

Caltrans: State of California Department of Transportation. www.dot.ca.gov

Department: Department of Public Works & Utilities of the City of Hayward, California.

Development Review Specialist (DRS): A City Public Works & Utilities Department employee who, by definition, is an authorized agent of the Director of Public Works. The DRS assesses fees for connection to the City's water distribution system and discharge wastewater into the City's sanitary sewer collection system, processes water and sewer service applications, and provides work orders to City water field crew for installation.

1.02 DEFINITIONS AND TERMS (continued)

Director: The Director of the Public Works & Utilities 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. The Director of Public Works may perform duties of City Engineer.

Dwelling Unit: A building or portion of a building arranged, intended or designed to be occupied by not more than one family, a congregate residence for 10 or fewer people, and having facilities for sleeping, eating, cooking and sanitary purposes, independent of another dwelling or dwellings.

Engineer: The Director of Public Works/City Engineer, the Deputy Director of Public Works/Assistant City Engineer, or the Assistant Director of Public Works & Utilities, or their designee, 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.

Equivalent Dwelling Unit: A measure of the size of a proposed development based on its projected water usage. For residential developments, this number is equal to the number of dwelling units. For non-residential developments, this number represents the number of single-family dwelling units that would produce the same peak day flow rate. The water use of a single-family home to be used for this calculation shall be based on the water use factor for future single-family homes, as defined in the latest edition of the City's Water Master Plan.

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, pipelines, appurtenances, pumping stations, wells, and all other general properties. 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

1.02 DEFINITIONS AND TERMS (continued)

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

Soils Engineer: A licensed civil or geotechnical engineer who is qualified in the field of geotechnical engineering and soil mechanics.

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 of the State of California Department of Transportation, latest revision, and the Standard Details of the City of Hayward, latest revision. 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 of the State of California Department of Transportation, latest revision.

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 water 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 un-sanitized, new or inactive water main that is not connected to the City’s water system. Wet Taps shall only be performed by the City Water Field Services staff. Dry Taps may be performed by Applicant.

Water Field Services Staff: A City Public Works & Utilities Department employee who, by definition, is an authorized agent of the Director and Engineer. The City Water Field Services staff are the only persons allowed to operate water valves and perform “wet taps” on the City active water mains.

Water Resource Recovery Facility (WRRF): A City facility for treating wastewater from residential, commercial, and industrial users through a series of treatment processes. WRRF was formerly known as Water Pollution Control Facility (WPCF). In addition, the City has a recycled water treatment facility located at WRRF to produce disinfected tertiary recycled water.

Water Specifications: This document.

1.03 CITY SERVICE CONTACTS

CONTACT	DESCRIPTION OF SERVICE
Development Services Development Services Dept. (510) 583-4005	Encroachment permits for work in City right-of-way or easements.
Permit Center Development Services Dept. - Building Division (510) 583-4005	Building permits and inspections (non-Public Works).
Construction Inspection Public Works & Utilities Dept. - Engineering Division (510) 583-4730	Inspections of Public Works projects and utilities improvements.
Development Review Specialist Public Works & Utilities Dept. - Utilities Division (510) 583-4722	Water and sewer service applications, connections and fees, and work orders for City water field crews.
Survey & Right-Of-Way Public Works & Utilities Dept. - Engineering Division (510) 583-4730	Construction staking requirements, monuments, and elevation information.
Utilities Operation and Maintenance Manager Public Works & Utilities Dept. - Utilities Division (510) 881-7901 (510) 881-7902 (Administrative Staff)	Oversee the City's water distribution and sanitary sewer collection system operation and maintenance.

1.03 CITY SERVICE CONTACTS (continued)

CONTACT	DESCRIPTION OF SERVICE
Utilities Field Services Manager Public Works & Utilities Dept. - Utilities Division (510) 881-7949 (510) 881-7933 (Administrative Staff)	City's water distribution operation, maintenance, service connections, and meter installations.
Wastewater Collections System Manager Public Works & Utilities Dept. - Utilities Division (510) 881-7970 (510) 881-7902 (Administrative Staff)	City's sanitary sewer collection system operation, maintenance, and video inspection or closed-circuit television (CCTV) of City-owned sewer pipelines.
Water Pollution Source Control Administrator Public Works & Utilities Dept. – Environmental Services Division (510) 881-7900	Water pollution prevention and investigation of illicit discharge or dumping.

1.04 CITY STANDARDS AND CODES

The City's currently adopted State of California, Department of Transportation (Caltrans) Standard Plans and Specifications 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 Code of Regulations Title 22 Division 4 Chapter 16 Article 4 (refer to Section 1.10 of these Water Specifications).

In addition, see Chapter 11, Article 2 of the Hayward Municipal Code, "Hayward Municipal Water System". Excerpts of the Municipal Code are presented and referenced below. A copy of the Hayward Municipal Code is available online at:

https://library.municode.com/ca/hayward/codes/municipal_code

Section 11-2.03 – Standard Service Connections. "Standard service connections shall consist of ¾-inch service pipe and ⅝ 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. "... for commercial or industrial/multi-family residential fire service ... installations shall not be less than four (4) inches in size (diameter). ... for 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."

1.04 CITY STANDARDS AND CODES

Section 11-2.09 – Water Service Connections. Backflow Prevention and Cross Connection Control, including Appendix ‘A’- Backflow and Cross-Connection Control Regulations. “... 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).”

1.05 DRAWINGS

1. STANDARD PLANS: The Caltrans Standard Plans 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.
2. 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 the approved Plans will become a part of these Water Specifications. Abbreviations and symbols shown on the Drawings shall be per Standard Details SD-100 and SD-101 respectively.
3. CONFLICTS: In case of conflict between the approved Project Drawings and these Water Specifications, including the Standard Plans and Specifications, then notify the Engineer of Record and the City Engineer. Conflicts shall be resolved as determined by the City Engineer.

1.06 CHANGES

If, during the progress of the work, changes in design, material, or location are deemed necessary 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.

1.07 PERMITS, RIGHT OF WAY, AND LICENSES

1. 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 pipeline location is not public property, a right of way satisfactory to the City shall be obtained at the Applicant's expense, 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, refer to the City's website at:

<https://www.hayward-ca.gov/services/permits/encroachment-permit>

2. CITY BUSINESS LICENSE: Any business operating within the City is required to possess a valid City Business License. The 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) 583-4622 or refer to the City's website at: **<https://www.hayward-ca.gov/documents/business-license-application-hayward-based-business>**
3. CONTRACTOR'S LICENSE: The Applicant or their 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 & REQUEST FOR INFORMATION

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. Prior to submitting these materials to the City, the Applicant's engineer shall review and approve all submittals. Refer to Appendix A City of Hayward Water System Approved Materials. The Applicant shall allow at least **10 business days** for the City to review submittals or Requests for Information (RFI). Approval by the Engineer shall not constitute a waiver of any portion of these Water Specifications.

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 their own expense any part of the work that the Engineer determines has been improperly executed.

Public Works inspections must be requested at least 24 hours in advance. For inspections on public streets and utilities (sanitary sewer, storm drains, etc.), contact the Public Works Supervising Construction Inspector in the Engineering & Transportation Division at 510-583-4730. For inspections associated with encroachment permits, refer to the approved permit for inspection requirements.

For inspections on private utilities, the Building Inspection Division can be contacted at 510-583-4140. For additional information, refer to the City's website at:

<https://www.hayward-ca.gov/your-government/departments/building-division>

Work under these Water Specifications can be performed on Monday through Friday, excluding weekends and holidays. Refer to Section 3.05, "Maintaining Traffic," Table 1 of these Water Specifications for a list of holidays observed by the City; these holidays are subject to change without notice. Requests to perform work or inspections on weekends or holidays shall be submitted during normal work hours at a minimum of three full working days (72 hours) prior to the beginning of the work.

1.10 DESIGN AND LOCATION OF WATER MAINS 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.

1. **SIZING**: Water mains shall be a minimum of 8 inches in diameter and located within street right-of-ways and 5 feet from the face of curb to the extent practical.
2. **DEPTH OF COVER**: Water mains with diameters from 8 to 12 inches shall be installed with a minimum cover of 42 inches. Cover shall be measured vertically from the established street grade or the surface of the permanent improvement to the top of the pipe barrel. In addition, the maximum cover shall be limited to 4.5 feet to the extent feasible given local changes in surface features and obstructions. The only exceptions to these minimum and maximum coverage requirements are when:
 - a. The approved Plans indicate otherwise.
 - b. 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.
 - c. The Engineer specifies or approves in writing a variance in the required cover.
3. **WATER VALVES**: Water 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.
4. **WATER MAIN LOOPING**: The project's water system shall be configured as a looped system with at least two connections to the City's water distribution system to ensure continuous circulation, provide redundancy, and minimize stagnation. The project's water mains shall be connected to existing or proposed water mains to achieve the required looped system. Dead-end water mains and tree/branching configurations are not permitted. Project water mains shall be located within public right-of-way or within water line easements dedicated to the City, at the Applicant's expense. Refer to Section 1.14 of these Water Specifications for water line easement requirements and minimum widths.

1.10 DESIGN AND LOCATION OF WATER MAINS AND APPURTENANCES (continued)

5. CRITERIA FOR THE SEPARATION OF WATER MAINS, SANITARY SEWER, STORM DRAIN, AND OTHER UTILITY PIPELINES

California Code of Regulations Title 22 Division 4 Chapter 16 Article 4 sets the minimum separation requirements between water mains and sanitary sewer, storm drain, and recycled water pipelines. The City's minimum separation requirements are as follows:

a. Basic Separation Standards

i. **Parallel Construction.** The separation between potable water mains and sanitary sewer and recycled water pipelines shall be a minimum of 10 feet horizontally. The separation between potable water mains and storm drain pipelines shall be a minimum of 5 feet horizontally, measured from the nearest edges of the facilities.

ii. **Perpendicular Construction (Crossing).** Water mains shall be at least 1 foot vertically above sanitary sewer, storm drain, and recycled water pipelines, measured from the nearest edges of the facilities. Refer to Standard Detail SD-224, "Ductile Iron Drop."

