

MONTARA WATER AND SANITARY DISTRICT



WATER UTILITY STANDARD SPECIFICATIONS

Adopted by the Board of Directors by Resolution No.1759

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PART A - GENERAL INFORMATION

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SECTION 1 GENERAL INFORMATION

1-01 Introduction and Scope. These STANDARD SPECIFICATIONS shall apply to the design and construction of all public water facilities in the District whether privately financed and constructed under permits issued by the District or whether publicly financed and constructed under contract with the District.

The jurisdiction of the District includes the entire water system and its appurtenances from the point of service connection to the main up to and including the water meter and meter box, and the District has no ownership or maintenance responsibility therefore. In general, the service area of the District covers inside the Urban Area in Montara and Moss Beach. Maps showing the existing District boundaries are available for inspection at the District office.

Special provisions, specifications addenda and/or notes on the plans shall be provided when deemed necessary by the District Administrator and/or District Engineer and shall be considered as part of the specifications for the work.

1-02 District Ordinances. The Ordinances of the District comprise the rules and regulations of the District with respect to the construction and use of water facilities. In general, the Code provides the authority of the District Administrator, District Engineer and District Construction Inspectors, adopts the "Standard Specifications," provides regulations for water facilities construction and for the use and construction of public water utilities, fixes annexation, plan checking, and permit and inspection fees, and provides for the establishment of uniform connection charges. A knowledge of the Code provisions and policies is essential to those proposing to design or construct water facilities under permit in the District. Copies of the Code are available on the Internet or may be obtained at the District office upon request.

1-03 Annexation Policy. The District provides service inside the Urban/Rural Boundary as established by the San Mateo County Local Coastal Program. Any requests for consideration of service outside that area must be made to the Board of Directors of the District.

1-04 Not used.

1-05 Right-of-Way Policy. The right-of-way policy requires that all public water facilities be located in easements or rights-of-way granted or dedicated for water utilities and public use. In the case of public streets, further dedication is not necessary unless specifically required. All new easements must be granted directly to the District as water utility easements by separate deed. Unless otherwise specifically permitted or required by the District Administrator or District Engineer, all easements shall be fifteen (15) feet in width and the easement shall be centered on the water line. Ten (10) foot easements may be provided under special circumstances only if specifically approved by the District Administrator. Easements shall be provided for water utilities and granted to the District in all cases where future extensions of water lines will be required on the property being serviced.

1-06 Condemnation Policy. When a public water utility must pass through private property and a right-of-way cannot be obtained through negotiation with the property owner, the District may, under certain conditions, order condemnation of the required easement. If condemnation by the District is desired, the following will be required:

- A. Requirements - Submit complete construction plans, a detailed easement plat, and a letter to the District Board of Directors explaining the situation and stating that all reasonable means to acquire the easement through normal procedures have been exhausted; no agreement could be reached; and requesting the District's assistance in acquiring the easement.
- B. Condemnation Ordered - If condemnation is ordered by the District, a duplicate tracing of the easement map shall be submitted showing the entire easement, any required temporary working easements, all affected properties, and a description of the easement and temporary working easement including correct and complete names and addresses of all vested owners of the property shall be furnished.
- C. Costs of Condemnation - All costs of the condemnation shall be borne by the applicant and he shall deposit with the District, in advance, the estimated cost of the easement and all legal, appraisal, engineering, administrative and other costs associated with the condemnation. The amount of the deposit shall be determined by the District Engineer.

1-07 Engineering Policy. The engineering policy of the District requires strict compliance with the Civil and Professional Engineers Act of the California Business and Professions Code. All engineering plans, specifications, reports or documents shall be prepared by a registered civil engineer, or by a subordinate employee under his direction, and shall be signed by him and stamped with his seal to indicate his responsibility for them. It shall be the Job Engineer's responsibility to review any proposed water system, extension and/or existing system change with the District Engineer, prior to engineering or design work, to determine any special requirements or whether the proposal is permissible. Approval of preliminary or final plans by the District does not in any way relieve the Job Engineer of the Permittee of his responsibility to meet all requirements of the District. The plans and specifications for any job can be revised or supplemented by the District at any time it is determined that the full requirements of the District have not been met. The Job Engineer shall review such changes and prepare the necessary revisions to the plans. Any cost of revisions or additions required by the District shall be paid for by the Permittee.

1-08 Environment Impact Report Regulations. The District Board of Directors has adopted "Local Guidelines for Implementation of the California Environmental Quality Act of 1970" and amendments thereto. Under these regulations, persons proposing to obtain permits for water utility construction may be required to prepare or finance the preparation of certain environmental impact studies and documents concerning the project. Persons planning projects involving extension of water mains are advised to contact the District's staff early in their planning process to determine the appropriate lead agency and exact District Environmental Impact Report requirements.

SECTION 2 DEFINITIONS AND TERMS

2-01 Definitions and Terms. Whenever in these specifications, or in any documents or instruments where these specifications govern, the following terms, abbreviations or definitions are used, the intent and meaning shall be interpreted as follows:

Acceptance - Formal acceptance by action of the District Board of an entire contract or agreement or work done under permit which has been completed in all respects in accordance with the plans and specifications and any modifications thereof previously approved.

Annexation - The process of inclusion of property into District boundaries by proper legal procedures. Annexations must be processed through the Local Agency Formation Commission.

Applicant - The person making application for a permit and who shall be the occupant and/or owner of his/her/their authorized representative of the premises to be served by the water facility for which a permit is requested.

Building - Any structure used for human habitation or a place of business, recreation or other purpose.

Building Water Facility Permit - The written authorization from the District for the installation of a water facility at a specific location and under specific conditions of the permit.

Contractor - Any contractor licensed by the State of California to enter into contracts for and to perform the work of installing water facilities within the District, or the owner of private property doing his own house water facility work on his private property only.

County – The County of San Mateo, State of California.

County Standard Specifications - The Standard Specifications, County of San Mateo, Department of Public Works.

Definition of Words - Whenever, in these specifications, the words directed, required, permitted, ordered, designated or words of like import are used, they shall be understood to mean the direction, requirement, permission, order or designation of the District Administrator or District Engineer. Similarly, the words approved, acceptable, satisfactory, shall mean approved by, acceptable to, or satisfactory to the District Administrator or District Engineer.

Developer - A private party installing water facilities.

District - The Montara Water and Sanitary District located in San Mateo County, CA, as represented by the District Board, District Administrator or District Engineer.

District Board - The governing body of the District.

District Engineer - The Engineer of the District, licensed by the State of California as a Civil Engineer, acting either directly or through authorized agents.

District Inspector - The engineering or technical inspector or inspectors duly authorized or appointed by the District Administrator and responsible for the particular duties delegated to him/her or them.

District Manager - The Manager of the District acting either directly or through authorized agents.

Fixture Units - The fixture unit load values for drainage piping as computed from tables of the current Uniform Plumbing Code.

Job Engineer - The engineer, licensed by the State of California as a Civil Engineer, under whose direction plans, profiles and details for the work are prepared and submitted to the District for review and approval. The Job Engineer shall provide all field surveys, construction staking, confirm field changes and prepare record drawings.

Water Main - A public water main shall mean any public pipe which is owned, operated and maintained by the Montara Water and Sanitary District. The District will accept and maintain water mains which are constructed to these standards and installed under a District public water main extension permit with District supervision and inspection.

Other Specifications - Whenever in these specifications other specifications are mentioned, it shall be understood that the materials or methods mentioned therewith shall conform to all requirements of the latest revision of the specifications so mentioned.

Outside Water Main - A water main beyond the limits of the Water and Sanitary District not subject to the control or jurisdiction of the District.

Owner - In the case of District projects, the term owner shall mean the Montara Water and Sanitary District. In the case of private projects, the term owner shall mean that person who is doing or having work done under permit or agreement with the District.

Permit - Any written authorization required for the installation of any water line or water works.

Permittee - The person to whom a public water utility permit is issued.

Person - Any person, firm, company, corporation, association or public agency.

Plans - Construction plans, water utility plans and profiles, cross sections, detailed drawings, etc., or reproductions thereof, approved or to be approved by the District, which show the location, character, dimensions and details for the work to be done, and which constitute a supplement to these specifications.

Private Construction or Private Projects - Projects involving construction of water facilities, other than District projects, which are to be performed by the Permittee and connected to the District water system. BA to be accepted by the District shall be constructed under a Public Water Main Extension Permit.

Public Water Main Extension Permit - The written authorization from the District for the installation of a public water main at a specific location and under specific conditions of the permit.

Record Drawings (As-Built Drawings) - Reproducible plans signed and dated by the Job Engineer and District representative, indicating that the plans have been reviewed and revised, if necessary, to accurately show all elevations and construction details which were actually built.

Right-of-Way - All land or interest therein which by deed, conveyance, agreement, easement, dedication, usage or process of law is reserved for or dedicated to the use of the general public, within which the District shall have the right to install and maintain public water facilities.

Section - Any reference to a section which is not accompanied by further reference refers to a section or sections of these specifications.

Soils Engineer - Any soils engineering firm or authorized representative of such a firm which is retained by the owner of a project for the purpose of designing, testing, or controlling grading, installation of pavements, or trench backfill, and/or means to handle subsurface water and supplying to the District reports on the same. The Permittee shall pay all costs for the soils engineer.

Special Provisions - Special Provisions are specific clauses of the Specifications for a specific job which set forth conditions or requirements peculiar to the project under consideration and covering work or materials involved in the proposal and estimate but not satisfactorily covered by these Standard Specifications.

Specifications - The directions, provisions, and requirements contained herein as supplemented by such Special Provisions as may be necessary pertaining to the method and manner performing the work or to the quantities and qualities of materials to be furnished under the contract or permit.

Standard Drawings - The drawings of structures or devices commonly used on District work designated by the District as Standard Drawings at the time a District contract or agreement is entered into or permit is issued.

Standard Specifications - The Standard Specifications of the Montara Sanitary District as contained herein and all subsequent additions, deletions or revisions.

State Standard Specifications - The Standard Specifications of the State of California, Department of Public Works, Division of Highways, current issue. Where the terms "State" or "Engineer" are used in the State Standard Specifications, they shall be considered as meaning the "District" or "District Engineer" as defined hereinabove.

Streets or Roads - Any public highway, road, street, avenue, alley, way, easement or right-of-way.

Surety - Any firm or corporation executing a surety bond or bonds payable to the District, securing the performance of the contract or permit either in whole or in part.

Traveled Way - That portion of the roadway for the movement of vehicles, exclusive of shoulders and auxiliary lanes.

Uniform Plumbing Code - The Uniform Plumbing Code adopted by the International Association of Plumbing and Mechanical Officials, current edition.

Water Works - All facilities for collecting, pumping, treating and distributing of potable water.

Work - All the work to be done under the District contract, or permit, in accordance with the plans, specifications and/or Special Provisions, and/or permit conditions.

2-02 Abbreviations. The following abbreviations shall have the designated meanings.

ACP - Asbestos Cement Pipe

AC – Asphalt Concrete

AAN - American Association of Nurserymen

AASHTO - American Association of State Highway and Transportation Officials

ACI - American Concrete Institute

AGA – American Gas Association

AISC – American Institute of Steel Construction

ANSI – American National Standards Institute

AREA - American Railway Engineering Association

ASA - American Standards Association

ASCE - American Society of Civil Engineers

ASME - American Society of Mechanical Engineers

ASTM - American Society for Testing Materials

AWPA - American Wood Preserver's Association

AWS - American Welding Society

AWWA - American Water Works Association

BAWUA – Bay Area Water Users Association

BCDC - Bay Conservation and Development Commission

Cal Trans Spec. – Standard Specification, State of California, Department of Transportation, current Edition
CDF - Controlled Density Fill
CIP - Cast Iron Pipe
CLP - Concrete Lined Steel Cylinder Pipe
CL & CP - Concrete Lined and Coated Steel Cylinder Pipe
CMP - Corrugated Metal Pipe
Drop MH - Drop Manhole
ESO – Electrical Safety Orders, State of California
Fed. Spec. - Federal Specifications
FL - Flow Line
IAPMO - International Association of Plumbing and Mechanical Officials
ISA - International Shadetree Association
Inv. El. - Invert Elevation
LAFCo - Local Agency Formation Commission
LH - Lamphole
MH - Manhole
MWSD – Montara Water and Sanitary District
NEMA - National Electrical Manufacturers Association
PCC - Portland Cement Concrete
PE - Polyethylene
PMP - Perforated Metal Pipe
PVC - Polyvinyl Chloride
RCP - Reinforced Concrete Pipe
RH - Rodhole
RI - Rodding Inlet
RPMP - Reinforced Plastic Mortar Pipe
S - Pipe Slope
SDR - Standard Dimension Ratio
St. P. - Steel Pipe
Sta. - Survey Station
UBC – Uniform Building Code
UPC – Uniform Plumbing Code
URB - Untreated Rock Base (Aggregate Base)
VCP - Vitrified Clay Pipe

PART B - ENGINEERING AND DESIGN REQUIREMENTS

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SECTION 3 DESIGN CALCULATIONS AND PLAN PREPARATION

3-01 Design Calculations. When requested to do so by the District, the Job Engineer shall submit calculations for District review and approval. Design calculations shall be submitted in duplicate and shall be in a neat, acceptable form and shall indicate the date, signature of the Job Engineer and his stamp with his State of California registration number and expiration date.

Calculations for water facilities shall be presented in tabular form and shall include the following information for each section of pipeline: ground elevations, cumulative design flow, invert elevations, length of pipeline run, and size, slope, capacity and velocity, demand calculations. Design calculation for pumping stations shall include soils data, structural design calculations, hydraulic calculations including the basis for average and peak flows, pump and system curves characteristics, and individual and combined pump head capacity curves.

All calculations shall be accompanied by a small scale map showing and identifying proposed water facilities and tributary service areas, etc.

3-02 Size of Plans and Data Required. Sheet sizes for plans for all water facilities shall be 22 inches by 34 inches, unless otherwise specifically approved in advance by the District, and the plans shall include as a minimum the following information and data:

- A. General - The plans shall show the name of the project, subdivision, and each sheet shall bear the Job Engineer's signature and registration stamp with expiration date. Each map and plan sheet shall have a north arrow, appropriate scale or scales and date of preparation indicated thereon.
- B. Water Utility Plans - The water utility plans shall show the true horizontal relationship between the proposed water utility improvements and the existing and/or proposed field conditions, including all existing or proposed utilities and other facilities in accordance with available information (see Section 11-02). Plans shall include pipeline sizes and designations and shall show all structures and their respective numbers, the property lines and corners adjacent to the pipeline alignment, laterals and ties to property corners, all necessary required stationing, horizontal curve data and street names. Horizontal scale must be 20 feet to the inch with a vertical scale of 5 feet to the inch unless another scale is specifically permitted by the District.
- C. Water Utility Profiles – Water utility profiles shall show the vertical relationship between the water pipeline invert and the ground surface at the time of water utility construction and the finished ground and/or paving surface. The pipeline size, pipe type and pipe class shall be shown between each pair of consecutive structures on the profiles. Pipeline profiles shall also show all existing and/or proposed utilities and/or other facilities in accordance with available information (see Section 11-02), which cross the alignment of the pipeline and shall accurately indicate clearance when less than twelve (12) inches.

(Water pipeline profiles must be prepared at the same horizontal scale as the plans and a vertical scale of five (5) feet to the inch, unless another scale is specifically permitted by the District.)

- D. Easements - All existing and proposed easements and rights-of-way shall be shown on the plans.
- E. Vicinity Map - A small scale vicinity map showing the location of the development, together with the streets and downstream sewer, shall be shown on the first sheet of the plans.
- F. Location Map - A location map at a scale of 100 feet to the inch shall be included on the first sheet of the plans showing the entire development, the overall sewer layout and appropriately indexing each plan sheet.
- G. Line Stationing - Each sewer line with a separate designation shall be stationed continuously upgrade from 0+00 at its point of connection to another line.
- H. Ties to Existing System - Horizontal and vertical ties to the existing District sewerage system shall be indicated on the plans.
- I. Structure Numbers – Valve boxes, meter banks, and all other water structures shall be numbered or stationed consecutively upgrade by type of structure. The structure number shall appear on the plans and profiles whenever the structure is shown or referred to.
- J. Elevation Datum - The elevation datum used shall be USC & GS mean sea level (National Geodetic Vertical Datum NGVD). The plans shall include a note indicating the elevation datum and describing the location of one or more benchmarks in the area of the work.
- K. Standard Notes - In addition to any other notes which may be appropriate or required, the following notes shall be included on all plans:
 - 1. "All water utility construction shall be in accordance with the Montara Sanitary District Standard Specifications and Drawings."
 - 2. "The Contractor shall notify the District 48 hours prior to starting any water utility work."
 - 3. "For any work in a public street, the Contractor shall obtain an encroachment permit from the agency having jurisdiction."
 - 4. "The locations of utilities shown on these plans are approximate only, and it is the Contractor's responsibility to verify locations and depths with appropriate agencies or by potholing. The Contractor shall call USA Underground Service Alert at least 72 hours prior to commencing work."

5. "The Contractor shall pothole all underground utilities prior to any trenching operation.
6. "The Contractor shall notify the District immediately of any conflict between water utilities and other underground facilities."
7. "The Contractor shall shore all excavations in accordance with applicable safety orders."

3.03 Rights-of-Way. Rights-of-way define and establish the rights for the District to maintain a water utility in the location designated by the Job Engineer (see Section 1-05). When water utilities are to be installed outside of public street rights-of-way in subdivisions, the required easements shall be shown on the subdivision final map and shall be granted to the District in a separate deed of easement. Outside of subdivisions, when water utilities are to be installed on private property, an easement must be granted to the District and the easement description and required easement map shall be provided to the District by the Job Engineer, along with the name and address of the property owner or owners of record. Unless otherwise specifically approved by the District, public water utility permits will not be approved nor will any work be permitted to proceed until the District receives, approves and accepts and records all required easements.

A. Easement Descriptions - Easement descriptions shall provide legal metes and bounds description of all easements to be granted. The preamble of the easement description shall read as follows:

"AN EASEMENT for the construction and maintenance of water utilities and appurtenances, together with the right of ingress and egress, over, on or under the following described property:"

B. Easement Maps - The easement map shall show the entire parcel over which the easement is granted, and all necessary survey ties, courses and distances, the point of beginning of the easement description, the last names of each grantor, the name of the water main extension involved, a north arrow, map scale, and the Job Engineer's signature and registration stamp with expiration date. Bearings and distances of easement courses shown shall conform to those given in the easement description. Two (2) black line prints of the easement map shall be submitted (for each grantor involved).

C. Easement Deeds - After approval of the required easement map and description, the Permittee shall prepare the necessary easement deed on an appropriate form and furnish the District with a properly signed and notarized deed of easement for recordation by the District.

3-04 Easements for Future Extensions. Easements shall be granted to the District through the property to serve the downstream property in all cases where future extensions of water lines could be required beyond the property being serviced. Such easements shall be included on the construction plans where there is any doubt as to the ability to properly serve the ultimate service area.

3-05 Flood Control Approval. In the event that a proposed water utility is to cross a creek, storm water channel, conduit, structure or drainage course under the jurisdiction of San Mateo County, a detailed large scale profile of the crossing shall be incorporated in the plans with approval of the County and/or appropriate jurisdiction prior to approval of the plans by the District.

3-06 Soils Investigation. Due to the inherent hazards involved in excavation, trenching, and pipe laying in certain common soil formations within the District, the right is reserved to require geological investigation and report prior to the approval of construction plans. In general, locations on steep side hills, locations in areas of established instability, locations in areas of bay mud or filled marshland, spring or seepage areas, or areas where concentrated or unusual development exists or is planned, shall be investigated and construction controlled by the recommendations contained in the Soils Engineer's report. The costs of all soils investigations shall be paid for by the Permittee.

3-07 Construction Permits. The Permittee shall be responsible for securing all necessary construction permits. Such permits include, but are not necessarily limited to, permits from San Mateo County, California Coastal Commission, the U.S. Army Corps of Engineers, State Department of Fish and Game, Cal/OSHA, Division of Industrial Relations, street or railroad encroachment permits, etc.

SECTION 4 DESIGN STANDARDS

4-01 Design Criteria. The following criteria for the design of gravity sewers within the jurisdiction of the Montara Sanitary District is hereby established.

A. Population Density - Population densities for determining the ultimate tributary population shall be based on actual count, current General Plan of the agency exercising jurisdiction, or based upon the character of proposed development, whichever is the greatest.

B. Average Single Family Unit - The average single family unit shall be taken as 3.5 persons per residence.

C. Manning Formula - The diameter of gravity sewers shall be determined by use of the Manning formula, using a roughness coefficient, "n", of 0.013 or the pipe manufacturer's recommendation, whichever is greater.

D. Special Design Problems - Special design problems involving siphons, pumps, pump stations, force mains, non-residential connections, or other unusual features, require individual study and approval by the District Engineer.

E. References - Reference is made to WPCF and ASCE manuals, and to Minimum Design Standards of the Federal Housing Administration (FHA- G-4518.1).

4-02 Pipes.

A. Pipe Materials - All main and lateral pipes shall be as specified in Part D of this specification, unless otherwise specifically required or approved by the District. Selection of the pipe type for a given project shall be made by the Job Engineer, subject to the approval of and final selection by the District. Special pipe and/or design provisions may be required by the District.

B. Minimum Water Main Size - The minimum nominal pipe size for water main shall be six inch in diameter unless otherwise specifically allowed by the District.

C. Not used.

E. Steep Slopes - For water utilities installed in areas with steep ground slopes, special design features may be required. Depending upon conditions of the specific installation, such items as check dams, rip-rap, trench dams, special anchorage or special pipe materials may be required by the District.

F. Minimum Pipe Cover - The following minimum pipe covers shall be attained in design and construction of water utilities. If certain conditions exist which make it impractical to meet the minimum cover and clearance requirements, special pipe, bedding, encasement, rip-rap, and/or backfill will be required as directed by the District Engineer.

1. Water Main - The minimum pipe cover for main water pipelines within street rights-of-way shall be 3.0 feet. The minimum cover for mains within easements or other rights-of-way not expected to become streets shall be 3.5 feet. Lesser pipe cover may be approved by the District with use of special pipe materials or concrete slab protection.

2. Service mains – Within a street right-of-way shall have a minimum cover of 18 inches, unless otherwise specified by the District or in the drawings. However, when the cover over the service main is less than twenty-four (18) inches, special pipe, bedding and/or concrete encasement may be required by the District.