The vertical separation shall be a minimum of 12 inches, measured from the outer diameter of the pipe to the outer diameter of the pipe between water mains and other utilities. Refer to Standard Detail SD-303, "Sewer Construction in the Vicinity of Other Utilities."

iii. **Common Trench.** Water mains and sanitary sewer and storm drain, or recycled water pipelines shall not be installed in the same trench.

iv. Refer to the City's Recycled Water Specifications for additional separation requirements between recycled water mains and other utility pipelines.

Local conditions may create a situation where there is no alternative but to install water mains, sanitary sewer 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).

1.10 DESIGN AND LOCATION OF WATER MAINS AND APPURTENANCES (continued)

- b. 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.

- c. Special Provisions: The Basic Separation Standards are applicable under normal conditions for sewers, storm drains, and water mains. More stringent requirements may be necessary if adverse conditions, such as high groundwater, exist.
- i. **Low Pressure Water Mains.** Sanitary sewer and storm drain pipelines shall not be installed within ($<$) 25 feet horizontally of a low head (≤ 5 psi) water main.
 - ii. **Pressure Testing of Pipelines.** New water mains, sanitary sewer, and storm drain pipelines shall be pressure tested, where the pipelines must be located ten (≤ 10) feet apart or less.
 - iii. **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.
 - iv. **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 wastewater which produces corrosive hydrogen sulfide.

1.10 DESIGN AND LOCATION OF WATER MAINS AND APPURTENANCES (continued)

v. Force Mains (Sanitary Sewer and Storm Drain).

1. Force mains shall comply with the Basic Separation Standards above.
2. 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 12 inches below the water main. In no instance shall a force main be installed above a water main
3. When a new force main crosses under an existing water main, all portions of the force main within 10 feet horizontally of the water main shall be enclosed within a continuous sleeve or casing pipe.
4. 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. In no instance shall a water main be installed below a force main.

1.10 DESIGN AND LOCATION OF WATER MAINS AND APPURTENANCES (continued)

- d. Separation Waiver Request Process: Prior to construction, the Applicant's licensed professional engineer shall prepare and submit the waiver information package in accordance with the requirements of the California State Water Resources Control Board's Division of Drinking Water (DDW) to the City for review.

The Applicant shall account for DDW review timeline during project planning, as receiving responses to waivers can take months and could impact the project schedule. The waiver information package shall include the following, but not limited to:

The waiver information package shall include the following, but not limited to:

- i. Alternative Analysis: Provide a detailed evaluation of all exhausted design alternatives, including a formal statement confirming that encroachment into the DDW separation criteria is unavoidable.
- ii. Mitigation & Public Health: Demonstrate that the project design minimizes encroachment to the greatest extent possible and incorporates sufficient mitigation measures to protect public health.
- iii. Variance Request: Explicitly request the required variance(s) and clearly identify all variance locations on the plans.
- iv. Stamped and signed by a licensed Civil Engineer.

The City may request additional information during the process. Following City review, the City will submit the waiver request package to DDW and will notify the Applicant of any subsequent actions or requirements upon receipt of DDW's response.

1.10 DESIGN AND LOCATION OF WATER MAINS AND APPURTENANCES (continued)

CASE 1 - NEW SANITARY SEWER OR STORM DRAIN PIPELINE

(See Figure 1 and Appendix B for Reference Standards)

Zone	Special Construction Requirements
P	PARALLEL or CROSSING: Zone P is a PROHIBITED zone. Water mains and sanitary sewer or storm drain pipelines shall never be installed within six (≤ 6) inches vertically and/or within one (≤ 1) foot horizontally of each other.
A	PARALLEL: Installation of new sanitary sewer or storm drain pipeline in Zone A parallel to existing water main is not allowed unless approved by the Director of Public Works and requires a waiver from the California State Water Resources Control Board's Division of Drinking Water (DDW). ¹
B	PARALLEL: Requires a waiver from DDW.¹ A new sanitary sewer or storm drain pipeline to be installed parallel to an existing water main and in Zone B shall be constructed of: 1. Fusible AWWA C900 PVC DR 14 (green color pipe for sewer). 2. Thermo-fusion welded (Butt fusion) HDPE pipe, minimum SDR-17. 3. Ductile Iron Pipe: standard asphaltic coating on the exterior, and Protecto 401™ ceramic epoxy lining by U.S. Pipe on the interior, or approved equal. 4. Reinforced Concrete Pressure Pipe with compression joints per AWWA C302 (<i>Not for sanitary sewer. For storm drain only</i>).

¹ For the Separation Waiver Request Process, see Section 1.10.5.d of these Water Specifications

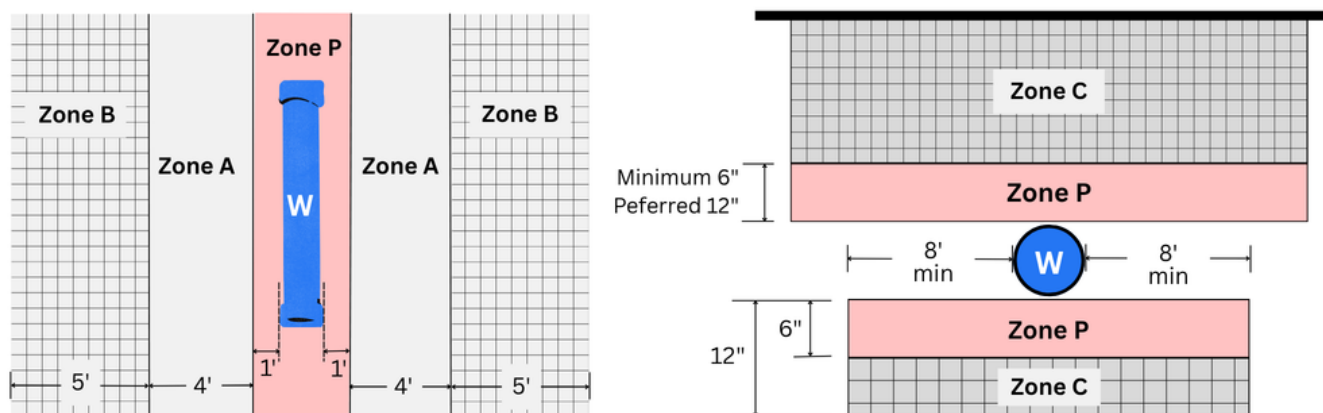
1.10 DESIGN AND LOCATION OF WATER MAINS AND APPURTENANCES (continued)

CASE 1 - NEW SANITARY SEWER OR STORM DRAIN PIPELINE

(See Figure 1 and Appendix B for Reference Standards)

Zone	Special Construction Requirements
C	CROSSING: Requires a waiver from DDW.¹ A new sanitary sewer or storm drain pipeline to be installed crossing an existing water main and in Zone C shall be constructed of: 1. A continuous section of AWWA C900 PVC DR 14 (green color pipe for sewer), centered over the pipe being crossed. 2. Thermo-fusion welded (Butt fusion) HDPE pipe, minimum SDR-17. 3. A continuous section of Ductile Iron Pipe: standard asphaltic coating on the exterior, and Protecto 401™ ceramic epoxy lining by U.S. Pipe on the interior, or approved equal. 4. 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>).

¹ For the Separation Waiver Request Process, see Section 1.10.5.d of these Water Specifications



Case 1 - Figure 1

Sanitary Sewer or Storm Drain Pipeline
Parallel or Crossing Water Main

1.10 DESIGN AND LOCATION OF WATER MAINS AND APPURTENANCES (continued)

CASE 2 - NEW WATER MAIN

(See Figure 2 and Appendix B for Reference Standards)

Zone	Special Construction Requirements
P	PARALLEL or CROSSING: Zone P is a PROHIBITED zone. Water mains and sanitary sewer or storm drain pipelines shall never be installed within six (≤ 6) inches vertically and/or within one (≤ 1) foot horizontally of each other.
A	PARALLEL: Installation of new water mains in Zone A parallel to existing sanitary sewer or storm drain pipeline is not allowed unless approved by the Director of Public Works and requires a waiver from the California State Water Resources Control Board's Division of Drinking Water (DDW). ¹
B	PARALLEL: Requires a waiver from DDW.¹ Existing sanitary sewer or storm drain pipeline parallel to a new water main and does not meet the requirements of Case 1 - Zone B: The new water main shall be constructed of: 1. Ductile Iron Pipe per standard C150/A21.50-02 2. AWWA C900 PVC DR 14 (blue color pipe for water).

¹ For the Separation Waiver Request Process, see Section 1.10.5.d of these Water Specifications

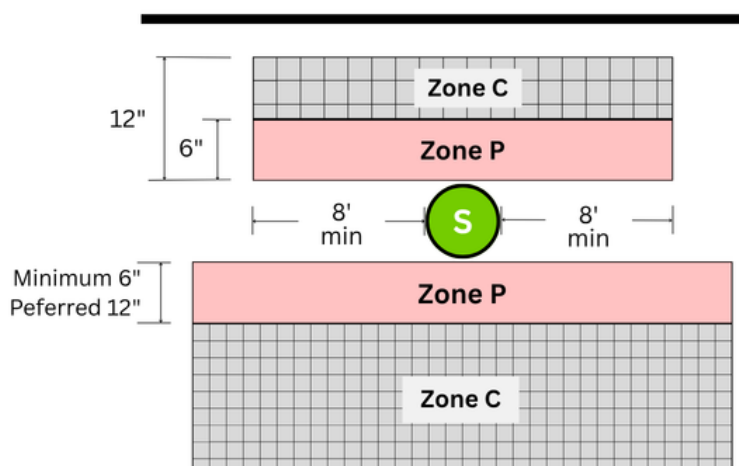
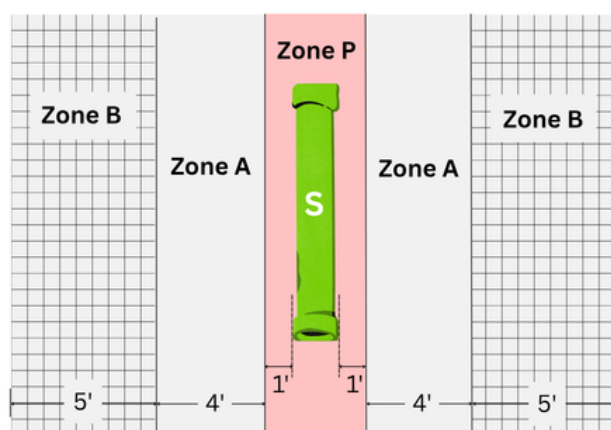
1.10 DESIGN AND LOCATION OF WATER MAINS AND APPURTENANCES (continued)

CASE 1 - NEW SANITARY SEWER OR STORM DRAIN PIPELINE

(See Figure 1 and Appendix B for Reference Standards)

Zone	Special Construction Requirements
C	CROSSING: Requires a waiver from DDW.¹ Existing sanitary sewer or storm drain pipeline crossing a new water main and sewer pipe does not meet the requirements for Case 1 - Zone C: The new water main shall have no joints within a minimum of eight feet from either side of the sanitary sewer or storm drain pipeline and shall be constructed of the same materials specified for Case 2 - Zone B, above.

¹ For the Separation Waiver Request Process, see Section 1.10.5.d of these Water Specifications



Case 2 - Figure 2

Water Main Parallel or Crossing
Sanitary Sewer or Storm Drain Pipeline

1.11 DESIGN AND LOCATION OF FIRE HYDRANTS

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

1. Only in locations approved by the Fire Department.
2. All fire hydrants shall be placed within 5 feet of a curb return, where practical.
3. 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.
4. At least 5 feet away from any of the following:
 - Driveway or wheelchair ramp.
 - Pole, luminaire, or street sign.
 - Building entry sidewalk.
5. At least 10 feet away from any sewer main or lateral.
6. Aligned with a property line, whenever possible.
7. At least 10 feet from the center of an existing parallel parking space.
8. With protective retaining walls when subject to encroachment by an adjacent slope.
9. Within 2 inch tolerance when installed at the standard 2'-0" distance from curb face.
10. With protective guard posts when there are no curb and gutter. Refer to Standard Detail SD-223, "Hydrant Bollard Installation," for requirements.
11. With blue raised reflective pavement markers per CA MUTCD Section 38.11. The maximum distance to a fire hydrant shall be per the requirements of the City of Hayward Fire Department and/or fire codes and regulations.

The maximum distance to a fire hydrant shall be per the requirements of the City of Hayward Fire Department and/or fire codes and regulations.

1.12 DESIGN AND LOCATION OF WATER AND FIRE SERVICES

All new water and fire service lines 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 tie-in connections (taps) to active, sanitized water mains, or to water mains connected to the City's water system, as well as the installation of water meters, shall only be performed by the City Water Field Services staff.

1. WATER SERVICES

- a. Water service connections shall be per Standard Details SD-213 through SD-221 as applicable to the project.
- b. Water service piping shall be run in a straight line perpendicular (90°) to the curb from the meter location.
- c. Between the water main and the water meter, the water service piping shall be constructed a minimum of 30 inches below the curb & gutter finished aggregate subbase elevation or 42 inches below the top of curb, whichever is deeper.
- d. Where non-metallic water service piping is used, tracer wire shall be installed from tap to meter box.
- e. Where a water service connection will serve two lots, the water service line and water meter box shall be centered on the common property line.
- f. Water meter boxes shall be installed a minimum of 2 feet from the top of driveway flare or any facility.
- g. Water service pipelines of 2 inch diameter or less, including water meters, shall be installed a minimum of 5 feet horizontally from sanitary sewer laterals.
- h. Water service pipelines greater than 2 inch diameter shall be installed a minimum of 10 feet horizontally from sanitary sewer laterals.

1.12 DESIGN AND LOCATION OF WATER AND FIRE SERVICES (continued)

- i. Dedicated irrigation water service meters shall be installed for all non-residential irrigated landscapes of 1,000 square feet and residential irrigated landscapes of 5,000 square feet or greater.
- j. All non-residential irrigation and water services, including residential services requiring backflow prevention devices, shall be installed with a Reduced Pressure Principle Backflow Prevention Assemblies per Standard Detail SD-202 and conform to AWWA C511. For backflow prevention devices requirements, refer to Section 2.12 of these Water Specifications.

2. FIRE SERVICES

- a. The size of the fire service shall be per the requirements of the City of Hayward Fire Department and fire codes and regulations, and per the Public Works & Utilities Department requirements to serve the project.
- b. For residential fire services, the minimum size of the service shall be 1 inch per Standard Detail SD-216, "Residential Domestic and Fire Services 1", 1.5", and 2". Note the different configurations and when backflow prevention assemblies are required.
- c. Each fire service shall be installed with a double check detector assembly (DCDA) per Standard Detail SD-201, "Double Check Valve Assemblies" and Standard Detail SD-204, "Fire Service 3" and Larger." For backflow prevention devices requirements, refer to Section 2.12 of these Water Specifications.

1.13 CONNECTIONS OF NEW WATER MAINS TO EXISTING WATER MAINS

Connections of new water mains to existing water mains will be made per the approved Plans. When a "Wet Tap" is designated, or when it is determined by the Engineer that a "Wet Tap" is required, **the City Water Field Services staff shall install the gate valve and split tee or nozzle and shall make the tap.** The Applicant or their agent must submit a request for such work through the Development Review Specialist at (510) 583-4722. 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, "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 per Standard Detail SD-231, "Jumper Pipe." 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 City Water Field Services staff may close valves in making a shutdown (if required) and open valves to restore pressure to an existing main and initiate pressure in the new installation.

The Applicant shall notify the Engineer and the City Water Field Services staff at least one month in advance to coordinate and establish a shutdown date, allowing sufficient time to notify all affected customers and for the City to plan valve closures. In general, shutdowns shall be kept as short as possible and shall be scheduled by City staff at times when there will be the least interference for customers. 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 done, and Applicant shall adjust their schedule accordingly.

The Applicant shall contact the Development Review Specialist to process required payments and deposits. All costs associated with connecting new water mains to existing mains shall be borne by the Applicant and paid to the City prior to the work.

1.14 WATER LINE EASEMENT (WLE)

When easements are required for public water facilities, the Applicant shall dedicate a public Water Line Easement (WLE) to the City at no cost. The WLE shall include rights of ingress and egress for the purpose of construction, reconstruction, maintenance, and repair of public water facilities. If the public water facilities are located within a private roadway, then the entire roadway shall be a WLE. Otherwise, the required minimum easement width shall be determined in accordance with Table 1 below. The final location and width of the easement shall be subject to the approval of the Director of Public Works.

All WLE shall meet the following requirements, but not limited to:

- Roadways shall be paved to allow all-weather access, ensuring safe and efficient entry for operation and maintenance activities.
- Accessible at all times. Gate codes shall be provided to the City. No vehicles parked within the easement. No facilities, overhangs, or structures are present within the easement.
- Provide the minimum required width per Table 1 below to accommodate equipment and the largest service truck for maintenance of the water facilities within the easement.

Facilities and improvements such as, but not limited to, structures, storage shed, stormwater retention/treatment facilities, deep rooted landscaping, trees, retaining walls, dumpsters, and garbage bins are not allowed within the WLE. The entire “air space” above-ground and over the WLE shall be clear of any facilities and improvements.

Table 1: The minimum required width for a City of Hayward Water Line Easement is based on pipe diameter and pipe depth, as outlined below:

Pipe Diameter (inch)	Depth (feet, finished grade to invert)	Easement Width (feet)
≤ 12	≤ 9	15
≤ 12	> 9	20
> 12	Any depth	20

1.15 WATER SYSTEM IMPACT EVALUATION

A water system impact evaluation will be required for all projects including 50 or more equivalent dwelling units. For projects with less than 50 equivalent dwelling units, the need for a water system impact evaluation will be determined on a case-by-case basis by the Director of Public Works or their designee. The City will manage the preparation of the evaluation. The Applicant shall be responsible for all costs associated with the evaluation as well as the design and construction of any necessary improvements identified in the City's water distribution system to accommodate the project and/or as determined by the Director of Public Works or their designee. The recommendations from the evaluation shall be implemented in the project's water improvement plans. Please refer to the City's latest Master Fee Schedule for the deposit amount.

In no event does the preparation of a water system impact evaluation relieve the Applicant from demonstrating achievement of fire flow as required by the City of Hayward Fire Department.

1.16 WATER SUPPLY ASSESSMENT

A Water Supply Assessment (WSA) may be required per California Water Code Section 10912. The City will manage the preparation of the WSA. The Applicant shall be responsible for all costs associated with the WSA.