G. Pipe Strengths and Maximum Depths - The minimum pipe strengths and classes given as standard in these specifications (see Sections 14 and 16) and in the "Approved Water Pipe Materials List," are based upon the attainment of standard bedding conditions (see Section 13-05H), maximum allowable trench widths (see Section 13-05B), and upon the assumption of average pipe depths (depths up to 12 feet). Where, for any reason, the standard bedding conditions cannot be attained, or the maximum allowable trench width is exceeded, or the pipe depth is greater than average, special pipe, bedding, backfill and/or encasement may be required as directed by the District. Where pipe depths or other known conditions required pipe strengths other than those specified as standard, the Job Engineer shall indicate the required pipe classes on the plans.

H. Pipe Clearance - All domestic water lines shall be designed and contracted to have a minimum of ten (10) feet horizontally and one (1) foot vertically from sewer pipes, recycled water (except disinfected tertiary recycle water) pipes, and any hazardous fluids such as fuels, industrial wastes and wastewater sludge pipes, and a minimum of four (4) feet horizontally from any disinfected tertiary recycle water and storm drainage pipes, and three (3) feet from all other utilities and/or improvements, unless a special approval is received from the District.

I. Not used.

L. Water Utility Alignment - Where water lines are to be installed within street rights-of-way, they shall, wherever practical, be designed and installed five (5) feet off the center line of the existing or future street (usually the side opposite the water line). In streets in hilly areas, the water utility shall be installed on the uphill side of the street where possible.

Where practical, all water lines within easements shall be designed and installed with not less than five (5) feet between the center line of water line and the edge of the easement. All water lines shall be designed and installed well in the clear of all other improvements and utilities (see "Pipe Clearance" above).

N. Structure Accessibility - Insofar as possible, all valve boxes and similar structures shall be situated so that they are accessible to the District's personnel.

P. Not used.

Q. Water Lines to be Installed in Existing Improved Streets - Where water lines are being designed for installation in existing streets, the Job Engineer shall submit the plans for the proposed work to the County Public Works Department for location and encroachment permit approval.

R. Water Lines to be Installed in or Across Utility, Highway, Railroad Rights-of-Way or Creeks - Where water lines are to be constructed across or within utility, railroad rights-of-way, or creeks requiring tunnels, bores and/or special pipe, the special pipe or construction shall extend the full length of the water line within the particular right-of-way. The Permittee shall secure all necessary encroachment permits or joint use permits for utility, highway, railroad rights-of-way or creek crossings.

V. Backflow Prevention Devices – See Section 16-05 for locating backflow prevention devices. These locations shall be equipped with an approved backflow prevention device, as specified in Section 16-05 and detailed on the Standard Drawings (see Drawing SD-11).

W. Not used.

X. Abandoned or Unused Water Lines - Any abandoned or unused water lines connected to District mains, including services to homes or buildings that are demolished, or any line from District mains to property lines shall be dug out and followed to the property line, and the old wye or tee or old connection area shall be cut away and spliced with a solid piece of pipe of the same size and dimension. The District Inspector shall be present when this procedure is done.

SECTION 5 PLAN APPROVAL AND PERMIT ISSUANCE

5-01 General. The procedure outlined in this Section shall be followed for submittal, review and approval of plans, and permit issuance for water lines extensions.

5-02 Plan Checking Deposit. The Plan Checking Deposit shall be paid to the District prior to any review of plans. This deposit is not refundable but, upon issuance of a main extension permit, the deposit will be credited against the total Plan Checking and Inspection Fees due under District rules and regulations.

5-03 Preliminary Review. To facilitate the processing and review of plans for main extensions, all of the following materials shall be submitted at least three weeks prior to the District Board meeting at which approval of plans is desired.

1. Two (2) complete sets of water utility plans and profiles.
2. Two (2) complete sets of any required special specifications.
3. Two (2) copies of the Job Engineer's preliminary cost estimate.
4. Two (2) copies of maps and descriptions for any required water utility easements.
5. If the project is a subdivision, submit one (1) copy of the final map, including the proposed certificate page, and one (1) copy of the proposed grading plans.

After submittal, the above materials will be reviewed by the District staff and the District Engineer. If there are any required corrections and/or recommended revisions, they will be noted on the plans, easements, etc., and one set will be returned to the Job Engineer for revisions and resubmittal. This procedure will be repeated until all District requirements are met and the plans are ready for approval of the District Board.

5-04 Final Review and Approval. In order to obtain final approval, the Job Engineer shall submit the following materials, as revised in accordance with the above paragraph.

1. Four (4) complete sets of water utility plans and profiles.
2. Four (4) complete sets of any required special specifications.
3. One (1) copy of maps and descriptions for all required easements, together with signed and notarized deeds from each grantor, ready for recordation by the District.
4. If the project is a subdivision, submit one (1) copy of the final map, including one (1) copy of the grading plans.

5. One (1) copy of the Job Engineer's estimate for all water facilities.
6. Any other pertinent plans, information or materials specifically required by the District Administrator or District Engineer.

When all of these materials are received and given final review, the plans will be submitted to the District Board for approval. The Board meets once each month (specific dates may be obtained from the District office) and the Job Engineer will need to schedule his work and submittal of plans to meet an appropriate Board meeting date. After approval of the plans by the District Board, the District Administrator will stamp "Approved" and sign all copies. He will then transmit one approved copy to the owner and one to the Job Engineer for his use. NOTE: The plan approval by the District shall become void six (6) months from the date of approval, unless a main extension permit for the work has been issued within that time.

5-05 Plan Revisions. In the event that any plan or field condition is encountered during construction that necessitates deviation from the approved plans, all work shall be halted until the plans are revised by the Job Engineer, resubmitted to the District and the revisions approved by the District. When revisions are required, the Job Engineer shall submit two (2) preliminary copies of the proposed revised sheets of the plans along with a letter explaining the recommended revisions. When the revisions are in approvable form, four (4) copies of the revised plan sheets shall be submitted for signature of the District Administrator and distribution similar to the original plans. The Permittee shall bear all costs for any plan revisions. The Job Engineer shall be responsible for seeing that all revisions are appropriately shown on the "Record Drawings" for the project.

5-06 Statement of Fees and Charges. During District review of the plans but prior to final approval, the District Administrator will prepare a Statement of Fees and Charges which will be sent to the Permittee, with a copy to the Job Engineer, detailing the fees and charges which must be paid and setting forth the required performance bond amount, and any other information or materials which may be required (other than approval of plans, specifications, etc.) prior to issuance of the main extension permit.

5-07 Issuance of Main Extension Permit. Written permission to construct the main extension will be granted only after all District requirements have been met, including final approval of all plans and specifications, payment of all appropriate fees and charges, posting of the required performance and maintenance bond, acquisition of all required easements, and the filing of a permit application form, receipt of the certificate of insurance from the Contractor, etc. (See Section 10-12.) No work shall be permitted to proceed until the main extension permit has been issued.

5-08 Subdivisions. Before approving the recordation of a subdivision final map, the County requires a letter from the District stating that plans and specifications for necessary water facilities to serve each lot in the subdivision have been approved by the District and that financial arrangements have been made to insure installation of these facilities. Before this letter is written, the property must be annexed to the District (if not already in the District) and the main extension permit must have been issued as above provided.

5-09 Items to Consider before Submitting Plans. The following is a general list of items which should be considered by the Job Engineer before submitting plans for review and approval of the District.

1. Have arrangements been made for the payment of the Plan Checking Deposit?
2. Are there any special details needed, such as special drawings, notes, and/or specifications to supplement the Standard Specifications?
3. Is the property to be serviced within the District boundaries?
4. If the property is not in the District, has the Owner requested in writing that his property be annexed and submitted the required Annexation Fee?
5. Can the proposed water system provide service to properties other than those arranging for the installation? If so, have full provisions been made for the additional service or future extension?
6. Has County Flood Control approval been secured for all water utility line crossings of storm water channels?
7. Are all necessary easements prepared?
8. Are there any special permits and/or licenses required in connection with the work?
9. Have all existing and future underground utilities been shown on the plans and are there any conflicts or special requirements for field location?

SECTION 6 CONSTRUCTION ENGINEERING

6-01 Staking Requirements. The Job Engineer shall be responsible for providing all necessary field surveys and construction staking. Grade and alignment stakes shall be set in advance of any trenching or excavation.

6-03 Survey Authorization and Responsibility. When a survey is to be made on private property for a public water utility, permission of the property owner shall be obtained by the Job Engineer or his representatives prior to entry. The District will not be answerable or accountable in any manner for any loss or damage that may come about during or as a result of survey work by others.

6-04 Field Changes. During construction the District, through the District Administrator, District Engineer or District Inspector, may request the Job Engineer to make changes in the work. The Job Engineer shall review such changes and prepare the necessary drawings and descriptions for execution by the Construction Contractor.

6-05 Soil Compaction Tests. For all works in public streets and works not in public streets as required by the District, the Applicant shall retain a Soils Engineer to take compaction tests in the trench backfill or embankment construction. On District projects, the District will retain a Soils Engineer.

The Soils Engineer shall take compaction tests at intervals and depths as required by the agency having jurisdiction on the right of way or as required by the District; as a minimum, one compaction test shall be taken midway in the intermediate backfill and on the surface every 100 feet of water line length. The Soils Engineer shall immediately provide the District Inspector the results of the soils tests. At the end of the job, the Soils Engineer shall provide the District with a summary of the soils tests taken.

6-06 Record Drawings. Upon completion of the work and prior to acceptance by the District, the Job Engineer shall provide "record drawings" to the District. Record drawings shall consist of all details shown on the original approved plans, corrected and/or expanded to reflect all design or construction changes from the approved plans. Particular attention should be paid to changes in the following items:

1. Water line locations.
2. Surface and invert elevations of structures.
3. Slope, size, type of pipe, and length between structures.
4. Wye and lateral locations.

The Job Engineer shall submit a preliminary copy of the record drawings for review by the District. After review and approval by the Inspector or other District representative, the Job Engineer shall submit one (1) complete set of high quality prints and one (1) complete set of high quality duplicate tracings, noted and signed by the Job Engineer as "Record Drawings".

SECTION 7 DISTRICT PERMITS, LICENSES AND BONDS

7-01 Permits. All work performed in relation to and for connection to the District water utility system requires a specific permit in accordance with District rules and regulations. In the case of District contract work, the contract is considered to be the District permit for all work included in the contract under District jurisdiction.

- A. Water Main/Line Installation Permits - Engineering plans and profiles are required in accordance with Sections 1 through 6 of these specifications.

7-02 Licenses. Contractors performing work requiring a permit by the District shall be licensed by the State of California. Work on public property, streets, roads and other rights-of-way shall be performed only by duly licensed Contractors. Property owners may perform water line work on their own property.

7-03 Bonds. Prior to the issuance of a permit for a water main extensions, the applicant shall furnish to the District a 100% faithful performance bond, cash, or other improvement security acceptable to the District, in the amount of the total estimated cost of the work as determined by the District, based on the District's Table of Current Construction Costs. Such faithful performance bond, cash deposit, or other improvement security shall be conditioned upon the performance of the work in accordance with the terms and conditions of the permit, and unless more stringent requirements are otherwise specified by the District Board, and 10% of the bond shall remain in effect to guarantee the correction of faulty workmanship and the replacement of defective materials for a period of one (1) year from and after the date of acceptance of the work by the District Board.

PART C - GENERAL CONSTRUCTION REQUIREMENTS

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SECTION 8 CONTROL OF WORK

8-01 Authority of District. All work shall be done in a workmanlike manner and shall be performed to the reasonable satisfaction of the District, which shall have general control of all work included hereunder. To prevent disputes and litigation, the District shall in all cases determine the amount, quality, acceptability, and fitness of the several kinds of work and materials which are provided; shall decide all questions relative to the true construction, meaning, and intent of the specifications and drawings; and shall have the power to reject or condemn all work or material which does not conform to the plans and specifications.

Should the Permittee or Contractor fail to act promptly or be remiss in the prosecution of any work done under these specifications, or should the exigencies of the case require that repairs or replacements be made before the Contractor can be notified or can respond to notification, the District may, at its option, make or cause to be made the necessary repairs or replacements or perform the necessary work, and the Permittee or Contractor shall pay to the District the cost of such work plus fifteen percent (15%) for District administration. Any such action by the District shall not relieve the Permittee, Contractor or his/her surety of their obligation or responsibility in the prosecution of the job, nor do these provisions establish contingent liability on the part of the District.

The Permittee shall pay all costs of his/her contractor, including the cost of any changes in the work required by the District.

8-02 Plans. The approved plans shall be supplemented by such working drawings as are necessary to control the work adequately. All authorized alterations affecting the requirements and information given on the approved plans shall be in writing. No changes shall be made in any plan or drawing after it has been approved by the District, except by its direction.

The Contractor shall keep on the job site a copy of the plans and specifications, as well as a copy of all governing specifications, which plans and specifications shall be accessible to the District at all times. The plans, specifications, standard drawings, Special Provisions and all supplementary documents are to be considered the requirements of the work, and it shall be the responsibility of the Contractor to familiarize himself fully with the requirements of these and the various governing authorities having jurisdiction over the work.

Working drawings, not included in the plans furnished by the Job Engineer, may be required for the prosecution of the work. They shall include shop details, erection plans, masonry layout diagrams, and bending diagrams for reinforcing steel, which shall be approved by the District before any work involving these plans is performed.

It is expressly understood that approval by the District of the Contractor's working drawings does not relieve the Contractor of any responsibility for accuracy of dimensions and details. It is mutually agreed that the Contractor shall be responsible for agreement and conformity of his working drawings with the approved plans and specifications.

Further, approval by the District of the Contractor's working drawings or any method of work proposed by the Contractor shall not relieve the Contractor of any of his responsibility for any errors therein and shall not be regarded as any assumption of risk or liability by the District or any officer or employee thereof, and the Contractor shall have no claim under the contract on account of the failure or partial failure or inefficiency of any plan or method so approved. Such approval shall be considered to mean merely that the District has no objection to the Contractor using, upon his own full responsibility, the plan or method proposed.

8-03 Suggestions to Contractor. Any plan or method for work suggested by the District to the Contractor, but not specified or required, if adopted or followed by the Contractor in whole or part, shall be used at the risk and responsibility of the Contractor; and neither the District, District Board, District Administrator nor the District Engineer or their agents shall assume responsibility therefore.

8-04 Conformity with Plans and Allowable Deviations. Finished surfaces in all cases shall conform with the lines, grades, cross-sections, and dimensions shown on the approved plans. Unless otherwise specified herein, deviations from the approved plans and working drawings, as may be required by the exigencies of construction, will in all cases be determined by the District and authorized in writing.

8-05 Interpretation of Plans and Specifications. The plans and specifications are intended to be explanatory of each other. Any work indicated in the plans and not in the specifications, or vice versa, is to be executed as if indicated in both. All work shown on the plans, the dimensions of which are not shown, shall be accurately followed to the scale to which the plans are made, but shown dimensions are in all cases to be followed, where given, though they differ from scaled measurements. Large scale drawings shall be followed in preference to small scale drawings. Should it appear that the work to be done, or any of the matters relative thereto, are not sufficiently detailed or explained in the plans and specifications, the Contractor shall apply to the Job Engineer for such further explanation as may be necessary, and shall conform thereto as part of the contract. In the event of any doubt or question arising respecting the true meaning of the specifications, Special Provisions or plans, reference shall be made to the District and its decision thereon shall be final.

8-06 Superintendence. The Contractor shall give his personal attention to and shall supervise the work to the end that it shall be prosecuted faithfully, and when he is not personally present on the work, he shall at all reasonable times be represented by a competent superintendent or foreman who shall receive and obey all instructions or orders given by the District, and who shall have full authority to execute the same, and to supply materials, tools and labor without delay and who shall be the legal representative of the Contractor. The Contractor shall be liable for the faithful observance of any instructions delivered to him or to his authorized representative.

8-07 Character of Workmen. The Contractor shall employ only such foreman, mechanics and laborers as are competent and skilled in their respective lines of work, and, when required by the District, the Contractor shall discharge any person who commits trespass, or is, in the opinion of the District, incompetent, unfaithful, intemperate, disorderly, or uses threatening or abusive language to any person on the work representing the District, or is otherwise unsatisfactory, and such person shall not again be employed on the work. Such discharge shall not be the basis of any claim for compensation or damages against the District or any of its officers or representatives.

8-08 Construction Utilities. The Contractor shall be responsible for providing, for and on behalf of his work under the contract, all necessary utilities, such as special connections to water supply, sanitation facilities, telephones, power lines, fences, roads, watchmen, suitable storage places, etc. All utility arrangements, including applicable permits, shall be obtained prior to the start of work and paid for by the Contractor.

8-09 Lines and Grades. When the Contractor requires stakes or marks, he shall notify the Job Engineer of his requirements at least forty-eight (48) hours in advance of starting operations that require such stakes or marks. The Contractor shall have all the utilities located and marked prior to staking.

Stakes and marks set by the Job Engineer shall be carefully preserved by the Contractor. If any such stakes and marks, necessary to complete construction, are destroyed or damages by reason of the Contractor's operation, the Contractor shall pay for replacing or restoring such stakes and marks by the Job Engineer.

The Contractor shall furnish all additional stakes, templates, and other material necessary for accurately transferring lines and grades to the bottom of trenches or excavations for the construction of pipelines and structures. For this purpose, he shall employ competent personnel or an independent licensed Civil Engineer or licensed Land Surveyor acceptable to the Job Engineer, who shall be responsible for accurately performing this work.

All distances given and measurements will be in a horizontal plane. Grades are given from the top of stakes or nails, or other points approved by the District.

Three (3) consecutive points shown on the same rate of slope must be used in common, in order to detect any variations from a straight grade, and in case such discrepancy exists, it must be reported to the Job Engineer and to the District. If such discrepancy is not reported, the Contractor shall be responsible for any error in the finished work.

8-10 Proof of Compliance with Specifications and Drawings. In order that the District may determine whether the Contractor has complied with the requirements of the contract not readily enforceable through inspection and tests of work and material, the Contractor shall, at any time when requested, submit to the District properly authenticated documents or other satisfactory proofs as to his compliance with such requirements.

8-11 Errors and Omissions. If the Contractor, in the course of the work, finds and errors or omissions in plans or in the layout as given by survey points and instructions, or if he finds any discrepancy between the plans and the physical conditions of the locality, he shall immediately inform the District, in writing, and the District shall promptly verify the same. Any work done after such discovery, until authorized, will be done at the Contractor's risk.

8-12 Inspection. The District's representatives shall at all times have access to the work whenever it is in preparation or progress, and the Contractor shall provide proper and safe facilities for such access and for inspection. The District shall be furnished with every reasonable facility for ascertaining that the materials and the workmanship are in accordance with the requirements and intentions of the plans and specifications. All work done and all materials furnished shall be subject to his inspection and approval.

If the specifications, the District's instructions, laws, ordinances, or any public authority require any work to be specifically tested or approved, the Contractor shall give the District timely notice of its readiness for inspection, and if the inspection is by another authority than the District, of the date fixed for such inspection. If any work should be covered up without approval or consent of the District, it must, if required by the District, be uncovered for examination and properly restored at the Contractor's expense.

The inspection of the work shall not relieve the Contractor of any of his obligations to fulfill his contract as prescribed, and defective work shall be made good and unsuitable materials may be rejected, notwithstanding that such defective work and materials have been previously overlooked by the District and accepted for payment.

All inspection requested outside of normal District working hours or days shall be reimbursed to the District by the Contractor at rates established by the District.

8-13 Inspection by Division of Industrial Safety. All work shall conform to the applicable requirements of the State of California Division of Industrial Safety. Any necessary corrective work disclosed by such inspection shall be satisfactorily completed at the Contractor's expense prior to acceptance of the work by the District.

8-14 Commencement of Work and Delays - Permit Work. This section shall apply to the commencement of work and delays for work done under permit within the District. For District contract work, requirements concerning the progress of the work, etc., refer to the job specifications for said work.

Before initial work is begun, the Contractor and his foremen shall file with the District addresses and telephone numbers where they can be reached during non-working hours.

As provided in Section 11-02, prior to excavation work, the Contractor shall contact all utilities and agencies which have or may have aboveground and/or underground facilities within the work area.

The Contractor shall also give the District notice of the time when he will start work or resume work when suspended. Notices shall be given at least forty-eight (48) hours in advance of the starting or resumption time, exclusive of Saturdays, Sundays, or holidays, for the purpose of permitting the District to make the necessary assignment of its representative or inspector on the work. After the Contractor once begins the work, the work shall be prosecuted diligently and continuously each day until completed. Work may be suspended only during emergencies or inclement weather or where required under these specifications.

In the event the District shall determine that the work is not proceeding in accordance with plans and these specifications, or any applicable rules and regulations, the District may order the cessation of further work until the work proceeds in compliance with such requirements. All delays in the work occasioned by such stoppage shall not relieve the Contractor of any duty to perform the work or serve to extend the time for its completion.

When, in the opinion of the District, the Contractor's delay in completing the work or failure to comply with the plans and specifications and any applicable rules and regulations has or may cause damage to the existing water utility facilities of the District, the District may order such work to be done as is necessary to protect said facilities and the expense of such work shall be charged to the Contractor by the District.

8-15 Removal of Defective and Unauthorized Work. All work which has been rejected as defective shall be remedied, or removed and replaced by the Contractor in an acceptable manner at no cost to the District. Any work done beyond the lines and grades shown on the plans or established by the District, or any extra work done without written authority, will be considered as unauthorized and will not be paid for. Work so done may be ordered removed at the Contractor's expenses. Upon failure on the part of the Contractor to comply promptly with any order of the District made under the provisions of this article, the District shall have the authority to cause defective work to be remedied, or removed and replaced, and unauthorized work to be removed and bill the costs to the Contractor or the Permittee.

8-16 Access to Work. During the performance of the work, the District and its agents and employees may at any time enter upon the work, or the shops where any part of such work may be in preparation, or the factories where any materials for use in the work are being or are to be manufactured or fabricated, and the Contractor shall provide proper and safe facilities therefore, and shall make arrangements with manufacturers to facilitate inspection of their processes and products to such extent as the District's interest may require. Other Contractors performing work for the District may also, for all purposes required by their respective contracts, enter upon the work.

8-17 Placing Portions of Work in Service. If desired by the District, portions of the work, as completed, may be placed in service, and the Contractor shall give proper access to the work for this purpose, but such use and operation shall not constitute an acceptance of the work by the District, and the Contractor shall be liable for defects due to defective materials, workmanship and equipment until the entire work is finally accepted by the District. The warranty period on equipment shall not begin until the entire work is finally accepted by the District.

8-18 Removal or Replacement of Work Done Without Lines, Grades or Levels. Any work done without lines, levels or grades being given by the Job Engineer or without favorable review of a District Inspector, may be ordered replaced at the Contractor's sole expense, except when such work is specifically authorized by the District.

8-19 Equipment and Methods. The work under the contract or permit shall be prosecuted with all materials, tools, machinery, apparatus, and labor and by such methods as are necessary to the complete execution of everything described, shown or reasonably implied. If at any time before the beginning or during the progress of the work, any part of the Contractor's plant, or equipment or any of his methods of execution of the work, appear to the District to be unsafe, inefficient or inadequate to insure the required quality or rate of progress of the work, he may order the Contractor to increase or improve his facilities or methods, and the Contractor shall comply promptly with such orders; but neither compliance with such orders nor failure of the District to issue such orders shall relieve the Contractor from his obligation to secure the degree of safety, the quality of the work, and the rate of progress required of the Contractor. The Contractor alone shall be responsible for the safety, adequacy, and efficiency of his plant, equipment and methods.

8-20 Unfavorable Weather and Other Conditions. During unfavorable weather and other conditions, the Contractor shall pursue only such portions of the work as shall not be damaged thereby. No portions of the work whose satisfactory quality and efficiency will be effected by any unfavorable conditions shall be constructed while these conditions obtain, unless by special means or precautions approved by the District, the Contractor shall be able to overcome them.

8-21 Easement Construction. The Contractor shall make every effort to restrict his operations to areas within the easements or rights-of-way provided for the work. He shall caution all employees not to trespass or operate equipment outside the easements provided, without first having obtained written permission from adjacent property owners. A copy of said written permission is to be submitted to the District prior to any encroachment. Prior to commencing any work on private property or within easements, the Contractor shall take pictures of the original condition. The Contractor shall clean up and restore all easement and other disturbed areas to a condition equal to or better than the original.

The Contractor shall conduct his operations so as to cause as little damage as possible to existing yard improvements. Yard improvements such as fences, landscaping, trees, patios, walkways, driveways, etc., in the line of construction shall be removed by the Contractor only after approval by the District. Unless otherwise provided in the Special Provisions or permitted by the District and/or property owners, all fences, trees, plants, lawns, ornamental shrubbery, patios, walkways, driveways, and any other yard improvements within the working easements or rights-of-way which have been damaged by the Contractor's operations shall be completely replaced, repaired or restored to its original conditions by the Contractor to the satisfaction of the District and/or property owner. Replacing, repairing, and restoring shall be accomplished with materials of the same kind and quality as those of the original improvement.

The Contractor shall remove, haul and dispose of, off the job site, all surplus and waste materials resulting from his operations that are not required to complete the project and shall thoroughly clean up the site of the work and dress the slopes and banks to the satisfaction of the District.

Full compensation for conforming to the requirements of this section shall be considered as included in the prices paid for the various contract items of work and no additional allowance will be made therefore.

8-22 Alterations. The District reserves the right to increase or decrease the quantity of any items or portions of the work or to omit portions of the work as may be deemed necessary or advisable by the District; also to make such alterations or deviations, additions to, or omissions from the plans and specifications, as may be determine during the progress of the work to be necessary and advisable for the proper completion thereof. Upon written order of the District, the Contractor shall proceed with the work as increased, decreased or altered. On private work, the Permittee shall pay all costs of any alternatives to work required by the District.

8-23 Cleaning Up. The Contractor shall confine his equipment, storage of materials, and construction operations to such limits as may be directed by the District, and shall not allow the site of the work to become littered with trash and waste material, but shall maintain the same in a neat and orderly condition throughout the construction period. The District shall have the right to determine what is or is not waste material or rubbish and the place and manner of disposal.

On or before the completion of the work, the Contractor shall without charge therefore, carefully clean out all pits, pipes, chambers or conduits and shall tear down and remove all temporary structures built by him and shall remove rubbish of all kinds from any of the grounds which he has occupied and leave them in first class condition.

8-24 Final Inspection. When the work contemplated by the contract, permit or agreement has been completed, the District will, upon request by the Contractor, make the final inspection on the grounds together with an authorized representative or representatives of any and all other agencies having an interest in the work.

SECTION 9 CONTROL OF MATERIAL

9-01 Source of Supply and Quality of Materials. Prior to commencement of any work, the Contractor shall submit to the District, a list of the suppliers or sources of all materials to be incorporated in the work. This list shall be approved by the District before any of the materials are delivered to the job site.

Only new materials conforming to the requirements of these specifications and approved by the District shall be used in the work. All materials proposed for use may be inspected or tested at any time during their preparation and use. After trial, if it is found that sources of supply which have been approved do not furnish a uniform product, or if the product from any source proves unacceptable at any time, the Contractor shall furnish approved material from other approved sources. No material which, after approval, has in any way become unfit for use shall be used in the work. Manufacturer's guarantees, instructions and parts lists shall be delivered to the District before acceptance of the work. All materials shall be manufactured, handled, and used in a workmanlike manner to insure completed work in accordance with the plans and specifications.

9-02 Quality in Absence of Detailed Specifications. Whenever under the contract, permit or agreement, the Contractor is required to furnish materials or manufactured articles or to do work for which no detailed specifications are set forth, the materials or manufactured articles shall be of the best grade in quality and workmanship obtainable in the market from firms of established good reputation, or, if not ordinarily carried in stock, shall conform to the usual standards for first class material or articles of the kind required, with due consideration of the use to which they are to be put. In general, the work performed shall be in full conformity and harmony with the intent to secure the best standard of construction and equipment of the work as a whole or in part.

9-03 Drawings, Samples and Tests. As soon as possible after execution of the contract or issuance of the permit, the Contractor shall submit to the District, in triplicate, sufficient information including, if necessary, assembly and detail drawings to demonstrate fully that the equipment and materials to be furnished comply with the provisions and intent of the specifications and drawings. If the information thus submitted indicates the equipment or material is acceptable, the District will return one (1) copy stamped with his approval; otherwise one (1) copy will be returned with an explanation why the equipment or material is unsatisfactory. The Contractor shall have no claim for damages or extension of time on account of any delay due to the revision of drawings or rejection of material. Fabrication or other work performed in advance of approval shall be done entirely at the Contractor's risk. After approval of the equipment or material the Contractor shall not deviate in any way from the design and specifications given without the written consent of the District. When requested by the District, sample or test specimens of the materials to be used or offered for use in connection with the work shall be prepared at the expense of the Contractor and furnished by him in such quantities and sizes as may be required for proper examinations and tests, with all freight charges prepaid and with information as to their sources.

All samples shall be submitted before shipment and in ample time to permit the making of proper tests, analyses, or examinations before the time at which it is desired to incorporate the material into the work. All tests of materials furnished by the Contractor shall be made by the District in accordance with recognized standard practice. No material shall be used in the work unless or until it has been approved by the District. Samples will be secured and tested whenever necessary to determine the quality of the material.

9-04 District Furnished Materials. The Contractor shall furnish all materials required to complete the work, except such materials as are designated on the plans or in the Special Provisions to be furnished by the District.

Upon written request of the Contractor, materials to be furnished by the District will be delivered to him within a reasonable time at the points designated in the Special Provisions, or if not designated in the Special Provisions, then to the project. They shall be unloaded and hauled to the site of the work by the Contractor at his expense, the cost of handling and placing all materials after they are delivered to the Contractor shall be considered as included in the contract prices paid for the items in connection with which they are used.

The Contractor will be held responsible for all materials delivered to him, and deductions will be made from any monies due him to make good any shortages and deficiencies, for any cause whatsoever, which may occur after such delivery, or for any demurrage charges due to delinquency in unloading.

9-05 Local Materials. The Contractor shall satisfy himself as to the quantity of acceptable material which may be produced or obtained at local sources, and the District will not assume any responsibility as to the quantities or quality of acceptable material available.

When tests of materials from sources in the vicinity of the work have been made by the District, the results of such tests will be available to the Contractor or to prospective bidders on inquiry at the office of the District. This information is furnished for the Contractor's or the bidder's convenience only and the District does not guarantee such tests and assumes no responsibility whatever as to the accuracy thereof or the interpretation thereof stated in the test records.

9-06 Acquisition of Materials. The Contractor shall have on hand, at the time he starts construction of any section of the work, all materials necessary to complete in a reasonable length of time, all work which would create a hazard or inconvenience if not completed.

9-07 Storage of Materials. Materials shall be so stored as to insure the preservation of their quality and fitness for the work. When considered necessary by the District, they shall be placed on wooden platforms or other hard, clean surfaces and not on the ground. They shall be placed under cover when so directed. Stored materials shall be so located as to facilitate prompt inspection.

All surplus piping materials shall be removed from the site of the work within five (5) days after completion of the pipe laying.

9-08 Defective Materials. All materials not conforming to the requirements of the specifications shall be considered as defective and all such materials, whether in place or not, shall be rejected. They shall be removed immediately from the site of the work, unless otherwise permitted by the District. No rejected material, the defects of which have been subsequently corrected, shall be used until approval in writing has been given by the District. Upon failure on the part of the Contractor to comply promptly with any order of the District made under the provisions of this section, the District shall have the authority to remove and replace defective material and to deduct the cost of removal and replacement from any monies due or to become due the Contractor.

9-09 Trade Names and Alternatives. For convenience and designation on the plans or in the specifications, certain equipment or articles or materials may be designated under trade names or the names of the manufacturers and with catalog information. Use of alternative equipment or an article or material which is of equal quality and of the required characteristics for the purpose intended will be permitted, subject to the approval of the District.

The burden of proof as to the comparative quality and suitability of alternative equipment or articles or materials shall be upon the Contractor and he shall furnish, at his expense, all information necessary or related thereto as required by the District. The District shall be the sole judge as to the comparative quality and suitability of alternate equipment or articles or materials and its decision shall be final. All additional costs required for redesign or modifications required to accommodate the substituted materials and/or equipment shall also be at the expense of the Contractor.

9-10 Certificates of Compliance. The Engineer may permit the use of certain materials or assemblies prior to sampling and testing if accompanied by a certificate of compliance stating that the materials involved comply in all respects with the requirements of the specifications. The certificate shall be signed by the manufacturer of the material or the manufacturer of assembled materials. A certificate of compliance must be furnished with each lot of material delivered to the work and the lot so certified must be clearly identified in the certificate.

All materials used on the basis of a certificate of compliance may be sampled and tested at any time. The fact that material is used on the basis of a certificate of compliance shall not relieve the Contractor of responsibility for incorporating material in the work which conforms to the requirements to the plans and specifications and any such material not conforming to such requirements will be subject to rejection whether in place or not.

The District reserves the right to refuse to permit the use of material on the basis of a certificate of compliance. The form of the certificate of compliance and its disposition shall be as directed by the District.

9-11 Salvage of Existing Materials. Unless otherwise indicated in the Special Provisions or permitted by the District, any salvage construction materials which have been a part of the District's water utility system may be claimed by the District and if so claimed such materials shall be delivered to the District yard.

SECTION 10 LEGAL RELATIONS AND RESPONSIBILITY

10-01 Laws to be Observed. The Contractor shall keep himself fully informed of all State and National laws and County and District ordinances and regulations which in any manner effect those engaged or employed in the work, or the materials used in the work, or which in any way effect the conduct of the work, and of all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same.

The Contractor shall at all times observe and comply with, and shall cause all his agents and employees to observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the District, and all of its officers and agents against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order or decree, whether by himself or his employees. If any discrepancy or inconsistency is discovered in the plans, drawings, specifications, or contract for the work in relation to any such law, ordinance, regulation, order or decree, the Contractor shall forthwith report the same to the District in writing.

10-02 Permits and Licenses. The Contractor shall, prior to beginning any work, procure all permits and licenses, pay all inspection charges and permit fees, give all notices necessary and incident to the due and lawful prosecution of the work and shall furnish to the District written proof of compliance of this section.

10-03 Patents. The Contractor shall assume all costs arising from the use of patented materials, equipment, devices, or processes used on or incorporated in the work, and agrees to indemnify and save harmless the District, the District Engineer and their duly authorized representatives, from all suits at law or actions of every nature for, or on account of the use of any patented materials, equipment, devices or processes.

10-04 Traffic Control. This section defines the Contractor's responsibility with regard to providing for the passage of public traffic through the work during construction. The Contractor shall so conduct his operations as to offer the least possible obstruction and inconvenience to public traffic, and he shall have under construction no greater length or amount of work than he can prosecute properly with due regard to the rights of the public. Prior to commencing work, the Contractor shall submit to the agency exercising jurisdiction over the road or street a written traffic control plan, including proposed street or lane closure times, for their approval and shall comply with the approved traffic control plan and all requirements of the encroachment permit.

Unless detours are permitted or unless otherwise provided in the Special Provisions, all traffic shall be permitted to pass through the work with as little inconvenience and delay as possible. Street or lane closures shall only be made within the hours provided in the approved traffic control plan. Spillage resulting from hauling operations along or across the traveled way shall be removed immediately at the Contractor's expense.

While trenching and paving operations are underway, traffic shall be permitted to use shoulders and the side of the roadbed opposite the one under construction. When sufficient width is available, a passageway wide enough to accommodate two (2) lanes of traffic shall be kept open at all times at locations where construction operations are in active progress.

In order to expedite the passage of public traffic through or around the work and where ordered by the Engineer, the Contractor shall install signs, lights, flares, barricades, and shall furnish flaggers and/or a pilot car and driver and other facilities for the sole convenience and direction of public traffic. Also where directed by the District or the agency having jurisdiction over the street, he shall provide and station competent flaggers whose sole duty shall consist of directing the movement of public traffic through or around the work. Where needed or required, flaggers shall be equipped with two-way radios.

In addition to the requirements herein specified for furnishing facilities and flaggers for expediting the passage of public traffic through or around the work, the Contractor shall furnish and erect, within or adjacent to the limits of the contract, such warning and directional signs required in the approved traffic control plan or as may be designated by the District Engineer or the agency having jurisdiction over the roadway.

All roads must be kept open for public traffic at all times unless specific written permission to close or restrict the use of a particular street is given by the District and by the County of San Mateo or the agency having jurisdiction of the roadway. In the event that closing of a particular street is allowed, it shall be the responsibility of the Contractor to notify law enforcement, fire departments, the school district and ambulance services as to the hours and dates of the street closure and routes of detours at least 24 hours in advance of their occurrence, and again to notify them when they are discontinued.

Whenever the Contractor's operations create a hazardous condition, he shall furnish at his own expense and without cost to the District, such flaggers and guards as are necessary to give adequate warning of and protection from any dangerous conditions to be encountered and he shall furnish, erect, and maintain such fences, barricades, lights, signs and other devices as are necessary to prevent accidents and avoid damage or injury. Flaggers and guards while on duty shall be equipped with red wearing and a red flag or paddle-type signal which shall be kept clean and in good repair. Flaggers shall be equipped with 2-way radios when needed for traffic control. Signs, flags, lights, and other warning and safety devices shall conform to the requirements set forth in the current "Manual of Traffic Controls for Construction and Maintenance Work Zones", issued by the State Department of Transportation.

10-05 Public Convenience. Convenience of abutting owners along the road or water lines shall be provided for as far as practicable. Convenient access to driveways, houses and buildings along the line of the work shall be maintained and temporary approaches to crossings or intersecting highways shall be provided and kept in good condition.

The right is reserved to the District, county authorities, and to gas, telephone, telegraph, television, and other electric power transmission utilities to enter upon any public highway, road or right-of-way for the purpose of making repairs and changes that have become necessary by the reason of the water utility installation.

All fences subject to interference shall be maintained by the Contractor until the work is completed, at which time they shall be restored to the condition prior to starting the work.

Excavation and backfill shall be conducted in such a manner as to provide a reasonably smooth and even surface satisfactory for use by the public traffic at all times. When possible, water utility construction shall be conducted on one-half the width of the traveled way at a time and that portion of the traveled way being used by public traffic shall be kept open and unobstructed until the opposite side of the traveled way is ready for use by traffic. The roadbed shall be sprinkled with water, if necessary, to prevent dust nuisance.

Bridges of approved construction shall be installed and maintained across the trench at all cross walks, intersections, and at such other points where, in the opinion of the Engineer, traffic conditions make it advisable.

10-06 Safety. This section defines the Contractor's responsibility with regard to providing for safety during construction. The Contractor alone shall be responsible for the safety of his plant, equipment and methods, including trench shoring. All trench shoring and other construction methods shall comply with State and Federal Safety Orders.

Should the Contractor appear to be neglectful or negligent in furnishing warning and protective measures, the District may direct attention to the existence of a hazard, and may order the Contractor to improve his facilities or methods, and the Contractor shall promptly comply with such orders, and the necessary warning and protective measures shall be furnished and installed by the Contractor at his own expense without cost to the District. Whether or not the District issues orders, and whether or not he points out the inadequacy of warning and protective measures shall be furnished and installed by the Contractor at his own expense without cost to the District. Whether or not the Engineer issues orders, and whether or not he points out the inadequacy of warning and protective measures, and even though the Contractor takes appropriate steps in accordance therewith, the Contractor shall not be relieved from responsibility for securing the necessary degree of safety, nor shall his obligation to furnish and pay for appropriate plant, equipment and methods be abrogated.

No material or equipment shall be stored where it will interfere with the free and safe passage of public traffic, and at the end of each day's work and at other times when construction operations are suspended for any reason, the Contractor shall remove all equipment and other obstructions from that portion of the roadway to be opened for use by public traffic. No material or other obstructions shall be placed within fifteen (15) feet of fire hydrants, which shall be at all times readily accessible to the fire department, nor within five (5) feet of United States mailboxes.

Full compensation for conforming to the requirements of this section shall be considered as included in the prices paid for the various contract items of work and no additional allowance will be made therefore.

10-07 Use of Explosives. When the use of explosives is necessary for the prosecution of the work, all necessary explosive work shall only be accomplished by a Contractor having the proper State of California license to handle and use explosives. Utmost care shall be taken to avoid danger or damage to life and property.

All explosives shall be stored in accordance with the provisions of Division XI of the Health and Safety Code. Attention is called to any local ordinance involving the use or storage of explosives. In advance of any blasting work, the Contractor shall obtain all necessary permits and clearances and shall comply with all Federal, State and local laws regulating the use of explosives.

10-08 Preservation of Property. Attention is directed to Section 11 of these specifications. Due care shall be exercised to avoid injury to existing water utility improvements or facilities, streets, highways, pavements, utility facilities, adjacent property, and roadside trees and shrubbery that are not to be removed. Dust resulting from the Contractor's operations shall be kept to a minimum. If required by the District, the Contractor shall keep on the job site equipment for washing the streets. Where landscaping or landscape irrigation lines are disrupted, the Contractor shall provide for alternate watering for irrigation of lawns or landscaping.

In case it shall be necessary to remove any telephone, telegraph, or electric power transmission poles, gas pipes, sewers, electrical conduits or underground structures of any character, or portion thereof, the owners or their agents or superintendents, upon proper application of the Contractor shall be notified by the authorized official to remove same within a specified time, and the Contractor shall not interfere with said structures until the time specified in the said notice shall have expired. In case sewer or gas service pipes crossing the line of the water utility trench are cut by the Contractor, such connection shall be restored without delay, after the passing of the trenching machine. Such cutting and restoration of service connections shall be at the sole expense of the Contractor and shall be done at such times and manner as to insure the least inconvenience to the users.

The Contractor shall examine all roadbeds, bridges, culverts and other structures on or near the work, over which he will move his materials and equipment, and before using them, he shall properly strengthened such roads and structures, where necessary. The Contractor shall be held responsible for any and all injury or damage to such roads and structures caused by reason of his operations.

Any painting, striping, safety buttons, traffic loops, catch basins, street signs and any public or private properties that are damaged or destroyed by the Contractor or his subcontractor shall be replaced with the consent of the District Engineer, the District Administrator or the encroachment permit issuer. This pertains to the job site or any area being used by the Contractor. The cost of replacement shall be included in the bid price for water line.

The fact that any underground facility is not shown upon the plans shall not relieve the Contractor of his responsibility under this section. It shall be the Contractor's responsibility to ascertain the existence of any underground improvements or facilities which may be subject to damage by reason of his operations.

Full compensation for furnishing all labor, materials, tools and equipment, and for doing all the work involved in protecting or repairing property as specified in this section, shall be considered as included in the contract work.

10-09 Responsibility for Damage or Injury. The District, District Board, District Engineer or any of their officers or employees shall not be answerable or accountable in any manner, for any loss or damage that may happen to the work or any part thereof; for any of the materials or other things used or employed in performing the work; for injury to any person or persons either workmen or the public; for damage to the property from any cause which might have been prevented by the Contractor, or his workmen, or anyone employed by him. The Contractor shall be responsible for any liability imposed by law upon the District, its officers, employees, or the Engineer for any damage to any person or property occurring or arising in the execution of the contract or performance of the work, including such resulting from a failure to abide by all applicable laws and regulations, or occurring or arising out of the improper execution of the contract or performance of the work, including such resulting from the failure to abide by all applicable laws and regulations, or occurring or arising out of the improper execution of the contractor or performance of the work, or resulting from work or materials which are defective, unsatisfactory, or imperfect or whose defective, unsatisfactory, or imperfect nature is discovered during any guarantee period, and shall indemnify, defend, and save harmless the District, the District Engineer and each of their agents, officers and employees, from all suits, actions, claims and demands of every name and description, brought for, or on account of any such injuries or damages and in addition to any remedy authorized by law, so much of the money due the Contractor under and by virtue of the contract as shall be considered necessary by the District may be retained by the District until the disposition has been made of such suits or claims for damages aforesaid.

No retention of money due the Contractor under and by virtue of the contract will be made by the District pending disposition has been made of such suits or claims for damages brought against the said county, city or district.

10-10 Contractor's Responsibility for Work. Until the acceptance of the work under the contract or permit, the Contractor shall have the charge and care of the work and of the materials to be used therein and shall bear the risk of injury, loss, or damage to any part thereof by the action of the elements or from any other cause whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work or materials occasioned by any of the above causes before its completion and acceptance and shall bear the expense thereof, except for such injuries or damages as are directly and proximately caused by acts of God.