1.17 GUARANTEE

The Applicant hereby guarantees all the following:

1. Any work performed by the Applicant shall be performed in a manner approved by the Engineer.
2. The Applicant shall provide the City submittals for review. Refer to Section 1.08, "Submittals," of these Water Specifications.
3. Any material furnished by the Applicant shall be materials listed upon the City's "Water System Approved Materials" list (included in Appendix A).
4. Both the work and materials shall fully comply with the requirements of these Water Specifications.
5. The completed water mains and appurtenances shall be in accordance with the requirements of these Water Specifications.

1.17 GUARANTEE (continued)

The Applicant hereby agrees to promptly reinstall, at their 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 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 them, has developed leakage or fails to fulfill any of the requirements of these Water 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, the Applicant shall reimburse the City for all costs of said repairs (including overhead costs to be determined at the time of work).

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 their sureties.

1.18 CLEANUP OF SITE

During the progress of the work, the Applicant shall keep the sites in a neat and sanitary condition and shall leave them so at the conclusion of the work. The Applicant shall dispose of refuse as often as directed by the City, so that at no time shall there be any accumulation of rubbish and excess materials. In the event that known contaminants are encountered during the installation of a water main or appurtenances, the Applicant shall provide and carry out a remediation plan at their own expense. Refer to Section 3.06, "Dust Control and Storm Drain Pollution Prevention," of these Water Specifications for additional requirements.

1.19 STAGING AREA

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

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 5-1.20B(4), "Contractor-Property Owner Agreement," of the Standard Specifications. Refer to Section 1.19, "Responsibility of the Applicant," of these Water Specifications for additional requirements.

1.20 RESONSIBILITY OF THE APPLICANT

The Applicant shall protect, restore, or cause to be restored all damaged property, including sidewalks; curbs and gutters; pipes; conduits; gas, water and other services; meter boxes; sewers; monuments; stakes; trees; shrubs and other plantings; and other public or private property to a condition as good as it was when they 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. The maximum spacing between the warning lights is less than or equal to 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. No construction material, equipment, or other material shall be left overnight within the City right-of-way or easement. No construction equipment, tools, or any other materials shall be stored on private property and/or planter areas during working hours that are not directly within the work area.

Convenient access to driveways, houses, and buildings along the line of work shall be maintained at all times. Temporary approaches to, and crossings of, intersecting streets shall be provided and kept in good condition.

If any improvements or facilities such as, but are not limited to, fencing, walls, landscaping, etc., need to be removed from private property or within the City right-of-way or easement to complete the work, appropriate temporary facilities shall be provided and maintained throughout construction to ensure safety. The Applicant is responsible for restoring the affected area to its original condition or better upon completion of the work.

1.20 RESONSIBILITY OF THE APPLICANT (continued)

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.

The Applicant's/Contractor's attention is directed to Section 5-1.17, "Character of Workers," of the Caltrans 2018 Standard Specifications. Under this section, the City Engineer or their designee, has the authority to require the Contractor to immediately remove, from the project, any worker whom the Engineer determines to be incompetent, disorderly, or acting improperly. No such worker shall be re-employed on the work without prior approval of the City Engineer.

The City right-of-way shall be used only as needed for active construction. No equipment, materials, or debris may remain in the right-of-way outside of working hours.

PART 2: MATERIALS

2.01 GENERAL

All materials shall be new and NSF 61 certified for drinking water. Materials shall be covered and stored off the ground in a clean and tidy environment. During installation, pipe ends shall be covered at the end of each work shift.

The materials and joints specified in these Water Standards are the minimum approved standards that shall be used. All materials used and all joints made in or entering the construction of water systems or parts thereof shall be watertight and free from defects. All materials used shall be of adequate strength and durability and of such design as providing a substantial watertight system. All joints and connections shall be made water-tight.

The City Engineer or their designee may require water pipelines to be constructed with seismic design features on a case-by-case basis. Water pipelines that cross or are located within the vicinity of earthquake zones, such as the Alquist Priolo Fault Zone, shall incorporate seismic design features. The City Engineer or their designee may provide additional specifications and requirements for earthquake-resistant pipe materials and installation.

2.02 POLYVINYL CHLORIDE PIPE AND FITTINGS

Polyvinyl chloride (PVC) pressure pipe and fittings shall conform to AWWA C900 and shall be blue color.

1. PVC Pipe C900 with integral bell shall be Diamond, JM Eagle, Vinyltech, Westlake, or approved equal and shall be DR 18 unless otherwise indicated on the plans.
2. PVC Pipe C900 with restrained joint and integral bell shall be Westlake AquaSpring C900 Certa-Lok or approval equal and shall be DR 18 unless otherwise indicated on the plans.
3. 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.
4. Rubber gaskets shall be RieberLok and shall conform to ASTM F477.
5. Couplings shall be designed to ensure a watertight joint with the pipe when subjected to the same hydrostatic test as designated for the pipe.
6. PVC pipes and couplings shall be designed and machined to the tolerances of, and be interchangeable with, pipe of other manufacturers meeting AWWA C900 standards.
7. Testing of the pipe and couplings shall be made in accordance with AWWA C900. Regardless of the place of manufacture, all pipes 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.

2.03 DUCTILE IRON PIPE AND FITTINGS

Ductile iron pipe (DIP) shall conform to AWWA C150/A21.50 and AWWA C151/A21.51.

1. DIP shall be cement mortar lined and seal coated in conformance to AWWA C104/A21.4.
2. Thickness Class shall be Number 50 for pipe diameter 6 inches through 12 inches and Number 51 for pipe diameter 4 inches and smaller.
3. All ductile iron pipe shall be polywrapped with V-Bio Polyethylene Encasement or approved equal. Refer to Section 2.13, "Protection from Corrosion" of these Water Specifications.
4. 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.
5. Couplings shall be designed to ensure a watertight joint with the pipe when subjected to the same hydrostatic test as designated for the pipe.
6. Flanged joints shall conform to AWWA C115/A21.15. Gaskets for flanged joints shall be as recommended by the manufacturer.
7. Ductile iron pipe shall be U.S. Pipe, McWane Ductile, American DIP, or approved equal.
8. Ductile iron fittings shall conform to AWWA C110/A21.10.
9. Fittings shall be Class 250, unless otherwise specified. Fittings shall be cement lined and seal coated in conformance with AWWA C104/A21.4. Joints shall be designed to accommodate the pipe joints.
10. Ductile iron fittings shall be Star, Tyler, U.S. Pipe, Union Foundry, Sigma, or approved equal.

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

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

All valves shall open counterclockwise (left). All valves shall be supplied with 2 inch square wrench nuts as required in AWWA C509. Valve ends shall conform to the requirements for bell, mechanical or flanged joints per Section 2.03, "Ductile Iron Pipe and Fittings," of these Water Specifications. All valves shall be protected with V-Bio Polyethylene Encasement or approved equal per Section 2.13, "Protection from Corrosion," of these Water Specifications. 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.

1. GATE VALVES: Shall be Resilient-Seat or Resilient-Wedge, used where valves 4 inches through 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, or approved equal.
2. BUTTERFLY VALVES: Shall be used where valves larger than 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, the City will provide additional specifications.
3. AIR VALVES: Air valve assemblies shall be per Standard Detail SD-226 and shall conform to AWWA C512. Air valves shall be a minimum of 1 inch in size, of the combination type, with a working pressure of 250 psi unless otherwise approved by the Engineer. Air valves shall be APCO, Crispin, Val-Matic, or approved equal.

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

2.06 VALVE BOXES

All valve boxes and covers shall be Chisty G-5 traffic-rated valve box or approved equal. Covers shall have "WATER" cast on the top per Standard Detail SD-205, "Valve Installation."

2.07 BLOW-OFFS

Materials for blow-offs shall be per Standard Details SD-211 and SD-212.

2.08 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.

2.09 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 & Utilities 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:

1. MODIFIED STEAMER HYDRANT: Clow Valve Co. Model LB 614 (similar to Model 950, 195 lb heavy duty hydrant) with one 2-½" Outlet & one 4-½" Outlet.
2. DOUBLE STEAMER HYDRANT: Clow Valve Co. Model 865 with one 2-½" Outlet & two 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 C503. Finish coat of hydrant top section shall be Safety Yellow, Equipment Yellow, Rustoleum V2148838 (can) or Rustoleum 3445402 (gallon). The Contractor shall apply an additional finish coat after installation. Surrounding area shall be free of yellow paint.
5. Cast on each top and bury section shall be the casting date.
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 on all new hydrants until the hydrants are placed into service.

2.10 TRENCH TAPE AND TRACER WIRE

For trench tape and tracer wire installation, refer to Section 3.15 of these Water Specifications.

Trench tape shall be a minimum of 2 inches 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 blue polyethylene insulation suitable for direct burial and wet conditions, per Standard Detail SD-228, "Tracer Wire Installation." The tracer wire shall be continuous, and splices shall be made with two copper or brass split bolt fasteners without encapsulation in epoxy and shall be wrapped in general purpose adhesive tape, which shall be 2 inches wide by minimum 10 mils thick, Scotchrap No. 50, Tapecoat CT, or approved equal. Continuity testing for tracer wire is at the discretion of the Engineer.

2.11 WATER SERVICE CONNECTIONS

Materials for water service connections shall be NSF 61 certified for drinking water and per Standard Details SD-213 through SD-221. In addition, materials for fire service lines shall be per Standard Detail SD-204. Valves and fittings for water service connections shall also conform to AWWA C800. The pipe materials for water service connections may be as follows and per the project plans.