In case of suspension of work for any cause whatever, the Contractor shall be responsible for the work as above specified, and he shall also be responsible for all materials delivered to the work, including materials for which he has received partial payment or materials which have been furnished by the District, and if ordered by the Engineer, he shall, at his own expense, properly store such materials. Such storage by the Contractor shall be on behalf of the District and the District shall at all times be entitled to the possession of such materials, and the Contractor shall promptly return the same to the site of the work when requested. The Contractor shall not dispose of any of the materials so stored except on written authorization from the Engineer. Where necessary to protect the work from damage, the Contractor shall, at his expense, provide suitable drainage and erect temporary structures.

Neither the District, District Engineer nor any of their agents, officers and employees assumes any responsibility for collecting indemnity from any person or persons causing damage to the work of the Contractor.

10-11 Indemnity. The Contractor shall hold harmless, indemnify and defend the District, the District Board, the District Engineer and each of their officers, agents and employees from any and all liability claims, suits, actions, losses or damage arising or alleged to arise from the performance of the work described herein or damages or claims to which the District, District Board, District Engineer and each of their officers, agents and employees may be subjected arising out of the Contractor's negligent performance, willful misconduct or unreasonable delay in connection with the work.

Indebtedness incurred for any cause arising out of the Contractor's negligent performance or willful misconduct in connection with work must be paid by the Contractor; and the District, District Board, District Engineer and each of their officers, agents and employees are hereby relieved at all times from any indebtedness or claim other than the contract sum.

10-12 Contractor's Insurance. The Contractor shall not commence work under the contract until he has obtained all insurance as specified herein; nor shall the Contractor allow any subcontractor to commence work on this project until the same insurance requirements have been complied with by each subcontractor.

The types of insurance the Contractor shall obtain and maintain for the full period of the contract will be Workmen's Compensation Insurance, Comprehensive General Liability Insurance and Automobile Liability Insurance, as detailed below. Any insurance bearing on adequacy of performance will be maintained after completion of the project for the full guarantee period. The Contractor shall be solely responsible for damage payments up to the amount of the deductible. Nothing contained in these insurance requirements is to be construed as limiting the extent of the Contractor's responsibility for payment of damages resulting from his operations.

A. Worker's Compensation Insurance - The Contractor and all subcontractors shall obtain for the period of the contract full Workmen's Compensation Insurance coverage for all persons whom they employ or may employ in carrying out the work under this contract. This insurance will be in strict accordance with the requirements of the most current and applicable State Workmen's Compensation Insurance laws. In case any class of employees engaged in hazardous work under the contract at the site of the project is not protected under the Workmen's Compensation statute, the Contractor shall provide and shall cause each subcontractor to provide adequate insurance for the protection of his employees not otherwise protected. The Contractor shall sign and file with the District the certification required pursuant to Section 1861 of the Labor Code.

B. Comprehensive General Liability - The Contractor and all his subcontractors shall obtain for the period of the contract full Comprehensive General Liability Insurance coverage. This coverage shall provide for both bodily injury and property damage, including coverage for injury, sickness or disease, death, and destruction of property arising directly or indirectly out of or in connection with the performance of work under this contract, including explosion, collapse, under-ground exposure and flooding, and will provide for a limit of not less than one million dollars (\$1,000,000) for all damages arising out of bodily injury, sickness or disease to, or death of one person in any one occurrence, and an aggregate limit of not less than two million dollars (\$2,000,000). Included in such insurance will be contractual coverage sufficiently broad to insure that provision titled "Indemnity" set forth in Section 10-11.

C. Automobile Liability Insurance - The Contractor and all of his subcontractors shall obtain for the period of the contract Automobile Liability Insurance with a combined single limit of \$1,000,000 for bodily injury or death and property damage. This insurance shall cover all vehicles, whether rented or owned, while being used in connection with performance of the work.

D. Proof of Carriage of Insurance - Before commencing work, the Contractor shall furnish the District a certificate or certificates, evidencing issuance of all insurance policies mentioned above. The Comprehensive General Liability insurance policy shall bear the following endorsements: (a) endorsement precluding cancellation or reduction in coverage before the expiration of thirty-five (35) days after the District shall have received written notification by registered mail from the insurance carrier, (b) a standard cross liability endorsement, (c) an endorsement naming as additional insureds the District, District Board, District Engineer and each of their officers, agents and employees, and (d) an endorsement that the insurance as provided is primary insurance, and no other insurance available to the above shall be called upon to contribute to a loss.

10-13 Disposal of Material Outside the Right-of-Way. Unless otherwise specified in the Special Provisions, the Contractor shall make his own arrangements for disposing of materials outside the right-of-way and he shall pay all costs involved therewith.

When any materials, including excess or unsuitable excavated earth or other water utility materials are to be disposed of outside the right-of-way, the Contractor shall first obtain a written permit from the property owner on whose property the disposal is to be made, and shall file a copy of the permit with the District, and the disposal area shall be kept in a neat and orderly condition throughout the construction period.

10-14 Cooperation Between Contractors and District. The Contractor shall cooperate with all other contractors who may be employed on the work or related or adjacent work, and any workmen who may be employed by the District on any work in the vicinity; he shall so conduct his operations as to interfere to the least possible extent with the work of such contractors or workers.

He shall make good promptly, at his own expense, any injury or damage that may be sustained by other contractors or employees of the District at his hands.

Any difference or conflict which may arise between the Contractor and other contractors, or between the Contractor and workers of the District in regard to their work shall be adjusted and determined by the District.

If the work of the Contractor is delayed because of any acts or omissions of any other contractor or of the District, the Contractor shall on that account have no claim against the District other than for an extension of that time.

10-15 Acceptance of Work. When the District has made the final inspection as provided in Section 8-24, and determines that all work under the contract, permit or agreement has been satisfactorily completed in all aspects in accordance with the plans and specifications and District rules and regulations, he will recommend formal acceptance by the District Board of Directors. Approved record drawings as required under Section 6-05 shall be submitted prior to acceptance of the work by the District.

10-16 Guarantee of Work. Unless more stringent requirements are otherwise specified (or in the case of permit work set forth in the form of a condition on the main extension permit), all work shall be guaranteed for a period of one (1) year from the date of acceptance by the District. The Contractor shall promptly make all needed repairs arising out of defective materials, workmanship and equipment. The District is hereby authorized to make such repairs if within ten (10) days after the mailing of the notice in writing to the Contractor, or his agent, the Contractor shall neglect to make or undertake with due diligence the aforesaid repairs; provided, however, that in case of an emergency where, in the opinion of the District, delay would cause serious loss or damage, repairs may be made without notice being sent to the Contractor, and the Contractor shall pay the costs thereof.

10-17 Personal Liability. Neither the District Board, the District Engineer nor any other officer or authorized employee of the District shall be personally responsible for any liability arising under or by virtue of the contract.

10-18 Protection of Survey Monuments. Various survey monuments consisting of iron pipe, cast iron, brass, and concrete markers may be located along the center lines of streets, at intersections, points of beginning and ending of curves, property corners, and at other points, and where the installation of the water utilities or other work of the contract may cause these monuments to be destroyed or disturbed. The Contractor shall notify the Job Engineer and the Contractor shall not disturb any monument or property corner that must be removed in the performance of his work until he has been advised by the Job Engineer that it has been properly referenced out for resetting. Should the Contractor disturb or remove any monuments or property corners due to his neglect, he shall be held responsible for the expense of their resetting by the District.

10-19 Water Service. If possible, the Contractor shall be held solely responsible to provide uninterrupted water service to all services effected by his work. The Contractor shall protect and indemnify the District, the District Board, the Inspector and all other officers, agents and employees against any claim or liability arising from or based on failure to provide such continuous service.

If it is impossible to provide continuous service, the Contractor shall coordinate with the effected parties, and notify them at least 48 hours prior to the temporary suspension of service. The Contractor shall complete work in a timely manner, and resume service as soon as possible.

10-20 Business License. A business license shall be obtained from the County of San Mateo if required.

SECTION 11 UTILITIES, OBSTRUCTIONS AND CONCRETE REMOVAL

11-01 Preservation of Property. Attention is directed to Sections 10-08 and 10-09, "Preservation of Property", and "Responsibility for Damage or Injury" of these specifications. Due care shall be exercised to avoid damage to existing improvements, utility facilities, and adjacent property. When any railroad, street, highway, private or public utility is crossed, all precautionary construction measures required by the owner of said crossing shall be followed by the Contractor.

11-02 Utilities. A particular effort shall be made to locate and indicate on the plans underground utilities and/or other facilities which may conflict with, cross or lie close to the work. The service connections to these utilities may be, but are not necessarily, shown on the drawings. Overhead utilities, including wires, poles and guys, are not necessarily shown on the plans and shall be determined from the Contractor's visit to the site.

While the locations shown are believed to be reasonably correct, neither the Job Engineer nor the District can guarantee the accuracy or adequacy of this information. It shall be the responsibility of the Contractor to determine the exact location of all utilities and service connections thereto ahead of any excavations through marking by USA Underground Service Alert and by potholing. The Contractor shall make his own investigations, including exploratory excavations, referenced herein as potholing, to determine the locations and type of existing utilities, including service connections, prior to commencing work which could result in damage to such utilities or conflict with the grade or alignment of the new installation. The Contractor shall immediately notify the Job Engineer as required under Section 11-07, "Changed Conditions."

The Contractor shall be responsible for all damage to underground utilities, whether they are shown on the plans or not, or whether they have been potholed or not. The Contractor shall determine the location of all underground utilities and services through conferring with the utility companies and through potholing as described herein below.

11-03 Utility Locations and Potholing. The Contractor shall, before proceeding with the work, call USA Underground Service Alert to have utilities marked on the ground by the various utility owners. The Contractor shall then confer with all agencies and utilities which have or may have aboveground and/or underground facilities in the vicinity of the work. The purpose of the conference shall be to notify said agencies and utilities of the proposed construction schedule and to locate and/or verify the locations of all facilities, including house connections in the area of the work.

As soon as the utility survey is completed and prior to fabrication of engineered pipe, the Contractor shall commence potholing to determine the actual location of the pipe, duct, or conduit. The Contractor shall uncover all underground utilities, including water utilities, sewers and storm drains. Underground utilities shall be uncovered to a point one (1) foot below the pipe, where crossing, interferences or connections are shown on the drawing. Before the Engineer sets pipeline grades, the shop drawings are prepared for any trenching or excavating of any pipe or structure, in order to determine actual clearance elevations, i.e., outside the top and bottom of the pipeline or structure.

Once uncovered, the Contractor shall record the depth of the utility at the pothole and clearly mark the depth on the pavement. Any variation in the actual elevations and the indicated elevations shall be brought to the Job Engineer's and District's attention. If the Contractor does not expose all required utilities prior to shop drawing preparation and trenching, he shall not be entitled to additional compensation for work necessary to avoid interferences, nor for repair to damaged utilities. Excavations around underground electrical ducts and conduits shall be performed using extreme caution to prevent injury or damage to workmen and the electrical ducts or conduits. Similar precautions shall be exercised around gas line, telephone, and television cables.

All potholes dug by the Contractor or his subcontractors for any reason shall be backfilled and compacted, and a minimum of two (2) inches of cutback shall be put down and compacted as temporary cover during construction.

11-04 Utility Relocations and Suspension of Service. Any utility relocations necessary for the work shall be coordinated with and/or performed by the owner of the respective utility. The Contractor shall also arrange for all necessary suspension of service and make arrangements to physically locate and avoid interference with all existing facilities. The Contractor may make arrangements for alterations for his sole convenience (not actually required to complete the water utility installation); such alterations shall be completely at the expense of the Contractor.

Where existing utilities and/or facilities, aboveground and/or underground, are encountered during construction, they shall not be displaced or molested unless necessary. If necessary to disturb or relocate a facility in the prosecution of the work, including accidental damage, the Contractor shall notify the owner or proper authority and shall abide with the requirements of and cooperate with such owner or authority (who may enter upon the work at any time) while protecting, repairing, replacing or relocating such facilities. All abandoned pipe lines that are severed during the work, shall be immediately plugged by the Contractor, with approved material (see Section 16-11), unless otherwise approved by the District.

All utility and other facility arrangements, agreements, permits, fees, locating, protection, repair, replacement, suspension of service, temporary relocations and other work in connection with utilities and other facilities, shall be the sole responsibility of and at the expense of the Contractor. Necessary permanent relocation of utilities and other facilities to accommodate the water utility construction, shall be the owner's responsibility.

11-05 Alignment Changes. In the event the Contractor requests a change in alignment to gain the advantage of reduced interference with utilities or other physical hazards and said change is agreed to by the District, the Contractor thereafter shall assume all responsibility for any physical hazards encountered along the realigned route at no cost to the District. The costs of engineering, including surveys and administrative work, incurred by the District in connection with said requested change shall be paid by the Contractor.

11-06 Removal of Obstructions. The Contractor shall remove, or cause to be removed, at his expense, all trees, bushes, landscaping, fences and structures of all kinds, whether above or below ground, as and when required by the plans, or where the proper construction and completion of the work require their removal. The Contractor shall also

remove at his expense, all rock, stones, debris, and all obstructions of whatsoever kind or character, whether natural or artificial, encountered in the construction of the work. However, no trees, plants, shrubbery or ornamental vegetation shall be removed without the consent of the District first being obtained, and suitable mutually agreeable arrangements made by the Contractor and the District for the replacement of such improvements. If required, a permit from the County shall be obtained for any necessary tree trimming or removal within public street rights-of-way.

Unless otherwise provided on the plans, in the Special Provisions or permitted by the District, all fences, trees, plants, lawns, ornamental shrubbery or vegetation, structures, walkways, driveways, and any other yard or street improvements which have been damaged by the Contractor's operations shall be completely replaced, repaired or restored by the Contractor, at his expense, to the satisfaction of the Engineer. Replacing, repairing, restoring shall be accomplished with materials of the same kind and quality as those of the original improvement.

Attention is directed to Section 8-21, "Easement Construction", for additional requirements for removal and replacement of obstructions within easements.

Any and all materials that are removed and are not to be incorporated in the improvement being constructed, shall be disposed of, off the job site, by the Contractor at his expense. Trenches or pits caused by the removal of existing improvements or obstructions shall be backfilled with suitable material designated by the District.

Existing improvements shown on the plans or required by the specifications or designated by the District to be salvaged, shall be carefully removed and stockpiled as directed by the Engineer.

Compensation for conforming to the requirements of this section shall be at no cost to the District.

11-07 Changed Conditions. In accordance with Section 7104 of the Public Contract Code, the Contractor shall promptly, and before the following conditions are disturbed, notify the Engineer, in writing, of any:

1. Material that the Contractor believes may be material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.

2. Subsurface or latent physical conditions at the site differing from those indicated.
3. Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract.

The Engineer shall promptly investigate the conditions, and if he finds that the conditions materially differ, or involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the work shall issue a change order under the procedures described in the contract.

In the event that a dispute arises between the District and the Contractor, whether the conditions materially differ or involve hazardous waste and cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the work, the Contractor shall not be excused from any scheduled completion date provided for by the contract, but shall proceed with all work to be performed under the contract. The Contractor shall retain any and all rights provided for, either by contract or by law which pertain to the resolution of disputes and protests between the contracting parties.

Conditions shall not be deemed to materially differ if (1) the Contractor has failed to comply in any respect with the provisions herein, or (2) the Contractor has failed to make such independent investigations, tests or examinations as a prudent contractor would deem necessary to satisfy itself as to conditions to be encountered in the performance of the work.

11-08 Disturbance to Trees. When working in the vicinity of any trees, the Contractor shall comply with the requirements of County ordinances and the requirements set forth below.

Disturbance of trees, shrubs and planting and their root structures shall be held to a minimum. Trees with root structure disturbed during construction shall be protected, pruned, treated, and watered as specified below. Where shrubs and plantings must be disturbed, they shall either be removed and replanted or shall be replaced in kind and size. All work on trees and shrubs shall be performed by a licensed Arborist. The Arborist and all work performed on trees and shrubs is subject to the approval of the District. All costs of the Arborist and all work on trees and shrubs which are damaged shall be borne by the Contractor.

No trees are to be removed unless specifically called for on the plans or specified in the Special Provisions. All trees within the work area shall be protected with a temporary barricade.

1. Tree limbs overhanging the line of the work and in danger of being damaged by the Contractor's operations shall be trimmed by the Contractor. The Contractor shall also remove other tree limbs under the direction of the Engineer, so that the tree will present a balanced appearance.

2. All pruning and treating of trees shall be done by a professional arborist or established tree service whose operators are skilled in the care of trees, at the expense of the Contractor. The arborist or tree service selected shall be subject to approval by the District.

3. Where a tree to be left standing is so close to the work area that it could not be adequately protected during a conventional trenching operation, the Contractor shall employ an alternative method of excavation for the pipeline, such as tunneling or boring.

4. No tree roots shall be unnecessarily cut in excavating or trenching operations. Major roots, defined as roots two (2) inches or larger, which are encountered in the course of excavation shall be exposed but not severed, and they shall be wrapped in plastic as a protective measure while exposed. Any other roots that are cut shall be pruned cleanly so that jagged or torn ends do not exist. Where a root has been shattered or jaggedly cut, the Contractor shall dig back to a sound point, but as close as possible to the point of tearing, shattering or splitting, and prune the root cleanly.

5. If any trees or shrubs are damaged or destroyed, the Contractor shall compensate the District or property owner for their full appraisal value using the method described in the "Guide for Establishing Values of Trees and Other Plants," current edition, published by the ISA or obtain a letter from the property owner that the claim has been settled.

6. The removal of any trees, shrubs, fences or other improvements outside of water utility easements or rights-of-way as deemed necessary by the Contractor, shall be arranged with the property owner involved, and such improvements shall be removed and replaced, if required, by the Contractor at his expense.

11-09 Removal of Concrete or Masonry Construction. At locations described in the Special Provisions, or shown on the plans or where directed by the District, portions of existing concrete pavement, curbs, gutter, sidewalks, foundations, and other concrete or mortared structures or objects not shown or noted in the plans or mentioned in the Special Provisions, but encountered in the line of construction shall be removed where necessary and disposed of by the Contractor at his expense.

All concrete curbs, gutters, aprons, patios, driveways and sidewalks that are broken, cracked or damaged by the installation of the improvements shall be reconstructed by and at the expense of the Contractor (see Section 13-04B). The repairs shall be made by removing and replacing the entire portions between joints or by removing the damaged portions by concrete saw and not by merely refinishing the damaged part.

Concrete removal operations in connection with the alteration of an existing structure shall be performed without damage to any portion of the structure that is to remain in place. If damage occurs, the Contractor shall repair any such damage at his own expense, to the satisfaction of the District. Where existing reinforcement is to be incorporated in new work, such reinforcement shall be protected from damage and shall be thoroughly cleaned of all adhering material before being embedded in new concrete.

Unless otherwise provided in the Special Provisions or directed by the District, material removed as above specified shall be broken into pieces not larger than two (2) feet in greatest dimension and disposed of in a manner acceptable to the District.

Compensation for conforming to the requirements of this section shall be at no cost to the District.

11-10 Crossing Under Railroad, Highway or Utilities. When any railroad, highway, private or public utility is crossed, all precautionary construction measures required by the owner of the railroad, highway, or utility shall be followed by the Contractor. All necessary permits, licenses, bonds, and fees required for the crossings shall be obtained at no cost to the District. The Contractor shall give all notices necessary and incident to the work.

SECTION 12 REFERENCES TO STANDARD SPECIFICATIONS

12-01 State Standard Specifications. Whenever the words "State Standard Specifications" are referred to in the specifications, the reference is to the State of California, Business, Transportation and Housing Agency, Department of Transportation, (Caltrans) Standard Specifications, latest edition. All work shall be done in conformance with applicable provisions of the State Standard Specifications, except as modified in these Specifications and in the Special Provisions. Where the terms "State" or "Engineer" are used in the State Standard Specifications, they shall be considered as meaning the "District" as defined herein. In case of a conflict between these specifications and the State Standard Specifications, these specifications will apply.

12-02 County Specifications. Whenever the words "County Specifications" are referred to in the specifications, the reference is to the County of San Mateo, Department of Public Works, Standard Specifications and other applicable standards promulgated by the County.

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SECTION 13 EARTHWORK

13-01 Description. Earthwork shall consist of performing all operations necessary to excavate earth, rock and/or other materials from the trench or excavation; to excavate all material, of whatever nature, necessary for the construction of foundations for water utilities, structures, sewers, and drainage facilities; to construct embankments; to place backfill around water utilities, structures, sewers and drainage facilities; to backfill ditches, holes, pits and other depressions within the work area; to construct temporary and permanent trench surfacing; to remove unsuitable material and replace with suitable material; to construct earth protection dikes.

13-02 Encroachment Permits. For all work within public right of ways, the Contractor shall secure all necessary encroachment permits from the agencies having jurisdiction and shall comply with all requirements of the encroachment permits.

13-03 Compaction. Compaction of materials shall be defined as follows:

A. Relative Compaction refers to compaction of soil and aggregate base as defined by ASTM 1557-78.

B. Relative Density refers to the density of crushed rock as defined by ASTM D 2049-69.

13-04 Materials. The Contractor shall provide and install all materials as shown on the drawings and/or as specified herein and as defined herein below.

A. Crushed Rock - Crushed rock shall be hard, sound and durable and shall not slake or disintegrate in water. One and one-half inch (1-1/2") crushed rock shall be uniformly graded with one hundred percent (100%) passing a 1-1/2" sieve and not more than five percent (5%) passing a 3/8" sieve. Three-quarter inch (3/4") crushed rock shall be uniformly graded with one hundred percent (100%) passing a 3/4" sieve and not more than five percent (5%) passing a 1/4" sieve.

B. Class 2 Aggregate Base - Class 2 aggregate base shall conform to Section 26, Aggregate Bases, of the State Standard Specifications, Paragraph 26-1.02B. The grading shall be 3/4" maximum.

C. Lightweight Rock Fill - Lightweight rock fill shall weigh 60 pounds per cubic foot or less when compacted to 90% relative compaction. The rock sizes can be either 3/4 inch or 1-1/2 inch, except that within 6 inches of the slab, the rock size shall be 3/4 inches. The rock shall be compacted in 12 inch lifts with a lightweight vibratory compactor.

D. Slurry Cement Backfill - Slurry Cement Backfill composition and placement shall conform to Section 19 of the State Standard Specifications, Paragraph 19-3.02E and Paragraph 19-3.03F.

Slurry Cement Backfill shall be used to backfill any undermined areas and may be used as an alternate to Class 2 aggregate base for intermediate backfill to grade. Care shall be taken not to disturb the Slurry Cement Backfill after placement.