1. Pipe diameter 3/4 inch and 1 inch water service lines can be copper, Type K.
2. Pipe diameter 3/4 inch and 1 inch water service lines can be polyethylene, 200 psi, SDR-9, PE 4710 classification number, and shall be Iron Pipe Size (IPS).
3. Pipe diameter 1-1/2 inch, and 2 inch water service lines can be polyethylene, 200 psi, SDR-9, PE 4710 classification number, and shall be Copper tube size (CTS).
4. Water service lines larger than 2 inches shall be C900 PVC or ductile iron conforming to these Water Specifications.
5. Polybutylene is no longer used or allowed for water service pipelines.

2.12 BACKFLOW PREVENTION DEVICES

The City Standard Details (SD) for backflow prevention devices are:

- SD-201, "Double Check Valve Assemblies"
- SD-202, "Reduced Pressure Principle Backflow Prevention Devices"
- SD-204, "Fire Service 3" and Larger"

Backflow prevention devices shall be above-ground, located on private property, and located a maximum 5 feet from the property line/easement/right-of-way or as determined in the field by the City Water Field Services staff.

All non-residential irrigation and water services, including residential services requiring backflow prevention devices, shall be installed with a Reduced Pressure Principle Backflow Prevention Assemblies per Standard Detail SD-202 and conform to AWWA C511.

Each fire service shall be installed with a double check detector assembly (DCDA) per Standard Detail SD-201 and Standard Detail SD-204. Fire services, including residential fire services, of 3 inches and larger shall be installed with a DCDA per SD-204.

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 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.

2.13 PROTECTION FROM CORROSION (continued)

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.

1. POLYWRAP (Polyethylene Protective Wrapping)

- a. General purpose adhesive tape shall be 2 inches wide by minimum 10 mils thick, Scotchrap No. 50, Tapecoat CT, or approved equal.
- b. Polywrap shall conform to AWWA C105/A21.5 for Type 1, Class C (black), Grade E1, and shall be V-Bio Polyethylene Encasement or approved equal. Minimum polywrap flat tube width sizes are listed below:

Polywrap Flat Tube Width (inches)

Pipe Diameter (inches)	Ductile Iron Pipe with Bell & Spigot Joints	Ductile Iron Pipe with Mechanical Joints
4	14	16
6	17	20
8	21	24
10	25	27
12	29	30

2. 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.
3. 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 per Standard Detail SD-125, "Permit and Subdivision Trench Sections," and per these Water Specifications.

1. 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:
 - a. Asphalt concrete shall be produced at a central mixing plant.
 - b. Aggregate shall conform to the ½ inch maximum, medium grading specified in Section 39 of the Standard Specifications, except that ¾ inch maximum medium grading may be used below the top 0.15 feet (i.e., final lift).
 - c. **Temporary pavement shall be maintained at all times until final paving is completed.** 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. **Cutback asphalt concrete installed in trenches from October through April shall be maintained at all times. Contractor shall monitor these locations and perform repairs as needed to ensure structural integrity.**
2. AGGREGATE BASE: Aggregate Base (AB) shall be ¾ inch maximum Class 2 and shall conform to the provisions in Section 26, "Aggregate Bases," of the Standard Specifications and these Water Specifications.
3. QUARRY FINES and DRAIN ROCK: Aggregate for quarry fines and drain rock shall conform to the requirements per Standard Detail SD-125, "Permit and Subdivision Trench Sections."

2.15 PORTLAND CEMENT CONCRETE

Materials for Portland cement concrete shall conform to the provisions in Section 90, "Concrete," of the Standard Specifications.

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) shall contain not less than 564 pounds of cementitious material per cubic yard.
- Class B Concrete (5-sack-mix) shall contain not less than 470 pounds of cementitious material per cubic yard. (Typical for Valve Boxes and Manholes)
- Class C Concrete (4-sack-mix) shall contain not less than 376 pounds of cementitious material per cubic yard. (Typical for Thrust, Reaction, and Support Blocks)
- Class D Concrete (7-sack-mix) shall contain not less than 658 pounds of cementitious material per cubic yard.

Materials for minor concrete shall conform to the requirements of Section 90-2, "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 SIDEWALK AND CURB AND GUTTER RESTORATION

Where existing sidewalk or curb and gutter are damaged by the installation of sewer facilities, appurtenances, or other construction activities, the Applicant shall replace them per Standard Detail SD-107, "Concrete Construction Special Provisions," and SD-108, "Sidewalk, Curb and Gutter, Island Curb, and Curb Ramp Sections."

Base rock material shall consist of Class 2 Aggregate Base per Section 2.14, "Trench Sections," of these Water Specifications and shall be a minimum of 4 inches thick unless otherwise noted on the approved plans.

Concrete for sidewalk shall be Class B, containing not less than 470 pounds of Portland cement per cubic yard, and shall conform to Section 90, "Concrete," of the Standard Specifications. Refer to Section 2.15, "Portland Cement Concrete," of these Water Specifications for additional requirements. In addition, concrete shall contain one (1) pound of lamp black per cubic yard. All concrete repairs shall extend to the nearest score line or control/expansion joint.

2.17 MICROSURFACING

Microsurfacing shall be per Section 37-3 of the Standard Specifications and per the City of Hayward Public Works Engineering specifications, which will be provided by the City as a supplement to these Water Specifications. Also refer to Standard Detail SD-126, "Pavement Mitigation For Streets On Moratorium."

In case of conflict between the Standard Specifications and the City of Hayward Public Works Engineering specifications, the City of Hayward Public Works Engineering specifications shall govern for microsurfacing. The City may require the Applicant to provide material submittals for review and approval prior to microsurfacing. Slurry seal shall not be used within the City.

2.18 MARKER POSTS

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

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.

All materials shall be new. Material shall be covered and stored off the ground in a clean and tidy environment. Pipe ends shall be covered at the end of the work shift during installation.

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 CURB AND GUTTER

Prior to installing a water main, earthwork and rough grading shall be completed and cut-sheets of pipeline construction staking shall have been approved by the City. The pavement subgrade shall be acceptable to the City, or Alameda County if work is located in the unincorporated area, and curbs and gutters shall have been constructed. For construction staking requirements, contact the survey section in the Engineering and Transportation Division at 510-583-4730 .

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

1. The street area has been rough graded to the extent that the water main shall have a cover from the finished grade to the top of pipe per the approved Plans.
2. 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.
3. 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.
4. The alignment and grade of the street area are in accordance with the improvement plans approved by the City.
5. The main and appurtenances will be located in accordance with Section 1.10, "Design and Location of Water Mains and Appurtenances," of these Water Specifications.
6. The Applicant agrees to promptly relocate the main and appurtenances at their 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 per 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 12 inches shall be constructed in accordance with the requirements in Section 1.10 of these Water Specifications and per Standard Details SD-224, "Ductile Iron Drop," and SD-303, "Sewer Construction in the Vicinity of Other Utilities."

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.

3.04 OPERATION OF WATER VALVES

Water valves on existing water mains in the City's water system or new valves introducing water to new mains are to be operated only by an authorized City Water Field Services staff. Applicant's employees shall not open or close these water valves. The Applicant shall give a minimum of **15 business days** notice to the Engineer prior to need for valve operation. If a shutdown is required, refer to Section 1.13, "Connections of New Water Mains to Existing Water Mains" of these Water Specifications for requirements.

3.05 MAINTAINING TRAFFIC

Attention is directed to Section 7-1.03, "Public Convenience;" Section 7-1.04, "Public Safety;" and Section 12, "Temporary Traffic Control Devices," of the Standard Specifications. Nothing in these Water Specifications shall be construed as relieving the Applicant from their responsibility.

1. STANDARD REQUIREMENTS

- a. Traffic Control Plans shall be submitted to the City Engineering & Transportation Department at least 20 business days in advance for review. For work on arterial streets, intersections, or bus routes, site-specific Traffic Control Plans are required. No detours shall be allowed.
- b. "No Parking" signs shall be posted at no greater than 50-foot intervals at least 72 hours prior to effective time of parking restriction. Contractor shall clearly indicate on the signs the day, date(s), and hours that "No Parking" is necessary.
- c. Temporary "No Parking" signs cannot be reused. New signs shall be posted for any schedule changes.
- d. 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 will require the Contractor to take appropriate measures to provide whatever facilities are deemed necessary to ensure proper traffic safety.
- e. 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. Additional flaggers are required at intermediate uncontrolled intersections. 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 appropriate personal protective equipment and be able to communicate by radio with each other at all times. Flaggers shall be clearly visible to approaching traffic at all times.

3.05 MAINTAINING TRAFFIC (continued)

- f. 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.
- g. Applicant shall cooperate with local authorities related to handling traffic through the area and shall make their own arrangements related to keeping the working area clear of parked vehicles.
- h. Police services for traffic control are available upon request and shall be coordinated through the City of Hayward Police Department, Traffic Division, at 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 shall arrange the services of the Police Department. The traffic control services of the Police Department shall be at the Applicant 's expense.
- i. On all streets, the full width of the traveled way shall be open for use by public traffic on Saturdays, Sundays, holidays (refer to Table 1 below), 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.
- j. In the event that the traffic control plan is determined to be ineffective, the Contractor shall resubmit a new traffic control plan for the Engineer's review and approval.
- k. Holidays mentioned above are listed in Table 1 below. These holidays are subject to change without notice.

3.05 MAINTAINING TRAFFIC (continued)

Table 1: Holidays observed by the City of Hayward

Holiday	Date
New Year's Day	January 1
Dr. Martin Luther King Jr. Day	3rd Monday in January
Lincoln's Birthday	February 12
Presidents' Day	3rd Monday in February
Cesar Chavez Day	March 31
Memorial Day	Last Monday in May
Juneteenth	June 19
Independence Day	July 4
Labor Day	1st Monday in September
Admissions Day	September 9
Indigenous Peoples' Day	2nd Monday in October
Veterans Day	November 11
Thanksgiving Day	4th Thursday in November
Friday after Thanksgiving Day	Friday following 4th Thursday in November

3.05 MAINTAINING TRAFFIC (continued)

Table 1: Holidays observed by the City of Hayward

Holiday	Date
Christmas Eve	December 24
Christmas Day	December 25
New Year's Eve	New Year's Eve December 31

1. SPECIAL REQUIREMENTS

- a. Traffic control for lane closure shall conform to the details per the State Standard Plans T-11, T-12, T-13, and T-14.
- b. A minimum of 1 traffic lane, not less than 10 feet wide, shall be maintained in all areas. If only 1 lane is available for two-way traffic, appropriate flagmen shall be used as specified in this section of these Water Specifications.
- c. Safe and convenient pedestrian access shall be provided at all times.
- d. Applicant shall install and maintain all construction signs conforming to State of California Standards and as directed by the Engineer.
- e. 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

1. DUST CONTROL: Applicant shall implement dust control measures conforming to the provisions in Section 10-5, "Dust Control," of the Standard Specifications.
2. 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."
 - a. "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. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day or at a frequency noted by the City Engineer or City Forces. The use of dry power sweeping is prohibited.
4. The Contractor shall begin cleanup operations at least one hour before the end of each day's work, clean all paved portions of the project and paved streets leading from the project that have dust-producing materials or debris deposited upon them

In addition, the Contractor shall provide continuous cleanup and debris/dust control at all times. Daily cleaning activities shall employ the use of a street sweeper capable of spraying for dust control and vacuuming and removing all debris from City streets. All cleaning activities shall be concluded by the end of the working hours.

3.07 WATERING (CONSTRUCTION WATER METER)

Watering shall conform to the provisions in Section 10-6, "Watering," of the Standard Specifications, except that no compensation for water supply shall be considered.

The Applicant shall meter all water taken from the City of Hayward Water System and pay the current rates for water consumed. The construction water meter shall be supplied by the City of Hayward Water Division. If the Contractor fails to obtain a construction water meter or draws water from a hydrant without one, the City reserves the right to halt all construction activities until a meter is properly issued by the City of Hayward Water Division. Water is available from the City of Hayward fire hydrants at or near the site of work. The Applicant shall submit an application to the City of Hayward Water Field Services and make payment of the appropriate fee or deposit for a construction water meter.

Equipment, materials, hoses, and apparatus associated with watering purposes shall be sanitized or new, and in good working condition at all times. If the City determines that any component is inadequate or not in proper condition, the Contractor shall immediately replace or repair it. Failure to comply may result in suspension of hydrant usage for water supply until the issue is resolved.

3.08 OBSTRUCTIONS

Attention is directed to Section 5-1.36, "Property and Facility Preservation," and Section 15, "Existing Facilities," of the Standard Specifications.

Applicant shall show the approximate location of all existing utilities on the Plans. Prior to performing any excavation, the Applicant shall contact Underground Service Alert (U.S.A.) within the time required by law. It shall be the Applicant's responsibility to locate all existing utilities in the work area prior to beginning any excavation activities.

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. The Applicant shall submit to the Engineer, at least 15 business days prior to excavation, drawings indicating the location and depth of all utilities encountered during potholing.

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 Contractor shall not perform both the initial sawcut and the T-cut during the initial trench excavation. The initial sawcut shall be made at the edge of the trench. After backfilling and compaction are complete, Contractor may saw cut for T-cuts. Additionally, no grinding shall be allowed.

The Applicant shall notify adjacent property owners of the work schedule and necessary access restrictions a minimum of five (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.

Excavation for pipes shall be by open trench unless otherwise specified, or shown on the approved Plans, or permitted by the Engineer. No excavated material and equipment shall 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 2 inches minimum, with a concrete pavement saw.

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.

3.09 TRENCH EXCAVATION AND BACKFILL (continued)

All excavation limits, backfill materials and compaction shall conform to the requirements per Standard Detail SD-125, "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. Plates shall be flush with the existing street/roadway.

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.

1. DEWATERING: All water encountered during the work shall be disposed of by the Applicant in such manner as shall 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 access 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. Applicant shall provide a means for desilting the water before discharging it at their expense. Prior to any discharge, the Applicant shall contact the City Water Pollution Source Control Division at (510) 881-7900 for further information regarding discharge requirements and notify the Engineer.
2. 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.

3.09 TRENCH EXCAVATION AND BACKFILL (continued)

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 2-inch layer with material as specified on Standard Detail SD-125, "Permit and Subdivision Trench Sections" or as specified by the Engineer.

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

All excavated material shall be removed from the project site concurrently 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.

3. **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 their own determination in this regard.

3.09 TRENCH EXCAVATION AND BACKFILL (continued)

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:

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

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

Native material used in new streets or new off-street traffic areas shall be used only when specifically authorized by the City Engineer and approved by the Soils Engineer. The Soils Engineer shall be present on-site at all times to observe the native material used for backfilling. Native material used as backfill material, where allowed, shall contain no rocks or clods greater than 4 inches in greatest dimension and shall be free of organic material and other deleterious material.

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 of aggregate subbases and bases shall be performed by the City as outlined in Section 25-1.01D(2)(d) and 26-1.01D(2)(d), "Quality Control Testing," of the Standard Specifications.

Relative compaction of trench backfill materials shall conform to the requirements per Standard Detail SD-125, "Permit and Subdivision Trench Sections," as shown on the Plans, and shall be done concurrently with pipe installation and placement of backfill materials. In unpaved areas backfill shall match the existing ground grade.

3.10 TRENCH SHORING AND SAFETY

The Applicant is responsible for maintenance of plates, shoring, and temporary pavement, and shall perform any necessary maintenance or repairs immediately as needed.

Attention is directed to Section 7-1.02K(6), "Occupational Safety and Health Standards," of the Standard Specifications, and 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 recessed 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 3-inch layer of temporary asphalt conforming to the requirements of Section 2.14, "Trench Sections," and Section 3.18, Pavement Replacement and Temporary Pavement," of these Water Specifications. Trench plates shall be tightly butted to each other and flush with the street/roadway, and fine graded asphalt concrete shall be compacted to form ramps, maximum slope of 8.5% with a minimum 12-inch taper to cover all edges of the steel plates. Applicant shall have plates readily available for driveway/pedestrian access and anchor the plates or use whatever means necessary to secure the plates.

When close sheeting is required, it shall be so driven 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.

3.10 TRENCH SHORING AND SAFETY (continued)

Sheeting and bracing, which have been ordered left in place, must be removed for a distance of 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. Sheeting, 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 to ensure the adequate protection of the completed structures and adjacent underground or surface structures and prevent the disturbance of the adjacent ground. Trench shields or other types of sheeting systems may be needed under current CAL-OSHA regulations.

Contractor shall be responsible for providing all trench shoring and support systems to protect existing structures and facilities adjacent to and within trenches, including, but not limited to, underground utilities, the existing chain link, and wooden fences. Existing structures and facilities that are damaged due to any construction shall be repaired by the Contractor.

3.11 INSTALLING POLYVINYL CHLORIDE PIPE

The installation of polyvinyl chloride (PVC) pipe shall conform to AWWA C605 and these Water Specifications. Pipe bedding, trench backfill and relative compaction shall per Standard Detail SD-125, "Permit and Subdivision Trench Sections." Pipe shall be uniformly supported throughout its length with no voids under or around the pipe.

The Applicant is specifically cautioned as to the possibility of empty pipeline floating due to flooding of the trench by groundwater, rainwater 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.

Before joining bell and spigot PVC 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.

3.12 INSTALLING DUCTILE IRON PIPE

The installation of Ductile Iron Pipe (DIP) shall conform to AWWA C600 and these Water Specifications. Pipe bedding, trench backfill, and relative compaction shall be per Standard Detail SD-125, "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. Pipe must be restrained using mechanical joint fittings.

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 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 with V-Bio Polyethylene Encasement in accordance with Section 2.13 and Section 3.16, "Protection from Corrosion," of these Water Specifications.

If specifically approved or required by the Director, ductile iron water pipe may be installed in a curved alignment in accordance with the manufacture's recommendations.

3.13 SETTING FITTINGS AND VALVES

Fittings, flexible expansion joints and valves shall be installed per the approved Plans. Such fittings and valves shall be lowered into the trench and cleaned and joined 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 per 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.

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. Refer to Standard Detail SD-205, "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 per Standard Detail SD-212, "Blow Off for Future Extension."

All fittings and valves shall be protected from corrosion per Section 2.13 and Section 3.16 of these Water Specifications.

3.14 WATER SERVICE CONNECTIONS

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

1. 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 orders. Temporary line caps or fitting plugs shall be installed in such a manner that they 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.
2. SERVICE TAPS: **City of Hayward Water Field Services staff shall only perform "Wet Taps" on active water mains.** Applicant may perform "Dry Taps" on water mains that are not connected to the City's water system and may use 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 their expense.
 - a. Written approval from the Engineer shall be obtained prior to performing Dry Taps and the following requirements shall be followed:
 - i. Service tap bit to be used shall have the capability of retaining the shavings of the tap outside the pipe.
 - ii. If there are any shavings in the pipe, the pipe shall be blown clean until all shavings are taken out from the pipe.
 - iii. All pipe openings, including corporation stops, shall be capped or plugged to prevent debris from entering the pipe. The caps and plugs 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/or replaced at Applicant's expense.

3.14 WATER SERVICE CONNECTIONS (continued)

- b. 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.
- c. 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**

Pipe Diameter (inch)	Outlet Diameter (inch)
4	1-1/2
8	2
10 to 24	3

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

3.14 WATER SERVICE CONNECTIONS (continued)

3. 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.