E. Structure Backfill - Structural fill when specified for fill or structural backfill shall consist of excavated on-site soil and/or imported material (not bay mud). Excavated on-site soil or imported material to be used as structural fill shall be so prepared that it is free of unsuitable material as defined herein in Paragraph 19-3.03E., and it shall have a plasticity index of 20 or less and a liquid limit of 40 or less. Structural fill shall be capable of being compacted to the required relative compaction. A sample of the material shall be submitted for approval by the District prior to placement.

F. Unsuitable Material - Unsuitable material is material containing debris, roots, wood, vegetable matter, scrap metal, asphalt, plastic and rocks over 6" in greatest dimension.

G. Topsoil - Topsoil shall be imported commercially manufactured, fertile, friable, natural, productive soil containing a normal amount of humus and capable of sustaining healthy plant life. Topsoil shall be free of subsoil, heavy of stiff clay, rocks, gravel, brush, roots, weeds, noxious seeds, sticks, trash, and other deleterious substances. Soil shall not be infested with nematodes or with other noxious animal life or toxic substances. Soil shall be obtained from well-drained, arable land and shall be of an even texture. Soil shall not be taken from areas on which are growing any noxious weeds, such as Morning Glory, Sorrel, or Bermuda Grass.

H. Water - Water used for dust control and moisture conditions for compaction shall be reasonably free of objectionable quantities of silt, oil organic matter, alkali, salts and other impurities as determined by the District. Bay water or water from drainage ditches on the project site shall not be used.

13-05 Trench Excavation and Backfill.

A. Trench Excavation - Trench excavation shall include the removal of all materials or obstructions of any nature, the installation and removal of all sheeting and bracing, and the control of water necessary to construct the work as shown on the plans. Excavation for water utilities shall be made only after pipe and other necessary materials are delivered on the site of the work. After such delivery, trench excavation shall proceed as rapidly as possible and the pipe installed and the trench backfilled without undue delay.

The District shall have the authority to limit the amount of trench to be opened or left open at any one time. In public street areas, excavation and pipe laying shall be coordinated to the end that a minimum of interference with public traffic will result.

In public street areas, excavation and pipe laying shall be coordinated so that the trench at the end of each day shall not be excavated for more than fifty (50) feet in advance of pipe laying, nor left unfilled for more than fifty (50) feet where the pipe has been laid for a total of one hundred (100) feet of trench under construction at any one time. During non-working hours, all trenches in public streets shall either be backfilled and temporarily paved or shall be shored and covered with steel plates suitable to carry H-20 traffic loads. The District may require the Contractor to submit engineering calculations demonstrating that the steel plates meet this requirement.

All temporary steel trench traffic plates shall be secured and flat on the road surface. Trench plates shall overlap the existing pavement by a minimum of 18" on each side of the excavation and shall be properly beveled with compacted AC at all edges to make a smooth surface between street level to steel plates for all traffic, including pedestrian, bicycles, skate boards, etc. All trenches and excavations shall be properly braced and shored before steel plates are placed. Lighted barricades and signs warning of uneven pavement shall be placed on either side of traffic plates.

Unless otherwise permitted by the Encroachment Permit, where trenching occurs in paved areas, the pavement shall be blade cut or scored and broken ahead of the trenching operations, and shall be saw cut (using a concrete saw) to a neat edge after backfilling and prior to paving. The proper tools and equipment shall be used in marking and breaking so that the pavement will be cut accurately and on neat lines parallel to the trench. Any pavement damaged outside these lines shall be re-cut along lines as directed by the District or agency having jurisdiction and restored at the expense of the Contractor.

Trenching may be accomplished by use of trenching machines, except where their use will result in damage to existing facilities. Trenching for all pipe shall, unless otherwise specified, be open cut to the lines and grades shown on the plans except those sections specifically indicated on the plans or designated by the District to be tunneled to protect existing trees or structures.

When the Contractor is digging in the vicinity of a water utility or other type of utility, he shall carefully pothole, i.e., expose, for the water utility or other utility.

Trenches shall be excavated below the barrel of the pipe to be installed and the bottom refilled with approved bedding material (as shown in the Standard Trench Detail (SD-18)).

B. Trench Width - The allowable width of trench shall be as shown in the Standard Trench Detail (SD-18). Where shoring is required, the width of the trench shall be increased only by the thickness of the sheathing.

Trenches shall be excavated with full depth vertical sides where possible. Minimum vertical trench shall be from pipe flow line to a point two (2) feet above the top of pipe. Whenever the maximum allowable trench width is exceeded for any reason, the Contractor will be required, at his expense, to install special pipe, and/or concrete encasement, and/or special backfill as directed by the District.

C. Trench Bracing - Excavations shall be adequately shored and braced as necessary to protect workmen, so that the earth will not slide, move or settle and so that all existing improvements of any kind will be fully protected from damage.

The Contractor shall furnish, install, and maintain such sheet piling, timbering, lagging, and bracing, as necessary to support the sides of the trench. The protection of adjacent structures from movement of the ground and the elimination of the element of danger to life, property, or to existing improvements is the intent of this requirement.

All such piling, timbering, lagging, and bracing shall, unless otherwise required by the District, be removed during backfilling in such a manner as to prevent any movement to the ground or damage to the piping or other structures. When sheet piling, lagging, and bracing is left in place, such materials shall be cut off where designated and the upper part withdrawn.

Undisturbed material outside the planned excavation slopes, which is unstable and constitutes a potential slide, and material which has already come into the excavation, shall be removed.

The Contractor alone shall be responsible for the safety of his workmen and adjacent improvements and property. All shoring shall comply with Federal and State Safety Orders. Attention is directed to the "Trench Construction Safety Orders" of the California State Industrial Accident Commission which the Contractor is required by law to obey, and which are adopted by reference as a part of these specifications.

D. Control of Water - The Contractor shall remove all water which may accumulate in the excavation during the progress of the work so that all work can be done in a dry trench. The Contractor shall at all times have on hand sufficient pump equipment and machinery in good working condition for all ordinary emergencies and shall have available at all times competent mechanics for the operation of all pumping equipment. Trenches or other excavations shall be kept free from water while the pipe or structures are being installed, while concrete is setting, and until backfill has progressed to a sufficient height to anchor the work against possible flotation or leakage.

Water from excavations and trenches shall be disposed of in such a manner as to comply with all applicable Federal, State and local laws and regulations.

E. Not used.

F. Disposal of Excess Excavated Material - All material excavated in streets, roadways, and rights-of-way, which is determined to be unsuitable for use as backfill or in excess of the amount required for backfilling, shall be removed immediately and disposed of at a legal disposal site. No stockpiling of excavated materials will be allowed at any time in public right of ways areas.

Where excavated material is specifically permitted to be used for backfill, it shall be laid away from the side of the trench to prevent caving or undue loading on the shoring and kept trimmed up so as to cause as little inconvenience as possible to the normal use of adjacent properties. Free access must be provided to all fire hydrants, water gates, meters, and private drives. Drainage ways shall be kept clear unless other provisions are made for handling drainage. In bay mud areas, excavated material must be kept well away from the edge of the trench to prevent heaving of the bottom of the trench.

G. Unsuitable Material - In advance of placing water pipelines or structures, existing material within the area where such pipe or structures are to be placed, which is unsuitable as a foundation for the pipe, including but not limited to bay mud, soft material, vegetable matter, garbage and junk piles, either on the surface or buried, shall be removed and disposed of at a legal disposal site.

In rock excavation or a mixture of rock and earth excavation, such material shall be loosened and broken up for the full width of the trench so that no ribs, rocks, or solid projections will be within six (6) inches of the water pipe. The material thus broken up shall be removed and disposed of and the resulting space refilled with approved bedding material.

When unsuitable material is removed, the resulting space shall be refilled with 3/4" crushed rock or other approved material. In bay mud, 1-1/2" crushed rock shall be used to replace the unsuitable material.

H. Pipe Bedding and Pipe Zone Backfill - All pipelines shall be bedded in an approved bedding material as shown on Standard Drawing SD-18. The pipe bedding and pipe zone backfill material shall be placed uniformly on each side of the pipe to prevent displacement. In wet or unstable bedding conditions, 3/4" or 1-1/2" crushed rock shall be used.

All bedding materials shall be compacted to a minimum of ninety percent (90%) relative compaction, and materials shall be carefully handled to prevent intrusion of foreign materials.

Bedding and pipe zone material for water pipeline shall be an approved granular material, free from vegetable matter and other deleterious substances, graded so that it will compact readily to form a firm, stable base when compacted, as shown on Standard Drawing SD-18. The use of sand for a pipe bedding or pipe zone backfill is not permitted.

Bedding material for building water lines shall be select granular material excavated from the trench, free of any organic matter, large clods or rocks. If the excavated material is determined to be unsuitable for bedding or pipe zone backfill, material similar to that specified above for water pipe shall be used.

The Contractor shall construct four (4) foot wide dams in pipe bedding and pipe zone backfill at 400 foot intervals using compacted clay or slurry cement backfill.

I. Intermediate Backfill - Intermediate backfill material shall consist of imported material or material excavated from the trench. All intermediate backfill material shall be free from vegetable matter, concrete, stones or clods larger than four (4) inches in diameter and other deleterious substances. The intermediate backfill material shall contain sufficient fines so that all voids will be filled when compacted, and shall be so constituted that the compaction requirements specified herein can be met. Sand is not permitted as intermediate backfill.

Intermediate backfill in public streets and highways shall be Class 2 Aggregate Base or shall otherwise conform to the requirements of the agency maintaining such streets and highways, but in no case will the requirements be less than those specified herein. Rounded or open graded aggregates, such as pea gravel, are not permitted for use as intermediate backfill. Use of native material for intermediate backfill within existing streets, or paved areas is not permitted. All backfill materials shall be placed and consolidated in such a manner as to permanently prevent damage to the pipeline, structure, roadbed, road surfacing and private property, or inconvenience to the public.

In the case of water utility work done under permit within new subdivisions, the installation and compaction of intermediate backfill shall be in accordance with the recommendations and specifications of the Developer's Soils Engineer, as approved by the District. If, for some reason, a soils report is not prepared which makes such recommendations and specifications, the minimum trench backfill requirements shall be those specified herein.

All intermediate backfill shall be compacted in such a manner as to obtain ninety percent (90%) relative compaction. Backfill material shall be placed in layers not exceeding eight (8) inches in loose depth and thoroughly compacted by tamping, rolling or otherwise to obtain the specified compaction.

Jetting of trenches to achieve compaction of backfill is not allowed. The Soils Engineer hired by the Developer or, in the case of District projects, the Soils Engineer hired by the District shall take compaction tests to verify compliance with the requirements of the Agency exercising jurisdiction on the street or as required by the District.

13-06 Structure Excavation and Backfill.

A. General - Structure excavation shall consist of the removal, to the lines designated on the plans or specified or ordered by the District, of all material of whatever nature necessary for the construction of foundations and other excavations specifically designated on the plans or in these specifications or in the Special Provisions.

Structure backfill shall consist of placing and compacting, to the lines designated on the plans or specified or ordered by the District, backfill material around structures; and other backfill specifically designated on the plans or in these specifications or in the Special Provisions.

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

B. Excavation - All excavation for structures shall be done to the dimensions and levels indicated on the plans or specified herein. Excavation shall be made to such width outside the lines of the structure as may be required for proper working methods, the erection of forms, and the protection of the work. Care shall be taken to preserve the subgrade. If disturbed, the Contractor shall replace the disturbed subgrade with compacted, crushed rock fill or other material approved by the District in a manner which will show by test an equal bearing quality with the undisturbed subgrade.

The Contractor shall, where necessary, protect excavations from caving by shoring or similar protective measures shall be repaired by the Contractor at his own expense. All shoring shall be removed prior to the placing of concrete and/or backfill material, unless otherwise specifically authorized by the District.

The excavation shall be kept free of water while construction work is in progress and any water encountered during the process of excavation shall be controlled to the satisfaction of the District.

The Contractor shall notify the District when excavation for a structure is complete and no forms, reinforcing steel, concrete, pipe or backfill material shall be placed until the excavation has been approved by the District.

C. Cofferdams - Cofferdams for foundation construction shall be carried below the bottom of the footings and shall be braced and as water tight as practicable. The interior dimensions of cofferdams shall be such as to provide sufficient clearance for construction forms and, when no seal is placed, to permit pumping outside the forms.

In the judgment of the Contractor, if the clearance provided on the plans between the outside of the footing and any pile or interior wall or surface is not sufficient to permit the expeditious driving of piles or building of forms, he may provide such necessary clearances by constructing the cofferdams sufficiently large to provide such clearance as he may deem necessary. It shall be considered and is agreed that any such enlargement in excess of the outside dimensions of the footing as designed is for the sole purpose of expediting the work of the Contractor and quantities of such excavation and backfill will not be included in the quantities to be paid for.

Cofferdams which are tilted or moved out of position by any cause whatsoever during the process of sinking, shall be righted or enlarged so as to provide the necessary clearance and proper location and such work shall be at the sole expense of the Contractor.

In tidal waters or in streams at a time of probable flood, cofferdams, walls shall be vented at low water elevation to insure full hydrostatic head both inside and outside of the cofferdam during the period of pouring and setting of seals.

No shoring will be permitted in cofferdams which will induce stress, shock, or vibration in the permanent structure.

When permitted by the District, cross struts or bracing may extend through foundation concrete. Such struts or bracing below low water will be permitted to remain in place. Struts or bracing above low water shall be removed and the volume displaced filled with concrete of the same mix as that specified for the surrounding concrete.

For substructure work, the Contractor shall submit drawings showing its proposed method of shoring and cofferdam construction and other details left open to his choice or not fully shown on the plans. The type and clearance of cofferdams, insofar as such details affect the character of the finished work, will be subject to the approval of the District, but the other details of design will be left to the Contractor, who will be responsible for the successful construction of the work.

After the completion of the substructure, the cofferdams with all sheeting and bracing shall be removed by the Contractor, at his own expense, to the level of the stream bed, or groundwater table, and such removal shall be performed in such a manner as not to disturb or mar the finished concrete or masonry.

D. Foundation Treatment - When a concrete or masonry footing is to rest upon rock, the rock shall be fully uncovered and the surface thereof shall be removed to a depth sufficient to expose sound rock. The rock shall be roughly leveled off or cut to approximate horizontal and vertical steps, and shall be roughened. The overcut of the rock shall be filled with concrete as a part of the structure, or, upon specific approval of the District, may be filled with compacted Class 2 aggregate base or crushed rock.

When piles are to be used, the Contractor, at his own expense will be permitted to excavate a sufficient distance below the bottom of the footing as shown on the plans to take care of swell due to driving piles. After the piles are driven, if it is found that the ground has risen above the planned grade, the Contractor shall remove such surplus material at his own expense. After the piles are driven, if it is found that the surface of the ground is below the planned grade, the Contractor shall backfill, at his own expense, to the planned grade with material approved by the District.

E. Disposal of Excess Excavated Material - All materials to be removed during the course of excavation in excess of that needed for backfill, or deemed by the District as being unsuitable for backfill, shall be hauled off the job site by the Contractor and disposed of at his own expense at a legal disposal site.

F. Inspections - In order to determine the character of the foundation material, the Contractor shall, if ordered by the District, dig test pits, and make test borings and foundation bearing tests.

Whenever any structure excavation is completed to the grade of the bottom of the footing shown on the plans, or set forth in the Special Provisions, or ordered by the District, the Contractor shall notify the District, who will make an inspection of the elevation and character of the foundation. No footing concrete or masonry shall be placed in a footing until the District has inspected and approved the elevation and character of the foundation for the footing.

G. Backfill - Structure backfilling operations shall conform to the requirements of this section, and any requirements specified in the Special Provisions.

Structural fill material shall conform to the requirements of Section 13-04E.

The Contractor shall make his own arrangements for obtaining structure backfill material and all costs involved therewith shall be considered as included in the contract price paid for structure excavation, or for the structure being constructed.

Structure backfill shall not be placed until the structure footings or other portions of the structure or facilities to be below ground line have been inspected by the District and approved for backfilling. No backfill material shall be deposited against the outside walls of concrete structures until seven (7) days have elapsed from the pour or until the concrete has developed the strength of 2,500 pounds per square inch in compression as determined by a break of a test cylinder cured under conditions similar to those prevailing at the site and tested in accordance with standard methods.

Backfill materials shall be placed in uniform horizontal layers not exceeding eight (8) inches in loose thickness before compaction and shall be brought up uniformly on all sides of the structure or improvement in order to avoid bending or distortional stresses. Each layer of backfill shall be conditioned for optimum moisture as necessary and thoroughly tamped, rolled or otherwise compacted or necessary to achieve a relative compaction not less than ninety percent (90%).

13-07 Embankment Construction.

A. General - Embankment construction shall consist of the construction of fills, including the preparation of the ground areas upon which they are to rest: the construction of earth dikes for site protection; the placing and compacting of embankment material in holes, pits and other depressions within the work area.

B. Subgrade Preparation - The relative compaction of the natural ground area upon which embankments are to be constructed, for a depth of not less than two (2) feet below finished grade, shall not be less than ninety percent (90%).

When necessary to conform to the above compaction requirements, the natural ground shall be excavated and the excavated material or other material designated by the District, backfilled in the excavated area. The backfill material shall be placed in layers not to exceed eight (8) inches in loose thickness before compaction and each layer shall be compacted as necessary to achieve a relative compaction not less than ninety percent (90%).

When embankments are to be made and compacted on hillsides, or where new fill is to be compacted against existing embankments, the slopes of the original hillside, old or new fill, shall be cut into as the work is brought up in layers. Material thus cut out shall be re-compacted along with the new fill at the Contractor's expense.

C. Embankment Materials - Wherever selection is possible, embankment material having a sand equivalent value of less than ten (10) shall be deposited in the lower portions of embankments and no such material shall be placed within two (2) feet of planned finished grade.

When the embankment material consists of large rocky material, or hard lumps such as hardpan or cemented gravel which cannot be broken readily, such material shall be well distributed throughout the embankment, and sufficient earth or other fine material shall be placed around the large material as it is deposited so as to fill the interstices and produce a dense compact embankment.

D. Compacting - Embankments shall be constructed in compacted layers of uniform thickness and each layer shall be compacted by means of approved compacting equipment in strict accordance with the Soils Engineers recommendation.

At the time of compaction, the moisture content of embankment materials shall be such that the relative compaction specified may be obtained with the compacting equipment being used. Embankment material which contains less than the required moisture content shall be watered as necessary, and the water may be added to the material at the excavation site. Compaction of embankment material which contains excessive moisture shall not be commenced until material has been allowed to dry to such an extent that the relative compactions specified may be produced with the compacting equipment being used. At all times it shall be the responsibility of the Contractor to employ such means as may be necessary to secure a uniform moisture content throughout the material being compacted. Full compensation for any additional work involved in drying embankment material to the required moisture content shall be considered as included in the contract price paid for excavating the material and/or constructing the embankment and no additional allowance will be made therefore.

Embankments shall be maintained to the grade and cross section shown on the plans until the acceptance of the contract and the Contractor shall be responsible for the stability of all constructed embankments and shall replace any portions which have become displaced or damaged.

13-08 Temporary Paving. Temporary paving shall be a minimum of two (2) inches thick and rolled with a roller after placement. The temporary paving shall be maintained by the Contractor and shall be level with adjacent pavement in a safe and usable condition until permanent paving is installed. Temporary paving shall be placed at all locations where necessary to accommodate traffic. All temporary paving materials shall comply with the requirements of the Air Quality Management District.

SECTION 14 MATERIALS FOR CONSTRUCTION - WATER PIPELINES

14-01 Water Mains

All materials and equipment furnished under these specifications shall be new. Salvaged materials shall remain the property of the District and shall not be reused nor removed without specific authority of the District. All salvaged material is to be delivered to the corporation yard of the local District. No material shall be used that is not specified hereinafter. It is not the intent of these specifications to eliminate other materials or equipment of equally demonstrated design and functional quality and efficiency. Any proposed changes in materials or brand name shall be made only upon written authorization from the District. Asbestos-Cement (AC) pipe shall not be used. Pipe shall be approved for use in potable water by the National Sanitation Foundation or other accredited laboratory acceptable to the State of California Department of Health Services.

A. General Service In-ground Water Mains: unless otherwise noted on the plans, water mains shall be one of the following as indicated on the drawings.

1. Polyvinyl Chloride Pipe (PVC) – Pipe shall conform to AWWA Standard C900, Class 150 (DR 18), as specified. Solvent cement jointing shall be prohibited. Pipe shall be manufactured with Cast-Iron-Pipe-Equivalent OD's, and furnished in standard 20-foot lengths. Water mains 14-inches in diameter or larger shall conform to AWWA Standard C905 and must be approved by the District.
2. Ductile Iron Pipe (DIP) or Cast Iron Pipe (CIP) – Shall be Class 52 for pipe diameters 4-inches or less and Class 50 for pipe diameters 6-inches or larger and of domestic manufacture with the inside cement mortar lined (1/16-inch) and the exterior coated (1-mil bituminous).

B. Special Service In-ground Water Mains

1. Higher Class PVC and DIP – Sewer or storm drain crossings and conflicts, certain street crossing and other applications require higher class pipe. Provide class of pipe as shown on the drawings. PVC pipe shall conform to AWWA Standard C900, Class 200 (DR 14). DIP shall conform as stated in Section 14-01A.2.
2. Steel Pipe – Steel pipe shall be allowed only in special circumstances, must be pre-approved by the company, and shall conform to and meet the requirements of AWWA Standard C201 or C202: working pressure 150 psi, minimum plate thickness 12 ga., rubber gasket flanged joints, inside diameter after lining equal to nominal diameter, 1/16" cement mortar lined and 1 mil bituminous exterior coated. Cement mortar protective lining and coating for steel water pipe shall conform to and meet the requirements of AWWA Standard C205.

C. Above Ground Water Mains – Unless otherwise noted on the drawings, above ground water mains shall be one of the following:

3. Ductile Iron Pipe (DIP) or Cast Iron Pipe (CIP) – DIP or CIP shall be class 52 for all diameters and shall be inside cement mortar lined. Unless otherwise noted, exterior shall be painted with a high solids epoxy paint system with total dry film thickness of no less than 8 mils applied in accordance with manufactures recommendations or a pre-approved equivalent coating system.
4. Steel Pipe – Steel pipe for above ground service shall conform to and meet the requirements of AWWA standard C201 or C202 – working pressure 150 psi, minimum plate thickness 12 gage. Coating system shall be either high solids epoxy interior and exterior (8-mils) or fusion-bonded epoxy as described in Section 19-05.