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 pipes shall be kept sealed until the actual connections are made at the corporation stop, existing service pipe or meter.

4. SERVICE LINE AND WATER METER: Applicant may install the water service line from the water main to the water meter. Hayward Water Field Services staff shall only provide and install a water meter 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

Refer to Section 2.10 of these Water Specifications for trench tape and tracer wire material requirements.

Trench tape shall be installed along the line of pipe approximately 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 by a minimum of 12 inches. Install tracer wire on all pipe installations per Standard Detail SD-228, "Tracer Wire Installation."

Tracer wire shall form a continuous line throughout 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 12 inch pigtail.

3.16 PROTECTION FROM CORROSION

Refer to Section 2.13 of these Water Specifications for corrosion protection material requirements.

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 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.

1. 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.
2. SACRIFICIAL MAGNESIUM ANODES shall be installed for all ductile iron fittings to prevent corrosion. Magnesium anodes for the ductile iron fittings shall be High Potential, Magnesium Alloy. The anodes shall be of the size indicated on the Plans. Each anode shall be cast with a steel core, and the core shall protrude from one end and shall be of sufficient length to permit attachment of a lead wire.

3.17 TESTING AND DISINFECTION OF WATER DISTRIBUTION MAINS

Prior to beginning any testing, the Contractor shall have completed items 1-19 of the Normal Sequence of Operations for Construction of Roadways (Refer to Appendix D).

1. Prior to testing and disinfection, the following shall apply:
 - a. **A testing and disinfection plan shall be submitted to the Engineer for approval indicating the fill and discharge taps.** The Contractor shall include a plan for discharging chlorinated water. The Standard Detail SD-231, "Jumper Pipe," depicts a City approved temporary jumper assembly, which connects from existing water main to the new water main.
 - b. All water mains, services, hydrants, and appurtenances shall be backfilled, compacted, and set to final grade.
 - c. The Contractor shall verify that the entire water system being tested, including all water mains, service lines, valves (are open), and appurtenances, is included in the testing and disinfection process.
2. PRESSURE TESTS: Pressure tests shall be performed per Standard Detail SD-229, "Collar Type Thrust Block for New Water Main Testing," and only after the following has occurred:
 - a. Compaction of backfill and approval of backfill by Engineer.
 - b. Before placement or replacement of permanent pavement.
 - c. A minimum of 7 days after last concrete thrust or reaction blocking has been cast with standard cement, or 36 hours after the last concrete thrust or reaction blocking has been cast using High Early Strength cement.

3.17 TESTING AND DISINFECTION OF WATER DISTRIBUTION MAINS (continued)

The duration of the pressure test shall be a minimum of 2 hours. The pipeline is required to maintain pressure of 200 psi $\pm$ 5 psi for the entire test period. Test pressure shall not exceed the maximum pressure rating of the pipe, valves, hydrants, and appurtenances.

Pressure tests shall not be conducted on existing water facilities or against valves.

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 pipeline 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 temporary blow off or fire hydrant. The pump, pipe connection, and all measuring apparatus shall be furnished by the Applicant and approved by the Engineer.

The pressure test shall officially commence when all equipment, including but not limited to hydrostatic test pumps, shall be removed and disconnected. The Contractor shall perform the test using a glycerine filled pressure gauge in proper working condition. The Contractor shall provide the pressure gauge submittal to the Engineer for review and approval prior to testing.

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.

3.17 TESTING AND DISINFECTION OF WATER DISTRIBUTION MAINS (continued)

3. 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 pipeline. 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 1,500 feet unless otherwise directed by the Engineer.

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

Allowable Pipe Leakage

Pipe Diameter (inch)	Maximum Leakage for 1,000 Feet of Pipeline (gallons)
6	2.86
8	3.8
10	4.75
12	5.70

3.17 TESTING AND DISINFECTION OF WATER DISTRIBUTION MAINS (continued)

4. DISINFECTION OF PIPELINES: The Applicant shall take every precaution to keep the interior of the pipelines 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, "Disinfecting Water Mains."
5. 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 5.1, "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 and no more than 48 hours apart, shall be collected from the new water main by the City of Hayward representative. The first sample shall be taken on a Monday, Tuesday, or Wednesday, excluding holidays, between 8:00 a.m. and 3:00 p.m. 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.

The contractor shall furnish, install, and maintain all bacteriological sampling locations required for acceptance of the new water main. Sampling locations shall be fully operational, approved by the Engineer, and located in safe, readily accessible areas for City personnel. The Contractor shall ensure unrestricted access to all sampling locations for flushing and collection of bacteriological samples until the water main has successfully passed all required bacteriological testing and has been accepted by the City.

3.17 TESTING AND DISINFECTION OF WATER DISTRIBUTION MAINS (continued)

After the disinfection of new mains 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:

- a. Prior to discharging chlorinated water into existing sanitary sewer manholes, the Contractor shall notify the City Inspector 2 full working days in advance. Maintain a minimum of 1 foot vertical air gap between end of discharge pipe and manhole frame. Discharge shall be monitored and controlled such that there is no surcharge or disruption of sewer service.
 - i. If discharge will be more than 50,000 gallons, receive approval from WRRF prior to discharge to sanitary sewer system.
 - ii. Record flow rate, volume and duration of tests/flushing information. Submit discharge records to Engineer.
- b. When sanitary sewers are not available, chlorinated water must be dechlorinated prior to discharge to storm drains or landscape areas.
 - i. 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:
 - 1. 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. When discharging to storm drains and landscape areas, 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.
 - 2. Fold bag over tablets, twisting in center.
 - 3. Secure bag with rubber bands and position it firmly inside a fabricated 4 inch diffuser.

3.17 TESTING AND DISINFECTION OF WATER DISTRIBUTION MAINS (continued)

- ii. 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
- iii. Blowoff or Pump Discharge: Use standard fire hose and position DFD so discharge does not cause erosion or implement erosion control measures.
- iv. Record Flow Rate, Volume and Duration of Tests/Flushing Information: Submit discharge records to Engineer.

Following the flushing of new water mains, the final connection of water mains to existing water mains shall be performed by the City at the Applicant's expense.

Sanitary construction practices shall 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 with the existing water service pressure. All leaks must be repaired by the Applicant to the satisfaction of the Engineer or their representative before backfilling.

3.17 TESTING AND DISINFECTION OF WATER DISTRIBUTION MAINS (continued)

6. FINAL CONNECTION: Contractor shall excavate and prepare the pits as needed for City Forces. City forces to perform the final connection of the new water main to the existing water main after the new water main's disinfection has been approved by the City. Contractor shall coordinate with the City to determine the required limits of excavation, dewatering, and shoring prior to excavation.

City forces shall perform all connections and repairs to existing City water mains, including operation of valves on the City's water system. The Applicant shall contact the Development Review Specialist to arrange all required payments and deposits. All costs associated with water connections and installations shall be borne by the Applicant and shall be paid and/or provide a time and materials deposit to the City prior to commencement of work.

After excavation, and once drain rock and shoring are in place, Contractor shall complete the following prior to the City performing the tie-in connection:

- a. Provide and maintain traffic control, including flaggers, as required.
- b. Remove all temporary plates and clean the excavation.
- c. Remove the temporary blow-off installed by the Contractor (protect the opening from contamination at all times).
- d. Provide sump pumps and maintain dewatering as required during the duration.

Following completion of the connection by City forces, the Contractor shall install the required thrust restraints, backfill the excavation, plate as necessary, restore the roadway, restore all disturbed improvements, and perform the final restoration in accordance with City requirements.

3.18 PAVEMENT REPLACEMENT AND TEMPORARY PAVEMENT

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

1. TEMPORARY PAVEMENT: **Temporary pavement shall be maintained at all times until final paving is completed.** Temporary pavement to an adequate thickness to remain structurally sound shall be placed in all trenches over compacted untreated base which is placed 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 shall be maintained at all times and checked daily at a minimum.

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

Cutback asphalt concrete installed in trenches from October through April shall be maintained at all times. Contractor shall monitor these locations and perform repairs as needed to ensure structural integrity.

2. 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, "Asphalt Concrete," 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 shall 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, "Aggregate Bases," of the Standard Specifications. Asphalt Concrete shall then be installed to the depth and width per Standard Detail SD-125, "Permit and Subdivision Trench Sections," 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.

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 layer shall be not less than 0.15-foot nor more than 0.40-foot in compacted thickness.

3.18 PAVEMENT REPLACEMENT AND TEMPORARY PAVEMENT (continued)

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

- a. Spreading and compacting shall be performed by methods that will produce an asphalt concrete surfacing of uniform smoothness, texture, and density.
- b. Asphalt concrete shall be compacted flush to existing grades and not "humped" or "dipped."
- c. 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 SIDEWALK AND CURB AND GUTTER RESTORATION

Refer to Section 2.16 of these Water Specifications for sidewalk and curb and gutter restoration requirements.

3.20 MICROSURFACING

Refer to Section 2.17 of these Water Specifications for microsurfacing requirements.

3.21 MARKER POSTS

Refer to Section 2.18 of these Water Specifications for marker posts requirements.

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3.12 APPENDIX A

City of Hayward Water System Approved Materials

Materials	Specification ⁽¹⁾	Suppliers / Products ⁽²⁾
Water Mains		
Polyvinyl Chloride (PVC) Pipe C900 with integral bell, Fittings & Couplings	AWWA C900, DR 18 unless otherwise indicated on the plans; ASTM D3139-19, ASTM F477	Diamond, JM Eagle, Vinyltech, Westlake.
PVC Pipe C900 with restrained joint and integral bell, Fittings & Couplings	AWWA C900, DR 18 unless otherwise indicated on the plans. Blue color.	Westlake AquaSpring C900 Certa-Lok.
Ductile Iron Pipe (DIP)	AWWA C150/A21.50 ($\leq 4'' = \#51$, $\geq 6'' = \#50$), AWWA C151/A21.51, AWWA C104/A21.4	U.S. Pipe, McWane Ductile, American DIP.
Ductile Iron Fittings	AWWA C110/A21.10, Class 250; AWWA C104/A21.4 or AWWA C116/A21.16	Star, Tyler, U.S. Pipe, Union Foundry, Sigma.

⁽¹⁾ For complete specifications, refer to the specific project specifications, the City's Standard Details, and the City's "Standard Specifications for Construction of Water Mains (Potable)."

⁽²⁾ Or approved equal.

3.12 APPENDIX A (continued)

City of Hayward Water System Approved Materials

Materials	Specification ⁽¹⁾	Suppliers / Products ⁽²⁾
Water Mains		
Ductile Iron Mechanical Joints	AWWA C111/A21.11	Star, Tyler, U.S. Pipe, Union Foundry, Sigma.
Ductile Iron Flanged Joints	AWWA C115/A21.15	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	AWWA C509, AWWA C550 • Gate (4" to 12"), AWWA C509 • Air, AWWA C512, 1", Combination, 150 psi	<u>Gate Valves:</u> Mueller, Kennedy, American Flow Control, Clow, M&H <u>Butterfly Valves:</u> Pratt <u>Air Valves:</u> APCO, Crispin, Val-Matic (SS trim, epoxy coated)

⁽¹⁾ For complete specifications, refer to the specific project specifications, the City's Standard Details, and the City's "Standard Specifications for Construction of Water Mains (Potable)."

⁽²⁾ Or approved equal.

3.12 APPENDIX A (continued)

City of Hayward Water System Approved Materials

Materials	Specification ⁽¹⁾	Suppliers / Products ⁽²⁾
Retrained Mechanical Joints	AWWA C111/A21.11	EBAA Iron (Series 1100, 2000PV Megalug [®])
Fire Hydrants	AWWA C503, NFPA No. 194	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 Tracer Wire	Blue w/ white lettering, 2" wide Copper, Single Strand, #12, THWN or polyethylene (Direct Burial & Wet).	Calpico, Allen Systems.

⁽¹⁾ For complete specifications, refer to the specific project specifications, the City's Standard Details, and the City's "Standard Specifications for Construction of Water Mains (Potable)."

⁽²⁾ Or approved equal.

3.12 APPENDIX B

City of Hayward Water System Referenced Standards

AWWA Standards

Ductile-Iron Pipe and Fittings

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

Steel Pipe

- C219: Bolted, Sleeve-Type Couplings for Plain-End Pipe

Valves and Hydrants

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

Pipe Installation

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

Disinfection of Facilities

- C651: Disinfecting Water Mains

3.12 APPENDIX B (continued)

City of Hayward Water System Referenced Standards

Service Lines

C800: Underground Service Line Valves and Fittings

Plastic Pipe

C900: Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 In.-12 In. (100 mm-300 mm), for Water Dist.

C901: Polyethylene (PE) Pressure Pipe and Tubing, ½ In. (13 mm) Through 3 In. (76 mm), for Water Service

ASTM Standards

D3139: Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

F477: Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

F1476: Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications

F1548: 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: Preparation of Bituminous Mixtures for Testing

CA 375: Determining the In-Place Density and Relative Compaction of AC Pavement

APPENDIX C

City of Hayward Index of Standard Details

Abbreviations and Symbols

SD-100	Abbreviations (2 sheets)
SD-101	Street and Utility Construction Drawing Symbols (5 sheets)

Streets

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SD-103	Cul-de-Sac and Right Angle Bend (2 sheets)
SD-104	Building Setback and Slope Terraces
SD-105	Median Tapers
SD-106	Median Flares
SD-107	Concrete Construction Special Provisions (2 sheets)
SD-108	Sidewalk, Curb & Gutter, Island Curb & Curb Ramp Sections (6 sheets)
SD-108A	Driveway For Sidewalk < 8 Feet
SD-109	Driveway Local & Collector Streets (Non-Commercial & Non-Industrial) (3 sheets)

Streets (continued)

SD-110	Driveway Commercial & Industrial Streets (2 sheets)
SD-110A	PCC Valley Gutter and Apron
SD-110B	Off-Street Parking
SD-111	Stabilized Construction Entrance
SD-112	Gutter Flare at Inlet
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SD-114	Steel Beam Barricade
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Streets (continued)

Water

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SD-126	Pavement Mitigation For Streets On Moratorium
SD-127	Microtrenching Residential Street Only

SD-201	Double Check Valve Assemblies
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SD-203	Tapping Tee and Valve Installation
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SD-208	Thrust Block – Crest Vertical Bends
SD-209	Optional Thrust Block – D.I.P. Crest Vertical Bend
SD-210	Thrust Blocks for Tees and Crosses
SD-211	Blow Off for Dead Ends
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Water (continued)

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SD-214	Plastic 5/8" & 3/4" Single Water Service Connection
SD-215	3/4" and 1" Consumer Water Service Connection – PE with Insta-Tite
SD-216	Residential Domestic & Fire Services 1", 1.5" & 2" (3 sheets)
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SD-218	Plastic Dual Water Service Connection
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SD-221	Large Main Service Connection
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SD-223	Hydrant Bollard Installation
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Water (continued)

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Sanitary Sewers

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SD-303	Sewer Construction in the Vicinity of Other Utilities
SD-304	Precast Concentric Sanitary Sewer Manhole, 48" & 60" (2 sheets)
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SD-307	Manhole Frame, Cover, and Pan (2 sheets)
SD-308	Sanitary Sewer Riser & Minimum Grades
SD-309	Industrial Waste Monitoring Structure
SD-311	Test Requirement for Sanitary Sewer (2 sheets)
SD-312	House Sewer (Sewer Lateral Connection)
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Storm Sewers

SD-401	Storm Water Inlet Anchor, Frame, and Grate	SD-413	Rip Rap Energy Dissipator
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SD-405	Type "E" Storm Water Inlet	SD-418	Pipe Entry
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APPENDIX D

Normal Sequence of Operations for Construction of Roadways (Public and Private Projects)

The following will be the normal sequence of operation for the construction of a roadway in the City of Hayward, including roadway improvements constructed as part of private development projects. 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. Perform clearing and grubbing.
2. Complete excavation or backfill to grading plane to within 6" of subgrade.
3. Install wet utilities (water, sanitary sewer, storm drain) and jumpers — Cut sheets required (signed and sealed by licensed civil engineer or land surveyor).
4. Install dry utilities (telephone, electric, fiber optic, gas, etc.) — Approved plans required prior to installation. Minimum 12-inch separation shall be maintained at crossings between wet and dry utilities unless specified on the plans.
5. Perform compaction testing of utility trenches — Trenches may be tested for compaction as each utility installed.
6. Perform preliminary tests of sewers and water lines — Unofficial, and for contractor verification purposes only.
7. Compact subgrade.
8. Perform compaction test on subgrade (written certification with seal by licensed engineer).
9. Perform grade verification of subgrade (written certification with seal by licensed engineer or surveyor).
10. Place, grade, and compact Class 2 aggregate base to curb & gutter grade (written certification with seal required for compaction and grade).
11. Place forms for curb and gutters, rolled curbs, and valley gutters — Cut-sheets required (signed and sealed by licensed civil engineer or land surveyor).
12. Perform grade verification 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 placement of roadway Class 2 aggregate base.
16. Perform compaction testing of base material (written certification with seal by licensed engineer).
17. Perform grade verification of base material (written certification with seal by licensed civil engineer or surveyor).

APPENDIX D (continued)

Normal Sequence of Operations for Construction of Roadways (Public and Private Projects)

18. Complete installation of hydrants, water services, and meter boxes to specified layout and grade.
19. Clean storm and sanitary sewer pipelines and appurtenances.
20. Perform initial closed-circuit television (CCTV) video inspection of storm lines and sanitary sewer. Perform air and deflection tests on sewers and pressure and leak tests on water lines.
21. Complete disinfection and flushing of water lines.
22. Remove temporary jumper and blow off and perform bacteriological test of water lines.
23. Put water lines into service (coordinate with City of Hayward Water Field Services or East Bay Municipal Utility District).
24. Remove and replace any damaged curbs and gutters or any concrete to abut new Hot Mix Asphalt (HMA).
25. Apply asphalt tack coat to all vertical surfaces.
26. Place first lift of Hot Mix Asphalt (HMA) (written certification of compaction with seal by licensed engineer). HMA with compaction less than specified shall be removed.
27. Place asphalt tack coat between HMA lifts as required by the State Standard Specifications.
28. Place second lift of HMA (written certification of compaction with seal by licensed engineer). HMA with compactions less than specified shall be removed.
29. Apply asphalt seal coat (if required by Project Specifications or as determined by the City Engineer).
30. Adjust all utility structures to grade and install monuments.
31. Clean and then re-video (CCTV) storm and sanitary sewer.
32. Install street name signs, traffic control signs, striping & pavement markings, barricades, and curb markings.
33. Complete all "punch list" items.
34. Conduct final "walk-through" inspection.
35. Submit "As-Built" drawings, Engineer's Final Report, Soils Engineer's Final Report, and Surveyor's Final Report.
36. Obtain final acceptance of Project.

In the event of any conflict, the following order shall prevail:

- 1) Special Provisions (City contract only), 2) Project Plans, 3) City Standard Details & Specifications, 4) State Standard Plans (Caltrans); 5) State Standard Specifications (Caltrans).