14-02 Joints

- A. Standard Non-restrained: Joint Joining of PVC pipe shall be with elastomeric-gasket bell ends or couplings. The bell ends shall be an integral thickened bell and (IB) or an integral sleeve-reinforced bell end. The bell end joints shall have a minimum wall thickness of the bell or sleeve reinforced bell equal, at all points, to the DR requirements for pipe. The minimum wall thickness in the ring groove and bell-entry sections shall equal or exceed the minimum wall thickness of the pipe barrel. One PVC coupling, manufactured of the same material and by the same manufacturer as the pipe, shall be furnished with each length of pipe together with two (2) rubber rings. The couplings shall be designed so as to insure a water-tight joint with the pipe. The couplings body and sockets shall have a wall thickness equal to the pipe barrel thickness with which the coupling is to be used. All rubber rings shall be furnished by the pipe manufacturer. These rubber rings (Elastomeric Gaskets) shall be manufactured to conform to the requirements of ASTM F- 477.
- B. Restrained Joints: Provide Joints on all above ground pipe runs and whenever else called for on the drawings. Restrained joints shall be mechanical joint type or equipped with Megalug, as manufactured by EBAA Iron Inc. or approved equal.

14-03 Service Lines

Standard domestic service lines shall be Type K domestic manufactured copper tubing and meet requirements of ASTM B-88. In special applications, polyethylene service lines may be called for. Where called for, supply high grade polyethylene pipe suitable for use as service lines. Supply pipe conforming to AWWA C901. Supply Mueller Industries or approved equal.

14-04 Fittings

- A. Fittings for PVC, DIP and CIP Pipe: All fittings for use with PVC, DIP, or CIP shall be cast iron or ductile iron. Cast iron fittings shall be classified as "Short body cast iron fittings" of material specified in ANSI A 21.10 (AWWA C-110) with metal thickness Class D. Ductile iron fittings shall be classified as "Compact ductile iron fittings" of material specified in ANSI A 21.53 (AWWA C-153). All fittings shall be cement mortar lined in accordance with ANSI A 21.4 (AWWA C-104).

All tees and crosses used with polyvinyl chloride pipe (PVC) shall have all flanged ends except fire hydrant, blow-off and pumping tees which may be hub-hub-flange; reducers shall have flange by hub ends; elbows may be either hub or flanged ends. Hub ends shall be designed as "Push-On" fittings designed to accept cast iron O>D> PVC Pipe. Closure shall be facilitated by a rubber ring retained in an internal groove inside the hub. The surface of the hub in the right area shall be cast free of pits or burrs, smooth and accurate, in order to meet the requirements for water-tightness. The rubber rings shall be furnished by the manufacturer of the fitting. A/C to C.I.O.D. PVC adapter rings may be used for connection to existing 6" and 8" AC fittings as approved by the District.

- B. Fittings for Steel Pipe: Flanges shall be compatible with the class rating of the fittings and shall conform to AWWA C207, Tables 1, 2, and 3. All welding shall be in accordance with AWWA Standard C206 and requirements of American Welding Society. After fabrication, all fittings shall be 100% fusion epoxy lined and coated with a minimum of 12 mils 3M Scotchkote (or approved equal) dry powder epoxy resin using the fluidized bed method of application. Prior to application of the coating, all surface irregularities shall be blasted in white metal finish. After fluidizing, the fitting shall be post cured in accordance with the powder manufacturer's specifications.

Finished coating shall be inspected with a low voltage holiday detector and any pinholes shall be marked, repaired, and retested. The coating applicator shall be approved by the epoxy powder manufacturer. Upon approval of the District, cast iron fittings for 14-inch and larger pipe may be used providing the fitting conforms to the latest revision of AWWA Specifications C-110 for 14-inch and larger.

14-05 Flexible Couplings

All flexible couplings will be Smith Blair or approved equivalent. Couplings 16-inch and larger shall be constructed and coated as specified in section 19-05.

14-06 Protective Wrap

Corrosion Protection Wrap shall be used at all buried joints employing bolts. Wrap shall be 5 mil minimum polyethylene sheeting sealed with duct tape or equivalent system. Wrap shall completely enclose all bolted joints and all metals susceptible to corrosion.

14-07 Valves

- A. Gate Valves shall be resilient seated in conformance with AWWA Specifications C509, and shall have a 200 psi or more working pressure. All ferrous parts, except finish or bearing surfaces, shall be given two coats of asphalt varnish. Valves shall have non-rising low zinc stems. All body bolts shall be 316 stainless steel. Cast iron wedge shall have sealing surfaces of the wedge permanently bonded with resilient material to meet ASTM D 429 tests for rubber to metal bonds. Stuffing boxes shall be o-ring seal type with two rings located in the stem above the thrust collar. Low friction tongue reduction thrust bearings shall be located both above and below the stem collar. Gate Valves shall be resilient wedge gate valves as manufactured by Mueller, American, or approved equal.

Unless otherwise noted, all valves 12 inches and smaller shall be gate valves. End-connections shall be flange adapt using flange by "Ring-Tite" adapters, with stainless steel bolts, nuts and washers.

- B. Hydrant Valves are to be flange by "Ring Tite". Valves shall open by turning the wrench unit counter-clockwise, and are to have 2-inch square operating nuts unless a hand wheel is specifically called for on the plans. All valves are to be for underground service.
- C. Butterfly Valves – All valves larger than 12-inches are to be butterfly valves, and shall conform to AWWA Specifications C504. Butterfly valves are to have a cast-iron body, rubber seated for working pressure of 200 psi or more. Valves shall be equipped with stainless steel bolts, nuts, and washers, and be for underground service. Butterfly valves are to be as manufactured by Clow, Henry Pratt, Kennedy, Keystone, or B.I.F. or approved equal.
- D. Specialty Valves – Refer to Section 16-03 for special valve requirements.
- E. Valve Operating Nut – In those installations where the operating nut is 4-feet, or more below finished grade, the Contactor shall extend the operating nut to not more that 3-feet below ground level at no additional cost to the District.

14-08 Stops

- A. Corporation Stops for copper services shall have compression coupling outlets and iron pipe thread inlets. All corporation stops to be Mueller Series 15000 or approved equivalent. Direct tapping by corporation stops shall not be allowed with C900 PVC pipe.
- B. Angle Stops (Curb Stops) shall be installed on all service valves from- $\frac{3}{4}$ inch to 2-inch. Copper services shall be compression couplings. All stops are to be manufactured by Mueller, Jones, Ford or approved equivalent. All angle stops for $\frac{3}{4}$ -inch flat rate services shall be Mueller 300B-24258 or approved equal.

14-09 Boxes

- A. Valve Boxes are to be Christy G-5 traffic models or approved equivalent, with cast- iron traffic lid or approved equal. All lids shall be marked "water".
- B. Meter Boxes shall be placed over all services. Boxes shall be set true to line and grade at the top of the curb or sidewalk or surrounding grade area. Meter box sizes shall be as specified on the Standard Drawings for the various sizes of service. In the Sacramento service area, boxes placed in landscaped areas may use alternate boxes as specified on applicable Standard Drawing, Section E.
- C. Blow-off Boxes are to be Christy B-16 with cast iron lid, all lids to be marked "water."

14-10 Service Clamps (Saddles)

All service clamps (Saddles) for $\frac{3}{4}$ -inch, 1", 1½", and 2" taps shall be made of Bronze and shall be made to specially fit the contour of the pipe they are to be installed on. All reducer bushings shall be bronze. Saddles are to be Jones, Ford, Mueller or approved equal. Refer to Sections 16-01A and 16-03D for restrictions on tapping and for tapping larger sizes.

14-11 Fire Hydrants

All fire hydrants shall meet AWWA Standard C503 and are to be installed in accordance with Standard Drawing SD-6 and SD-7. Hydrants shall be approved for use in the specific proposed area by the local fire protection agency.

- A. Residential Hydrants shall be wet barrel type hydrants with independently operated outlets, a 6" inlet, one 4½" hose nozzle, and one 2 ½" hose nozzles. Approved hydrants for residential installations are Clow 950 or 960 or approved equivalent.
- B. Commercial Hydrants shall be wet barrel type hydrants with independently operated outlets, a 6" inlet, one 4 ½" hose nozzle and two 2 ½" hose nozzles. The approved hydrants for commercial installations are Clow 960 or approved equivalent.
- C. Breakaway Spools, and Shear Bolts. All hydrants shall have breakaway spools and be equipped with hollow core shear bolt installed at the top and bottom of breakaway spool or other approved break away mechanism.

SECTION 15 DEMOLITION AND ABANDONMENT OF LINES AND STRUCTURES

15-01 Description. The Contractor shall remove equipment and concrete work as necessary for the construction of work and abandon certain pipelines and structures as shown on the plans and as specified.

15-02 Safety. The Contractor shall take all necessary precautions with regard to safety in carrying out the demolition work. Suitable barriers shall be erected around the demolition area to protect workmen and the public, and the Contractor shall rigorously comply with applicable safety requirements.

15-03 Salvage of Equipment and Materials. All electrical and mechanical equipment and piping designated to be salvaged shall be carefully salvaged and delivered to the District in good condition. When designated on the Plans or in the Special Provisions, the Contractor shall give the District two (2) working days to remove sensitive electrical equipment. Salvaged materials shall not be reused in new work unless specifically permitted by the District.

15-04 Methods and Equipment. Before starting work, the Contractor shall inform the District fully as to the method of demolition he proposes to follow, and the amount and character of equipment he proposes to use, which shall be subject to the approval of the District. The approval of the District shall not be considered as relieving the Contractor of the responsibility for the safety of his method or equipment or from carrying out the work in full accordance with the plans and specifications.

15-05 Removal of Old Structures. The Contractor shall carefully dismantle old structures which, unless otherwise provided in the Special Provisions.

15-06 Not used.

15-07 Not used.

15-08 Disposal of Materials and Debris. All materials and debris resulting from the demolition work and after salvage by the District shall become the sole property of the Contractor and shall be disposed of by the Contractor at a legal disposal site.

SECTION 16 METHODS FOR CONSTRUCTION

16-01 Water Mains

- A. Installation Guide: All PVC C-900 water mains shall be installed in accordance with current J-M Pipe Installation Guide. All DIP and CIP shall be installed in accordance with pipe manufacturer's specifications. Additionally, PVC C-900 water main installations shall conform to the following:
1. Direct tapping of PVC pipe with size on size tapping sleeves requires written pre-approval of materials and methods from the District.
 2. Solvent welded joints are not approved.
 3. PVC pipe shall not be installed in areas where soil has been contaminated by petroleum distillates. If such contamination is discovered during the course of construction, a change order will be issued to change the type of pipe to be installed. Any deviations from these provisions must be approved equivalent.
- B. Tracing Wire: Tracing wire will be installed on all no-metallic main line, hydrant, and service runs. All installations shall be in accordance with Standard Drawing SD-15. Three-inch tracer tape may be used with the approval of the District.
- C. Excavation, Backfill and Spoils
1. Excavation within the street right-of-way shall be in accordance with the latest version of the applicable local County standard drawings and specifications. All backfill and bedding shall be in accordance with pipe manufacturer's specifications. All ductile iron pipe shall have tamped sand bedding. Sand bedding shall be required for all types of pipe in areas having rocky or hardpan conditions.
 2. All excess native excavated material not used as backfill shall be the Contractor's responsibility and shall be disposed of by one of the following:
 3. Upon approval from an authorized representative of the project developer or owner, spoils may be left on-site and spread out evenly with the existing native top soil.
 4. Remove all spoils from project site to an off-site disposal area. All bids shall be submitted on the basis of no spoil removal unless otherwise noted by the District of the Engineer.
- D. Main Installation Near Sewers: The "California Waterworks Standards" sets forth the minimum separation requirements for water mains and sewer lines.

These Standards, contained in Section 64572, Title 22, California Code of Regulations, specify that water mains shall be installed at least:

1. Ten feet horizontally from and 1 foot higher than sanitary sewers located parallel to the main.
2. One foot higher than and no less than 45-degrees to sanitary sewers crossing the main.
3. 25 feet horizontally from sewage leach fields, cesspools, seepage pits, septic tanks, sewage leach field, underground hazardous material storage tank, or groundwater recharge project site.

Separation distances specified shall be measured from the nearest edges of the facilities. Where the requirements cannot be met due to topography, inadequate right-of-way of easement or conflicts with other provisions of these regulations, lesser separation is permissible if:

- a. The water main and the sewer are located as far apart as feasible within the conditions listed above.
- b. The water main and the sewer are not installed within the same trench.
- c. The water main is appropriately constructed to prevent contamination of the water in the main by sewer leakage. Refer to Section 14.01B.

In no case shall the minimum separation between the sewer and water facilities be less than as dictated in "Criteria for Separation of Water Mains and Sanitary Sewers" issued by State of California, Department of Health Services unless allowed in writing by the District.

- E. Main Thrust Blocking: All main thrust-blocking shall be in accordance with current issue of J-M Pipe installation guide for PVC Class Water Pipe and Standard Drawing SD-9. All pipe and fittings shall be wrapped with plastic prior to pouring of thrust blocks to insure that the concrete does not adhere to the pipe/fittings.
- F. Main Installations Near Other Utilities: All water mains will be securely installed with a minimum separation of 3 feet from all other utilities. See Section 16-01D for Water Main – Sewer Separation Requirements. No common-trenching will be permitted unless specifically approved in writing by the District.
- G. Capping Water Mains: All pipes shall be capped at the end of each work day to prohibit foreign matter from entering pipes and possible contamination of the District's distribution system.
- H. Stub Mains: Stub mains will not be used as a substitute for separate PFP, domestic or irrigation services. Deviation from this standard requires prior approval by the District after consultation with the Department of Health Services and appropriate Fire Department officials.

16-02 Fire Hydrant Installation

All fire hydrant installation shall conform to Standard Drawings SD-6 and SD-7. All fire hydrant connections to mains shall be of a diameter not less than diameter of hydrant, and include a gate valve flanged and bolted to the tee in the main. Unless otherwise specified, connections shall be 6-inch, with 6-inch flanged gate valves installed on the main line tee for the hydrant extension.

- A. Painting: The Contractor shall be responsible for painting the hydrant the coating color and type required by the local fire protection district. Should the fire protection district not require such painting, the Contractor shall paint the hydrant in accordance with the Districts requirements. Contractor shall be responsible for hydrant numbering provided by the District for each new installation.
- B. Locations: Contractor shall be responsible for installing the hydrant(s) in the location shown on the Final Construction Plans, and for contacting the local fire protection district for approval as to the exact location before setting the hydrant and steamer outlet direction. Any deviation from the construction plans shall only be done with the written approval of the District.
- C. Protection: All fire hydrants that are subject to traffic (i.e. within streets, roads, parking lots, driveways, etc.) shall have 4-inch GSP concrete filled posts installed symmetrically around the hydrant(s). Posts shall be installed to a minimum depth of 2 feet from final grade to 4 feet above final grade. All posts area to be primered and then painted with two (2) coats white enamel paint. Contractor will be responsible for contacting the local fire protection agency for location approval before final placement of posts. The number of posts, if not shown on the Final Construction Drawings Plans shall not be less than four (4).

16-03 Valves

- A. Blowoff Valves – will be installed on dead-end mains and at all low points in the distribution system as directed by the District. Blowoff boxes shall be traffic model Christy B36 or approved equal. Installation shall be in accordance with applicable Standard Drawing SD-13 or SD-14, unless otherwise specified on plans.
- B. Air Release Valves – shall be installed at all high points in distribution system in accordance with Standard Drawing SD-8 and shall be APCO or Crispin or approved equal. Size to be specified by the District or as specified on the construction plans. Lids shall be marked “water”.

- C. Combination Air Release Valves shall be installed at all high points of distribution main 10-inches or larger or as directed by the District. Combination Air Release Valves shall have cast iron bodies, stainless steel floats and shall be APCO 143C, 145C or approved equal.
- D. Tapping Valves shall conform to and be tested in accordance with the standard for gate valves Section 14-07A, with the exception of the ends and the seat rings. One end shall be flanged and one end shall be "Ring-Tite". The flanged end shall have slotted bolt holes to fit all standard tapping machines. Seat rings shall be oversized to permit the use of full-size cutters. The cast-iron tapping sleeves shall be mechanical joint type. Tapping valve and sleeve shall be Mueller or Clow. Tapping sleeve and valve shall be subject to air testing before the pipe is tapped. The Contractor shall provide a test flange, testing assembly consisting of connection to test flange, pressure gauge (0-150 psi range) and isolation valve, and air compressor necessary for testing. Initially, the testing flange and assembly will be mounted on the mechanical joint tapping sleeve and tested at 75 psig pressure for one-half hour. If the test is successful, the flange and testing assembly shall be removed and tapping valve installed. Flange and testing assembly shall be mounted on the tapping valve, pressure of 75 psig applied with the tapping valve open. The valve with then be closed, and flange and testing assembly removed. A mild soap-water solution shall be brushed over the fittings to detect any leakage. The main will not be tapped until successful completion of this testing. The entire assembly will subsequently be subject to the field testing pressure.

16-04 Services

All services shall be installed in accordance with Standard Drawings SD-1 through SD-5, the current edition of the "Installation Guide for PVC Pipe" published by J-M Pipe and the pipe manufacturer's specifications. Service clamps (saddles) will be used for all services up to and including 2-inch in size. Services greater than 2-inches but less than main size shall be by tapping sleeve and valve or by tee. Services sizes equivalent to main size shall be by tee unless approved for tapping by the District. Service clamps and sleeves must be a minimum of 18-inches apart but no closer than 18-inches to a pipe joint.

16-05 Backflow Prevention

Those water uses on customer premises that involve hazardous applications or threats to the quality of water in the public water system shall include an approved backflow prevention system in accordance with State and local policies. All other provisions of the State, County and local plumbing and health codes, as they relate to backflow prevention, shall be adhered to. Approved backflow prevention devices are required for each domestic, commercial, industrial, or fire service connection to premises where any of the following circumstances exist:

1. An auxiliary water supply is furnished to, used or available for use on the Premises.

2. Any liquid or semi-liquid substance is maintained under pressure on or in the Premises under circumstances that it may enter the District's water system.
3. Any toxic or other substance or material dangerous to health is located or maintained in or on the Premises under circumstances that has the potential for entry into the District's water system.
4. More than one connection to the Premises from the District's water system exists and the flow from one service to another may occur.
5. An internal water pressure system is installed in or on the Premises that, under operation, may cause a backflow.
6. An irrigation system exists in or on the Premises which is supplied by a separate water service or source.
7. A Fire Protection Service is provided to the Premises and an Auxiliary water supply is furnished to, used or available for use on the Premises.
8. The premises contains a multi-story building or buildings, the water service to which poses a potential contamination hazard to the District's water system.
9. Any other condition exists on the Premises that may cause a backflow.

Backflow prevention devices shall be specified as reduced pressure principle backflow prevention devices. The backflow prevention device shall be located and installed in accordance with the requirements, specifications and standards of the District (See SD-05) and the assembly shall be accessible for inspection and repair at all times. Unless such device is readily accessible within a building, structure, or other enclosed improvement, it shall be installed in a secured enclosure aboveground.

Maintenance and certification inspection responsibility of the backflow prevention device shall lie with the customer. Water service will not be provided until the customer provides proof of a passed inspection with a report signed by a certified backflow prevention device inspector. Upon completion and successful testing, the Manager shall issue a Backflow Prevention Device permit to the Owner, which shall be effective for one year, and shall be renewable annually. Backflow Prevention Devices shall then be inspected and tested by the District's certified Backflow prevention inspector annually or more frequently as the District may determine.

Because the District may update the adopted Water Standard Practice covering Backflow Prevention from time to time without updating these Specifications, it is the Contractor's responsibility to contact the District to confirm that the current requirements are being met at the time of installation. Contact the District Manager of Operations at (650) 728-1054 to confirm backflow prevention requirements prior to installation.

16-06 Disinfection

Before being placed into service all water mains, valves, hydrants, and fittings installed by the Contractor shall be chlorinated by the Contractor using calcium hypochlorite tablets which shall be placed in the pipe at the time of installation. Since the main cannot be flushed prior to disinfecting, it is essential that the pipe be kept clean during laying. All pipe shall be inspected carefully before lowering

into the trench, and any visible dirt and foreign matter shall be removed. It is necessary that the pipe be kept free of trench water. If these items are not accomplished to the satisfaction of the District, another method of disinfecting which is agreeable to the District shall be used. All valves not actually in use shall be opened and closed to insure chlorination of all services. The following method shall be used for the application of the calcium hypochlorite tablets:

- A. Fasten the required number of tablets (See Table 1) to the upstream end, inside top of each length of pipe as it is installed. The tablets shall be attached by a food-grade adhesive such as Permatex Form-A-Gasket No. 2 or Permatex Clear RTV Silicone Adhesive Sealant, manufactured by Loctite, or approved equal. Care should be exercised in placing the tablets to insure that the adhesive does not cover the side or exposed surface of the tablets, thereby allowing maximum contact of the water with the tablets.
- B. Fill the mains slowly with water, opening fire hydrants at high points and blow-offs at dead ends, until all air has been expelled from the mains and allow the water to stand for 24-hours. A sample then must be submitted to a state certified laboratory for bacteriological analysis. If the sample does not pass California State Drinking Water Standards, the water shall be drained from the line, flushed, and re-disinfected until a sample meets the State Standards. After meeting State Standards the water shall then be drained out, and the mains shall be thoroughly flushed.
- C. No looped water system shall be opened at both ends until sample passes State Standards and chlorination has been thoroughly flushed from the new system. Final opening of looped system will be performed by the District inspector or by special authorization from the District.

D. Calcium Hypochlorite Tablets

TABLE 1

Number of 5 gram calcium hypochlorite tablets required for each 20-foot length of pipe to obtain a dose of 25 mg/l:

Size	2"	3"	4"	6"	8"	10"	12"	16"	18"	20"
# of Tablets	1	1	1	1	2	3	4	7	8	10

E. Water Disposal: Contractor shall be solely responsible for disposal of chlorinated water in accordance with all applicable federal, state and local requirements. As part of the project submittals, the Contractor shall provide a written plan describing the method of disposal for review by the District.

16-07 Inspection

All work done and all materials and equipment furnished under this contract shall be subject to the inspection and approval of the District Inspector. The inspector shall at all times have access to the work during its construction, and shall be furnished with every reasonable facility and assistance for ascertaining that the materials and the workmanship are in accordance with the requirements and intent of the contract drawings and specifications. Any work constructed without inspection as provided above, or constructed contrary to the instruction or orders of the District must, if requested by the inspector, be uncovered for examination and properly restored at the Contractor's expense. An inspector shall have the authority to order the work entrusted to his supervision stopped, if in his opinion such action becomes necessary, until the District's Engineer is notified and has determined and ordered that the work may proceed in due fulfillment of all contract requirements. The inspection of the work does not relieve the Contractor of any of his obligation to fulfill the contract as prescribed.

Any work, materials or equipment not meeting the requirements and intent of the drawings and specifications may be rejected, and unsuitable work or materials shall be made good, notwithstanding the fact that such work or materials may have previously been inspected or approved and payment therefore may have been made.

Re-examination of any work may be ordered by the inspector, and such work must be uncovered by the Contractor, the Contractor shall pay the entire cost of such uncovering, re-examination and replacement if the work does not conform to the plans and specifications.

16-08 Pressure Testing

After chlorination of the line, the system shall be pressure tested by the Contractor. Air shall be vented from all high points in the line. If required, the Contractor shall provide a corporation stop in a saddle at these points for improved venting. All valves controlling the section to be tested shall be closed. A test pressure of 150 psi shall be applied and held for a period of 2 hours. Contractor shall provide the necessary pump and calibrated container for measurement of make-up water required to replace leakage during this 2 hour period. Allowable leakage in the section during this test shall conform to methods described in J-M Pipe Installation Manual.

All defective items discovered during the pressure test shall be repaired or replaced by the Contractor at the Contractor's expense. Test shall be repeated after any repair until the system meets the above leakage requirement. The test will be witnessed by a representative of the District.

16-09 Valve and Appurtenance Testing

All valves and similar appurtenances (blow-off, air-releases, etc...) shall be field tested to demonstrate proper operation. Field testing shall include operation of the device (on/off) at least twice and shall be witnessed by a District representative prior to final acceptance.

16-10 Material and Specifications

A. Qualification: Metallic and no-metallic materials may be used separately, and in combination to construct component parts of a water system including, but not limited to conduits, pipes, couplings, caulking materials, protective linings, and coatings, services, valves, hydrants, pumps, tanks, and reservoirs, provided:

1. The materials shall have a reasonably useful service life.
2. The material shall be capable of withstanding safety factors and internal and external forces to which it may be subjected in service.
3. The material shall not cause the water to become impure, unwholesome, unpotable, or unhealthful.
4. Materials and equipment shall be so selected as to mitigate corrosion, electrolysis and deterioration.

5. Insulating bushings should be made of nylon or “delrin” (Acetal Resin). Insulating bushing shall be used when dis-similar base metals would otherwise be in direct contact.

B. Specification: Materials and equipment not specified in this specification shall be recommended by a properly qualified person and approved in writing by the District. Newly Developed Materials and Equipment – It is not the intention to prevent the use of newly developed materials and equipment that otherwise meet the requirements of paragraphs regarding qualification and specification above.

16-11 Abandonment of Water Facilities

A. If the existing saddle is bronze the services abandoned shall be removed up to the corporation stop. The corporation stop shall be left in a shut position and a cap installed if required. Existing steel service saddles shall be removed and replaced with a stainless steel full circle clamp with stainless steel bolts.

B. Hydrants shall be removed up to the tee. A cap or blind flange shall then be installed at the tee, and adequate thrust block installed if required.

C. Mains abandoned shall be cut, capped (or plugged) with a metal cap or a concrete cap. A concrete plug shall be used when authorization is obtained by the District.

D. Asbestos Cement Pipe (ACP) shall be disposed of by either of the following methods:

1. Abandonment on-site in accordance with Section 16-11C.

2. Removed from site and disposed of by the Contractor in accordance with all current applicable Federal, State and Local standards.

16-12 Preservation of Survey Monuments, Markers and Stakes

The Contractor shall be responsible for investigating and being knowledgeable of the location of any property corners, survey monuments, construction stakes or other survey markers which may affect or be affected by the Contractor’s actions. The Contractor shall be responsible for the protection of all existing survey monuments, corner witnesses, construction stakes, bench marks and other survey markers for the duration of the Contract. All such monuments, stakes or markers damaged or destroyed shall be replaced at the Contractor’s sole expense by a Licensed Land Surveyor or a Registered Civil Engineer authorized to practice land surveying. Replacement shall include preparation and recordation of Corner Records, Record of Survey Maps or other such documents with the County as required by local or state law.

16-13 As-Built Plans

As-built plans shall be provided by contractor for all water distribution projects and shall be professionally drafted on a permanent reproducible medium. As-built plans for projects other than strictly water distribution shall be made in accordance with Section B.20.C. Measurements for all water facilities should be triangulated from existing permanent structures such as buildings, manholes, fire hydrants, etc. A sample as-built drawing, SD-17, is to be used as a guideline.

As-builts will be returned if it is determined that additional measurements are necessary. As-built depths of cover shall be shown when less than 36-inches or greater than 48-inches.

As-built plans shall be signed and dated by an authorized representative of the Contractor certifying that facilities as shown are actually as constructed. The District shall withhold payment in accordance with Table J until as-builts are found acceptable by the District.

TABLE J

Amount Withheld	Contract Amount
\$250	Less than \$1,000
\$500	\$1,000 to \$4,999
\$1,000	\$5,000 to \$24,999
\$2,000	\$25,000 to \$49,999
5% of Contract Price	\$50,000 and above

SECTION 17 STRUCTURAL CONCRETE

17-01 Description. Structural concrete shall include the furnishing all labor, tools, equipment and material necessary for the installation of all concrete, reinforced concrete, reinforcing steel, grout, and mortar, as detailed on the plans or in the Special Provisions.

Concrete work shall also include the treatment of concrete surfaces; the provision of construction joints; the placing and setting of all anchor bolts, pipe railings, manhole steps and floor opening frames and covers, and all appurtenances to the mechanical, and electrical equipment that must be attached to or set into the concrete; the setting of all anchor bolts for structural steel, and all miscellaneous items attaching to the concrete as detailed on the plans or in the Special Provisions under the equipment section of the work.

17-02 Standards. All concrete materials and construction shall comply with the requirements, and be in accordance with the American Concrete Institute Standard 301, "Specifications for Structural Concrete for Buildings," except as supplemented and modified as follows (all references to "Architect/Engineer" in the ACI Standard shall be interpreted as referring to the District). Design and construction shall conform to the e latest "Uniform Building Code." Arrangement and details of reinforcing steel, including bar supports and spacers, shall be in accordance with the latest ACI 315 detailing manual.

17-03 Strength. All concrete shall be Working Stress type concrete for use in structures or structural elements which have been analyzed and proportioned by working stress (straight line) theory.

The concrete for all structures shall have a minimum compressive strength of three thousand five hundred (3,500) pounds per square inch twenty-eight (28) days after placement.

All structural concrete shall be Class A containing a minimum of five hundred sixty-four pounds (six sacks) of Portland cement per cubic yard.

17-04 Submittals. The Contractor shall submit to the District for favorable review the following, even though items proposed to be furnished conform to the exact description stated in the specifications or as shown on the plans:

1. A notarized statement stating that the cement conforms to ASTM C-150.
2. Concrete mix design and strength data.
3. Shop Drawings of reinforcing detail and layout.

17-05 Cement. All cement for all structures shall be Type II, ASTM C-150.

17-06 Admixtures. Admixtures may be used subject to District approval.

17-07 Aggregates. All aggregates shall conform to "Specifications for Concrete Aggregates" (ASTM C-33). All aggregates shall have a minimum C.V. (cleanliness value) and S.E. (sand equivalent) of not less than 75. Three (3) samples shall be tested in each case and shall be taken from the weight hopper. The average of the results of the individual tests will be the accepted value in each case. These values shall be maintained throughout the course of the work, and any indicated deviation therefrom will be cause for rejection of such material, pending additional tests. Tests shall conform to Test Method No. Calif. 227 for cleanliness value and Test method No. Calif. 217 for sand equivalent (Materials Manual, Testing and Control Procedures - Materials and Research Department, State of California).

The nominal maximum size of aggregates shall be 1-inch and gradation shall be based on a 1-inch nominal maximum size aggregate. In a thin section (6 inches or less in thickness), a 2-inch nominal maximum size aggregate may be used if expressly approved in writing by the District.

17-08 Selection of Proportions. The Contractor shall have his mix designed and shall submit the proposed proportions to the District for review and approval. The cement content shall be not less than six (6) sacks of cement (94 lbs. per sack) per cubic yard of concrete, and the water-cement ratio shall not be greater than 5.75 gallons of water per sack of cement. Only clean, fresh water shall be used for making concrete.

17-09 Reinforcing Steel. Unless otherwise specified, reinforcing steel shall be Deformed and Plain Billet-Steel Bars for Concrete Reinforcement conforming to ASTM A-615 Grade 60. Bars smaller than #4 bars shall be ASTM A-615 Grade 40. Reinforcing bars shall be placed in accordance with the size and spacing shown on the plans.

Mesh reinforcement shall conform to the requirements of ASTM A-185. The gauge of the wire and the dimensions of the mesh shall be as detailed on the plans or in the Special Provisions.

17-10 Formwork. Lumber and plywood shall conform to the dimensions of the concrete surfaces shown on the plans, shall be sufficiently tight to prevent leakage, and shall be sufficiently strong and braced to maintain their proper shape and alignment.

All sharp edges and corners shall be chamfered with one (1) inch triangular fillets, unless otherwise directed by the District. The triangular fillets or chamfer strips shall be milled or surfaced on all sides. Curved surfaces shall be formed of strips of matched lumber not over four (4) inches wide or of other material, such as plywood or metal, which has been approved by the District.

Unless specifically approved by the District, earth cuts shall not be used as forms for vertical surfaces other than foundations below grade. Where permitted, the cut shall be neat, straight and must stand vertical.

17-11 Reinforcing. Reinforcing bars shall be tied and supported so as to maintain their exact shape and alignment during concrete placement. Lap bars 50 diameters at splices unless noted otherwise.

17-12 Depth of Footings. The elevations of the bottoms of footings, as shown on the plans, shall be considered as approximate only, and the District may order, in writing, such changes in dimensions or elevations of footings as may be necessary to secure a satisfactory foundation. Coarse bedding material shall be placed as a, subgrade below the footing to a minimum depth of twelve (12) inches, under the entire footing of all concrete structures, except standard manholes.

17-13 Control of Water. Water shall be controlled as required in Section 13-05D. Pumping of water from the interior of any foundation enclosure shall be done in such a manner as to preclude the possibility of any portion of the concrete materials being carried away. No pumping will be permitted during the placing of concrete, or for a period of at least twenty-four (24) hours thereafter, unless it be done from a suitable sump separated from the concrete work.

The Contractor shall take all necessary precautions to preclude the discharge of silt or cement fines from newly poured concrete into natural waterways or into sewers.

17-14 Concrete Placement. The Contractor shall notify the District at least seventy-two (72) hours before concrete is placed. No concrete shall be placed until all excavations, forms, reinforcing, and inserts have been constructed and inspected by the District.

All concrete shall be thoroughly vibrated during the pouring operation by a mechanical vibrator. The Contractor shall have a spare vibrator on the job prior to any pour.

17-15 Finishes on Concrete Surfaces. The following specifications set forth the requirements for the classes of surface finish, which shall be applied to the various parts of concrete structures.

A. Wearing Surface - Unless otherwise specified on the Plans, in the Special Provisions, or directed by the District, the wearing surfaces of concrete steps and concrete walkways, together with the top surfaces of all floors of structures and slabs shall be given a monolithic finish. All surfaces to be finished shall be thoroughly worked and brought to a uniform steel trowel finish. In addition, where directed by the District, stair treads, landings, walkways or floors shall be given a brush or broom finish.

B. Ordinary Surface Finish - Ordinary Surface Finish shall be applied to all concrete surfaces either as a final finish or preparatory to a higher class finish. On surfaces which are to be buried underground and are in contact with the ground or specified backfill, the removal of fins and form marks and the rubbing of mortared surfaces to a uniform surface will not be required. Unless otherwise specified, Ordinary Surface Finish shall be considered as a final finish.

During the pouring of concrete, care shall be taken that the methods of compaction used will result in a surface of even texture, free from voids, water or air pockets, and that the coarse aggregate is forced away from the forms in order to leave a mortar surface.

Immediately after the forms have been removed, all form bolts shall be removed to a depth of at least one (1) inch below the surface of the concrete. All holes and depressions caused by the removal or setting back of such form bolts shall be cleaned and filled with a Class II mortar of matching color. Care shall be exercised to obtain a perfect bond with the concrete. All fins caused by form joints and other projections shall be removed and all pockets cleaned and filled. Cement mortar for filling pockets shall be treated as specified for bolt holes. In the judgment of the District, if rock pockets are of such an extent or character as to affect the strength of the structure materially or to endanger the life of the steel reinforcement, he may declare the concrete defective and require the removal and replacement of that portion of the structure affected.

Holes or depressions in surfaces which are to receive Class 1 Surface Finish shall be cleaned and filled with mortar at least seven (7) days prior to starting Class 1 Surface Finish. Exposed mortar shall be wetted with water at intervals during the day for two (2) consecutive days after placing. After the mortar has thoroughly hardened, the surface shall be rubbed with carborundum as required to match the texture and color of the adjacent concrete.

C. Class 1 Surface Finish - The application of Class 1 Surface Finish shall result in obtaining smooth, even surfaces of uniform texture and appearance, free of unsightly bulges, depressions and other imperfections. The degree of care in building forms and character of materials used in form work will be a contributing factor in the amount of additional finishing required to produce smooth even surfaces of uniform texture and appearance, free of unsightly bulges, depressions and other imperfections, and the District shall be the sole judge in this respect.

Unless otherwise indicated on the plans or in the Special Provisions, all exposed interior and exterior concrete surfaces of all treatment plant and pumping station structures shall be given a Class 1 Surface Finish as a final finish.

After completion of the Ordinary Surface Finish, areas which do not exhibit the required smooth, even surface of uniform texture and appearance shall be sanded with power sanders or other approved abrasive means until smooth, even surfaces of uniform texture and appearance can be obtained.

17-16 Curing. All concrete shall be properly cured in accordance with the requirements of the American Concrete Institute Standard 301.

Forms shall not be stripped until seven (7) days have elapsed after the concrete was poured.

17-17 Concrete Deposited Under Water. In excavations for the footings of proposed structures, if conditions render it impossible or inadvisable in the opinion of the District to dewater the excavation before placing concrete, the Contractor shall deposit under water, by means of a tremie or bottom dump bucket, a layer of concrete of sufficient thickness to thoroughly seal the cofferdam. Concrete deposited in water shall be Class A with ten (10) percent extra cement added. The exact thickness will depend upon the hydrostatic head, but in no case shall the seal be less than eighteen (18) inches. This seal shall, in general, be allowed to remain in place for not less than five (5) days and preferably ten (10) days before dewatering so as to set sufficiently to withstand the hydrostatic pressure.

All portions of the structure for which concrete must be deposited under water shall be poured continuously until completed. When such portions are completed, all scum, laitance, and sediment shall be removed before fresh concrete is deposited. Concrete shall not be placed in running water.

17-18 Waterproofing. When called for on the plans or in the Special Provisions, waterproofing of the type specified shall be installed in accordance with the requirements of Section 54 of the State Standard Specifications or as specified in the Special Provisions.

17-19 Drypack and Special High-Strength Non-Shrink Mortar. Where "drypack" is called for on the plans, a mixture containing one (1) part cement to three (3) parts clean sand shall be used. The moisture content shall be such that the mixture will ball when formed by hand, but will crumble when struck. The mixture shall be confined in the opening to be filled and driven home in small amounts, using a hammer and a stick or blunt metal tool in such a manner that a very dense mortar is obtained. Should the resulting joint leak, the material shall be chipped out and the opening refilled until a watertight joint is obtained.

As shown in the plans, the Contractor shall provide concrete bases under all equipment. Cement grout shall be poured under all fabricated metal bases in such a way that all voids are filled with non-shrink mortar, giving support to all parts of the fabricated base. Mortar shall be placed by pouring with enough pressure (head) so that mortar will reach all portions of the fabricated base. A hole shall be drilled in fabricated base at each cell to let out air and a small amount of mortar to assure completely filling each cell.

Mortar used shall be non-shrinking, non-metallic, level-fill grout, water and oil resistant, developing a compressive strength of at least 7,500 psi in seven (7) days, non-metallic and bond to metal. Mortar shall be used in accordance with the recommendations of the manufacturer.

17-20 Alterations to Concrete Structures. All alterations, chipping, drilling or cutting of concrete shall be approved by the District. Where the Contractor is required to cut openings through existing concrete or masonry walls, the hole shall be pre-cut with a proper masonry saw on both sides of the wall. After removal of the concrete, all rough surfaces of the wall shall be ground smooth and patched with cement mortar.

Openings for installation of pipes up to twelve (12) inches diameter shall be machine cored. For larger pipes, openings shall be made by drilling small holes around the periphery prior to chipping out the concrete. After the pipe has been installed, the opening shall be grouted and made completely watertight.

17-21 Grout for Pipes and Anchors. Pipes, anchor bolts, manhole steps or other embedments installed in existing concrete shall be grouted using quick-setting, non-metallic, hydraulic cement. The cement shall be "Waterplug," or "Sika Plug W/C," or equal. The installation shall be made in accordance with the recommendation of the manufacturer.

Where leaks occur in concrete walls, the concrete shall be chipped around the leak and sealed with cement grout above specified, in strict accordance with the manufacturer's instructions.

17-22 Concrete Surface Repairs. Repairs to spalled, cracked, pitted, or crazed concrete surfaces shall be made using MasterEmaco Repair Mortars by Master Builders Solutions, or using the SikaGrout Series by Sika Corp., or approved equivalent. As an alternate, the Contractor may repair concrete surface defects with an approved nonshrink trowel grade epoxy filler, Tnemec 63-1500 filler and surfacer, Wil-Cor, Inc. #990 trowelable putty or approved equivalent. The repairs shall be made in strict conformance with the manufacturer's recommendations. For smoothing or repairing large areas that require more than 1/4-inch thickness, special instructions on the use of the material shall be obtained from the manufacturer. The finish painting shall be compatible with the patching material.

17-23 Bonding New Concrete to Old. Where it is required to apply new concrete over old surfaces or to bond precast concrete sections or other types of material to concrete, the Contractor shall first apply a brush-on epoxy resin concrete adhesive equivalent to Sikadur 22 Lo-Mod as manufactured by Sika Corp., or the MasterEmaco ADH Series by Master Builders Solutions, or approved equivalent. The old surface shall be cleaned by sandblasting or chipping and the adhesive applied in strict accordance with the recommendations of the manufacturer.

17-24 Slump Tests. Slump tests shall be performed by the Contractor in the presence of the Inspector at the beginning of each day's pour and at such additional times as required by the District or its representative. Slump tests shall be made in accordance with current ASTM Designation C-143.

The amount of water used in the mixture shall be the amount required to produce concrete with a slump within the range shown as nominal slump in the following table:

Nominal Maximum Slump (inches)	Type of Work
0-3 5	Reinforced concrete structures – Heavy sections
0-4 6	Reinforced concrete structures – Thin sections & columns
0-3 4	Non-reinforced facilities
0-2 3	Concrete pavement & walls
6-8 9	Concrete placed under water

When the slump of the concrete is found to exceed the nominal slump, the mixture shall be adjusted as directed by the District to reduce the slump to a value within the nominal range shown.

Where there are adverse or difficult conditions which affect the placing of concrete, the Contractor may request permission of the District to increase the slump by increasing both the water and cement content. The cost of additional water and cement shall be at the Contractor's expense.

17-25 Cylinder Testing. For projects involving the placement of a total of ten (10) cubic yards or more of concrete, the Contractor shall take a minimum of three (3) cylinders for testing by the District.

Additionally, three (3) test cylinders shall be made for each day's pour where more than twenty (20) cubic yards of concrete is poured, or for each 150 cubic yards of concrete placed.

The Contractor shall furnish the cans for the test cylinders and pour the concrete into the cans. The test cans shall be marked with the date and stored on the job site in conditions similar to the structure which was poured. The District will pay for the testing.

17-26 Inspection. The District shall inspect and approve formwork and reinforcing steel placement prior to concrete pours. The Contractor shall provide at least twenty-four (24) hours notice that inspections are required.

SECTION 18 CASTINGS AND METAL FABRICATIONS

18-01 Description. Castings and metal fabrications shall be constructed in accordance with the details shown on the plans, Standard Drawings and as hereinafter specified. The Contractor shall install or erect the metal work, remove the temporary construction, including the removal of the old structure or structures if specified, in accordance with the plans, these specifications and the Special Provisions.

18-02 Materials. The various materials shall conform to the requirements of the specifications of the ASTM as listed in the following tabulation with certain modifications and additions as specified later in this section.

MATERIAL ASTM DESIGNATION

Structural steel A-36

Structural silicon steel A-94

Structural nickel steel A-8

Low alloy structural steel for welding A-242

Structural steel for welding A-373

High-strength structural rivet steel A-502

Bolts and nuts A-307

Black steel pipe (std. wt. seamless) A-120

Carbon steel for forgings A-235, Class C1

Alloy steel for forgings A-237, Class A

Cast steel A-37, Grade 65-35

Cast iron A-48, Class 30

Malleable iron castings A-47, Grade No. 32510

Bronze castings A-22, Class C

Aluminum Alloy GS11A-T6 A-209

Stainless steel forgings A-473

Materials used in the manufacture of corrugated metal pipes shall conform to AASHTO Designation M-36.

Where the Contractor has been granted permission to substitute rolled stock for forgings, the rolled stock shall meet the physical and chemical requirements for forged steel.

18-03 Structural and Miscellaneous Steel. Steel shapes and plates shall be ASTM A-36. Steel pipes shall be ASTM A-501. Anchor bolts shall be ASTM A-307 with hex heads and nuts. Bolt holes in steel shall be 1/16" oversize, except for holes in column baseplates which may be 1-inch oversize.

Fabrication and erection shall conform to the AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, latest edition. All welding shall conform to the standards of the Structural Welding Code of the American Welding Society and Section 1.17 of the AISC Specification, latest edition. All welders shall be certified by the AWS and approved by the Testing Agency.

18-04 Bolts, Nuts and Washers. Bolts and nuts shall conform to the requirements for regular hexagon bolts and nuts of ANSI B18.2.1 and B18.2.2, respectively. Material shall conform to ASTM A-307. Circular washers for common bolts shall conform to ANSI B27.2, Type A. All bolts, nuts and washers shall be Type 316 stainless steel unless shown otherwise on the plans.

18-05 Galvanizing. Hot dip galvanize all sheet steel, plain or shaped, in accordance with ASTM A-525, Commercial Class 1.25.

Hot dip galvanize all products fabricated from rolled, pressed, and forged steel shapes, plates, bars and strip 1/8-inch thick or heavier in accordance with ASTM A-123.

Hot dip galvanize all steel hardware, nuts, bolts, washers, anchors and threaded rods in accordance with ASTM A-153. Nuts shall be sized so that they screw on threaded bolts readily after galvanizing.

Repair damaged galvanizing by heated repair method. Repair materials shall be Galvalloy, or Gal-Viz, or equal.

18-06 Cast Iron Frames and Covers. Castings shall conform to the shape and dimensions shown on the Standard Drawings. All castings shall be clean and free from blow or sand holes or defects of any kind.

The cover and its seat in the frame shall be machined so that the cover will sit evenly and firmly in the frame.

Cast iron frames and covers shall be dipped or painted with asphalt which will form a tough, tenacious, non-scaling coating which does not have a tendency to become brittle when cold or sticky when hot. Covers shall be easily removable.

18-07 Metal Railings. Metal railings shall be of standard one and one-half inch (1-1/2") galvanized iron pipe, aluminum, or stainless steel, as detailed on the plans. They shall be neatly welded and finished and securely anchored in place in their designated locations. Pin connections shall be used wherever possible. A minimum of field welding shall be made. All steel railings shall be ground smooth and galvanized after fabrication.

The Contractor shall provide suitable chains with eyes welded to the end post or rail at one end, and with snap catch and eye at the other end, at entrance to floor openings and wells within and adjacent to the structure. Chains and eyes shall be ground smooth and galvanized after fabrication.

18-08 Aluminum Fabrications. All aluminum handrails, gratings and frames shall be fabricated in a substantial and workmanlike manner. All grating openings shall be banded, and aluminum angle supports shall be installed as necessary for safety. All grating shall be removable. Grating not secured in position by angles shall be provided with standard bolted aluminum clips or fasteners.

After fabrication, all aluminum material shall be given a clear anodized (electro- chemical) finish conforming to AAMA A41 designation to a thickness of 0.7 mils minimum anodized coating.

Where shown, aluminum gratings shall be provided with Type 316 stainless steel hinges and locking hasps. All screws or bolts shall be Type 316 stainless steel. A padlock shall be provided for each lock and grating. The padlock shall be master keyed to the District standard.

18-09 Aluminum Isolation Coatings. Aluminum pigmented asphalt paint shall be used for aluminum in contact with other metals.

All aluminum in contact with concrete shall be coated with an approved isolation coating.

18-10 Cutting with Torch. The use of a cutting torch is permissible if the metal being cut is not carrying stress during the operations. The radius of re-entrant flame cut fillets shall be as large as possible, but never less than one (1) inch. To determine the net area of members so cut, one-eighth (1/8) inch shall be deducted from the flame cut edges. Stresses shall not be transmitted through a flame cut surface.

When cutting with a torch, cuts shall be true to line with a maximum deviation of one-sixteenth (1/16) inch. All burned edges shall be finished by grinding or chipping. The use of the burning torch will be permitted on ends that form compression connections, providing a minimum of one-quarter (1/4) inch of metal is left to be removed by machining.

18-11 Painting. All iron and steel surfaces shall be cleaned and painted in accordance with the requirements of Section 19 of these specifications.

18-12 Inspection. All castings and fabrications shall be inspected and approved prior to installation. The acceptance of any material or finished members by the Inspector shall not be a bar to their subsequent rejection, if found defective. Rejected material shall be immediately removed from the site and replaced promptly by the Contractor.

SECTION 19 PAINTING

19-01 Description. Painting shall include the furnishing of all plant, labor, equipment, appliances, and material and the performing of all operations in connection with the preparation of surfaces, application of all paint or other materials and the manufacture of paints, paint material and miscellaneous materials incidental thereto. Surfaces to be painted shall receive treatment and the number of coats prescribed herein, or as detailed on the plans or in the Special Provisions. Paint colors shall be those specified and approved by the District.

19-02 Standards.

A. Painting Standards - All painting shall be done in accordance with Section 59 of the State Standard Specifications, State of California, Department of Transportation, latest edition.

B. Products - All materials, supplies and articles furnished shall, wherever practicable, be the standard product of a recognized, reputable manufacturer. The standard products of manufacturers other than those specified will be accepted when it is proved to the satisfaction of the District that all paint materials comply fully with the specifications.

C. Metal Surfaces - Metal surfaces shall be prepared and painting shall be done in accordance with Steel Structures Painting Council (SSPC) Specifications.

19-03 Safety. Paint materials shall be stored in assigned area, and storage area shall be kept clean and fire safe. Used rags, thinner and buckets shall be disposed of daily.

The Contractor is advised that application of coal tar epoxy and other paint materials may be hazardous. The Contractor shall take all necessary precautions to ensure the safety of workers and property.

The Contractor shall maintain a copy of the Material Safety Data Sheets (MSDS) for all coating materials on the job site at all times.

19-04 Air Quality Standards. All work, materials, procedures and practices under this section shall conform to requirements of the Bay Area Air Quality Management District.

19-05 Epoxy Filler and Surfacer Compound. Epoxy filler and surfacer compound for concrete surfaces shall be non-shrink, trowel grade filler and surfacer with high bond strength and high resistance to abrasion, impact, wet conditions, corrosive fumes, solvents and chemical contact. Filler and surfacer compound shall be Tnemec 63-1500 epoxy putty, Wil-Cor #990 trowelable epoxy putty, or equal 100% solids epoxy patching material.

One (1) coat of Tnemec Series 69, Sherwin Williams Pro-Industrial Series, or approved equal shall be sprayed on the concrete for the purpose of highlighting the large holes and defects in the concrete surfaces.

The epoxy filler and surfacer compound shall be troweled into the big holes and defects in the concrete surface. The troweled thickness over damaged concrete surfaces shall be 1/32" to 1/16".

19-06 Coating Systems.

<u>Designation</u>	<u>Paint Specification</u>	
A	Surface Preparation	Steel – SSPC-SP-10 (near white metal blast cleaning) Concrete – Brush-off blast
	System	High-Build Coal Tar Epoxy
	Paint Types	Tnemec Series 46H-413 High Build Tnemec Tar or Two (2) coats of Rust-Oleum System C9578 Coal Tar Epoxy
	Primer Coats	Self-Priming Steel – Two Coats Total 16-20 mils dry film thickness Concrete – Two Coats Base coat 4-6 mils Top coat 12-14 mils Total 16-20 mils dry film thickness
B	Surface Preparation	Steel – SSPC-SP-10 (near white metal blast cleaning) Concrete – Brush-off blast
	System	High-Build Epoxoline
	Paint Types	Tnemec Series 69 Sherwin Williams Pro-Industrial Series
	Primer Coats	Steel: Self-Priming Concrete: Thin paint to provide 2 mils of dry film thickness, apply epoxy filler and surface compound (See 19-05) Two (2) coats Each coat 5-7 mils dry film thickness Total 10-14 mils dry film thickness
C	Surface Preparation	SSPC-SP-6 (commercial blast cleaning)
	System Paint Types	High-Build Epoxoline base coat Alkyd Polyurethane Enamel top coat Tnemec Series 69 base coat Tnemec Series 75 top coat Or Sherwin Williams Pro-Industrial Series base coat Equivalent Sherwin Williams top coat Tnemec 606 base coat

Primer	Compatible Sherwin Williams Primer
Coats	Two (2) coats
	Base coat 4 mils
	Top coat 4 mils
	Total 8 mils dry film thickness

19-07 Preparation of Surfaces. All surfaces to be painted shall be thoroughly cleaned before applying paint or surface treatments, including sealing of all surface markings that may bleed through. Clean clothes and clean fluids shall be used in solvent cleaning to avoid leaving a thin film of greasy residue. Cleaning and painting shall be so programmed that dust or spray from the cleaning process will not fall on wet, newly painted surfaces. Hardware, and similar accessories shall be removed or suitable masked during preparation and painting operations, or shall otherwise be satisfactorily protected. In all cases the recommendations of the paint manufacturer shall be rigidly followed in the preparation of surfaces prior to painting.

After the Contractor has completed the job of preparing all surfaces to be painted, the surfaces shall be inspected and approved by the District prior to the application of any paint.

A. Metal Surfaces - All metal surfaces to be painted shall be prepared by sandblasting pursuant to the requirements of Section 19-06 and shall be completely clean and free of all oil, grease, dirt, rust, loose mill scale, old weathered paint, and other foreign substances. The removal of oil and grease shall, in general, be accomplished by sandblasting. Minor amounts of grease and oil contaminants will be tolerated on the surface, prior to sandblasting, provided that the abrasive is not reclaimed and reused. All galvanized metal shall be thoroughly washed with neutralizing solution prior to painting.

B. Concrete Surfaces - All concrete surfaces to be painted shall be prepared by sandblasting pursuant to the requirements of Section 19-06 and shall be completely clean and free of all oil, grease, dirt, etc., and shall be completely wire brushed to remove any loose concrete or paint and all cracks shall be patched to the satisfaction of the District. Surfaces to be painted with coal tar epoxy shall be sandblasted to remove the smooth surface mortar in accordance with the recommendations of the paint manufacturer.

19-08 Paint Applications.

A. Workmanship - All work shall be done in strict accordance with the instructions of the paint manufacturer and in a workmanlike manner so that the finished surfaces will be free from runs, drops, ridges, waves, laps and unnecessary brush marks. All coats shall be applied in such manner as to produce an even film of uniform thickness completely coating all corners and crevices. All painting shall be done by thoroughly experienced workmen. Care shall be exercised during spraying to hold the nozzle sufficiently close to the surfaces being painted to avoid excessive evaporation of the volatile constituents and loss of materials into the air, or the bridging over of crevices and corners.

Spray equipment shall be equipped with mechanical agitators, pressure gauges, and pressure regulators. Nozzles shall be of proper size. Floors, roofs, and other adjacent areas and installations shall be satisfactorily protected by drop cloths or other precautionary measures. All overspray shall be removed by approved method or the affected surface repainted.

The District shall be notified when each coat has been applied and is ready for inspection. Until each coat has been inspected and approved by the District, no succeeding coats shall be applied.

B. Atmospheric Conditions - Except as specified or required for certain water-thinned paints, paints shall be applied only to surfaces that are thoroughly dry and only under such combination of humidity and temperatures of the atmosphere and surfaces to be painted as will cause evaporation rather than condensation. In no case shall any paint at all be applied during rainy, misty weather or to surfaces upon which there is frost or moisture condensation, without suitable protection as approved by the District. Where painting is permitted during damp weather, or when the temperature is at or below 50 degrees F, the surfaces shall be heated to prevent moisture condensation thereon. Bare metal surfaces, except those which may be warped by heat, may be dehydrated by flame-heating devices immediately prior to paint application. While any painting is being done, the temperature of the surfaces to be painted and of atmosphere in contact therewith, shall be maintained at or above 50 degrees F, except where paints are being used which dry solely by evaporation, in which case the temperature of the air and surface may be 35 degrees F or as approved by the District. All paint when applied shall be approximately the same temperature as that of the surface on which it is applied.

C. Protection of Painted Surfaces - Where protection is provided for paint surfaces, such protection shall be preserved in place until the paint film has properly dried, and the removal of the protection is authorized. Items which have been painted shall not be handled, worked on or otherwise disturbed until the paint coat is completely dry and hard. After delivery at the site, all shop coated metalwork shall be repainted or retouched from time to time with specified paint whenever, in the opinion of the District, it becomes necessary to maintain the integrity of the film.

19-09 Painting Schedule. Various items shall be painted in accordance with the painting schedule given below. Coating systems refer to those listed in Section 19-06.

<u>Item Description</u>	<u>Coating System Designation</u>
All concrete and metalwork submerged or exposed to moisture or sewage, such as wet wells, weirs, gates, pipework (not manholes), etc.	A or B
All exposed interior and exterior concrete surfaces, such as pump station and structure walls, ceilings, etc. (not floors)	B
All exposed interior and exterior metalwork, machinery, pipe, valves and fittings, bolts, nuts, hangers, clamps, etc.	C

19-10 Cleanup. Upon completion of his work, the painting contractor shall remove his surplus materials. All paint spills shall be removed and the entire premises shall be free from rubbish, debris, etc., caused by his work. He shall present the work clean and free from blemish so that it is acceptable in every way. All glass and equipment name tags shall be thoroughly cleaned of paint spots and polished, and the job made ready for use.

SECTION 20 SURFACE RESTORATION

20-01 Description. Surface restoration shall include the furnishing of all labor, material, equipment, tools, and services required for the performance of paving and surfacing operations, including repair of curbs, gutters, sidewalks, as well as public and private driveway and sidewalk areas, as specified here and/or as shown on the drawings or as necessary to complete the project. Any concrete curbs, gutters or sidewalks damages by the work shall be repaired or replaced in kind.

No surface restoration shall be performed until all compaction tests have been made and passed and until approved by the District.

20-02 Air Quality Control Board Regulations. The Contractor shall use materials which comply with the Bay Area Air Quality Management District.

20-03 Pavement Restoration. Pavement restoration for public roads shall conform to the requirements of the agency having jurisdiction over the roadway right-of-way. Materials for paving and surfacing shall conform to the applicable provisions of the State Standard Specifications and the County Specifications.

Pavement thickness shall match the thickness of the adjoining pavement or the thickness indicated on the drawings, whichever is greater.

20-04 Pavement Cutting. Trenches and other excavations in asphalt paved areas shall be cut by means of a saw to the full depth of the pavement as required by the agency having jurisdiction over the street. Pavement cuts shall be laid out by a chalk line and care shall be taken to ensure neat, straight edges.

After the District has approved a section of trench for final paving, the Contractor shall strip out all temporary pavement to the full depth of the new pavement section as specified. Spalled or cracked sections of pavement beyond the excavation limits which, in the opinion of the District, show signs of having separated from the adjoining pavement or are moveable, shall be removed and replaced with new pavement. Broken edges of pavement shall be trimmed along lines parallel to the trench edges. Exposed subgrade materials shall be compacted to the same standards as the adjoining trench backfill.

20-05 Prepaving Grinding - Where required, existing pavement shall be ground down to make a smooth joint with existing gutters and joints with existing pavement. All pavement grinding shall be done in accordance with Paragraph 39-2.01C(3)(e) of the State Standard Specifications.

20-06 Aggregate Base. Aggregate base shall be Class 2, conforming to Section 26 of the State Standard Specifications. Minimum relative compaction shall be 95%. Base shall be placed and compacted prior to placing of temporary paving.

20-07 Asphalt Concrete. Asphalt concrete shall conform to the applicable requirements of Section 39 of the State Standard Specifications for Type B aggregate or as modified by the agency with jurisdiction over the street. Paragraph 39-8 is not applicable.

Paving asphalt shall be Grade AR-4000, conforming to the requirements of Section 92 of the State Standard Specifications. Four to six percent (4-6%) bituminous binder shall be provided.

Bituminous mixtures shall be delivered to the roadbed at temperatures specified in Section 39 of the State Standard Specifications. Spreading of the mixture shall be in accordance with Section 39 of the State Standard Specifications. All loads shall be covered with tarpaulin or other material during transportation.

Initial or breakdown rolling and the final rolling of the uppermost layer of the asphalt concrete shall be compacted in accordance with Section 39 of the State Standard Specifications. Compaction by vehicular traffic shall not be permitted.

The joints between old and new pavements or between successive days' work shall be carefully made in such manner as to insure a continuous bond between old and new sections of the course. After the trench has been backfilled, edges of the existing pavement shall be exposed and cleaned and re-trimmed to straight, vertical surfaces. All joints shall be painted with a uniform coat of tack coat before the fresh mixture is placed. Each lift of asphalt concrete shall be allowed to cool down before the next lift is placed. Before the final lift of asphalt concrete is placed, the edges of the trench shall be tacked with RS-1 asphaltic emulsion.

20-08 Pavement Reinforcing Fabric. Pavement reinforcing shall conform to the requirements of Section 96 and Section 39-2.01C(3)(g) of the State Standard Specifications.

Prior to placing the fabric, the existing pavement to receive the fabric shall be cleaned to the satisfaction of the District of all materials such as, but not limited to, vegetation, sand, dirt, gravel and water.

Where required, an asphalt leveling course shall be placed over the existing asphalt. Cracks between 1/8" and 1/4" will be filled with a crack filler. Wider cracks or holes are to be repaired with slurry, emulsion or hot mix. Heater scarification with rejuvenating agent should also be considered as an effective way of eliminating surface cracks, oil spots, and providing a consistent surface for fabric placement.

Placement of the fabric shall be made only under the following conditions:

1. The ambient air temperature is above 50 degrees F and rising.
2. The pavement is dry and the pavement temperature is 40 degrees F and rising.

The surface area to receive the fabric shall be sprayed with pavement asphalt Type AR-4000 or AR-8000, at a rate of 0.25 ± 0.03 gallons per square yard, except at intersections where the application rate, 15 feet before and after each stop line, should be in the range of 0.20 gallons per square yard. The exact rate and type shall be determined by the District. The Contractor's attention is directed to Section 39-2.01C(3)(g) of the State Standard Specifications. The asphalt shall be sprayed with a suitably metered truck calibrated by California Test Method No. 399A. Good practice dictates that the asphalt binder be spread in the range of 290 degrees F and 365 degrees F, and preferably greater than 325 degrees F.

The fabric shall be placed into the asphaltic binder with a minimum of wrinkles that lap, and broomed or squeegeed to remove any bubbles prior to the binder cooling substantially enough so the fabric will not adhere to it. The equipment for placing the fabric shall be mechanized and capable of handling full rolls of fabric. The test for cutting wrinkles shall be made by gathering together the fabric in a wrinkle. If the height of the doubled portion of extra fabric is $\frac{1}{2}$ -inch or more, the fabric should be slit to remove the wrinkle and allowed to lay flat. Brooming will maximize the fabric contact with the pavement surface. The equipment used to place the fabric is subject to approval by the District.

To enhance the bond of the fabric with the existing pavement and to smooth out any wrinkles and folds in the fabric, the Contractor may be required to pneumatically roll the fabric after it is placed.

20-09 Portland Cement Concrete Pavement. Where shown on the Plans, the Contractor shall place Portland Cement Concrete Pavement. Portland Cement Concrete pavement shall conform to the County Specifications.

20-10 Slurry Seal. Where shown on the plans, the Contractor shall place a slurry seal. Slurry seal materials shall conform to the requirements of the State Standard Specifications, Section 37-3.

20-11 Conformance to Existing Improvements. Asphalt concrete overlays shall be tapered to conform to existing paving, gutters, catch basins, etc.

20-12 Raising Existing Castings to Grade. After the final paving is placed, the Contractor shall raise all existing monuments, valves, manholes and other castings to the final surface elevation. The method of raising the castings to grade shall conform the requirements of the agency having jurisdiction over the street.

20-13 Restoration of Striping and Pavement Markers. After the final paving is complete, the Contractor shall stripe the new pavement and provide new pavement markers and delineators to replace the old ones. Traffic stripes and pavement markings shall conform to Sections 84 of the State Standard Specifications. Markers and delineators shall conform to Section 82 of the State Standard Specifications. No work shall be done until the layout is approved by the agency having jurisdiction over the street. Restoration of striping and pavement markings shall be included in the cost of pavement restoration.

20-14 Unpaved Travel Surfaces. Trenches in unpaved areas of private streets shall be surfaced with a minimum of twelve (12) inches of Class 2 Aggregate Base.

20-15 Concrete Surfaces. All concrete curbs, gutters, aprons, patios, driveways and sidewalks which are broken, cracked or damaged by installation of the improvements shall be reconstructed by and at the expense of the Contractor, of the same kind of material and of the same dimensions as the original work, conforming to the requirements of the County Specifications. The repairs shall be made by removing and replacing the entire portions between joints or by removing the damaged portions by concrete saw and not be merely refinishing the damaged part. All work shall match the appearance of the existing improvements as nearly as practicable. Lamp black or other pigments may be added to the concrete to obtain the necessary result.

20-16 Landscaped or Cultivated Areas. All excavations or trenches in landscaped or cultivated areas shall have the top twelve (12) inches backfilled with top soil. The top soil shall consist of fertile, friable soil of loamy character conforming to the requirements of Section 21-2.02C of the State Standard Specifications or as specified in the Special Provisions. With specific approval from the District, the Contractor may use top soil taken from the excavation. After installation, the top soil and any adjacent unimproved land which has been compacted by the operations of the Contractor shall be thoroughly scarified and the surface cleared of all large clods, stones or debris.

PART E – STANDARD DRAWINGS

SD-1	½" & 1" Metered Service Installation (For Domestic Service Connections Only)
SD-2	1-½" & 2" Metered Service Installation (For Domestic Service Connections Only)
SD-3	4", 6", 8" Fire Flow Meter Installation
SD-4	3", 4", 6", 8" Domestic Service Compound Meter Installation
SD-5	Hydrant and Air Release Valve Visibility, Clearance, & Protection
SD-6	Fire Hydrant Installation
SD-8	Air Release Valve Installation
SD-9	Typical Thrust Blocking Details
SD-10	Fire Sprinkler Connection
SD-11	Residential Domestic Fire Sprinkler Service (with Backflow Prevention Device)
SD-12	Private Fire Protection Detail Class I & II Fire Sprinkler System
SD-13	2" Blow Off Installation (End Main)
SD-14	2" Blow Off Installation (Low Point)
SD-15	Tracing Wire Detail
SD-16	Water System Legend and Staking Procedure
SD-17	Sample As-Built
SD-18	Standard Trench Detail
SD-19	Water Main Installation under Storm Drain and Sewer
SD-20	Required Separation between Water Mains & Sanitary Sewers
SD-21	Special Construction Requirements for Water Mains
SD-22	Facility Standards
SD-23A	Dual PFP and Domestic Service Meter Installation
SD-23B	Dual PFP and Domestic Service Meter Installation
SD-24	PFP and Dual Domestic Service Meter Installation

