SECTION 3 - CONSTRUCTION METHODS AND CONTROL

3-01 INSPECTION

The construction of any water system improvement intended for dedication to the SBMWD shall be subject to inspection by SBMWD. Such inspection will assure the SBMWD that all phases of the work are in compliance with these approved specifications and plans. The inspector will be the representative of the SBMWD and shall coordinate the various responsibilities of the utility throughout the work.

The SBMWD shall have access to the work and shall be furnished with every reasonable facility for ascertaining full knowledge of the progress, material, and workmanship used to complete the work. The SBMWD shall be given 48-hours advance notice of major phases of construction for purposes of inspection unless noted otherwise on the construction drawings. All material shall be inspected prior to placement and all workmanship shall be visually inspected prior to backfilling. Reasonable aid shall be given to ascertain the exact location of all work.

The inspection of the work shall not relieve the Contractor of any obligation to complete the work as prescribed by these specifications. Defective work shall be made good and unsuitable materials may be rejected notwithstanding the fact that such defective work and unsuitable materials have been previously accepted by the SBMWD.

The SBMWD shall have the authority to suspend the work wholly, or in part, for such time as it may deem necessary due to the failure of the Contractor to perform any provisions of the plans or specifications. The work can only continue when the defective material or method is recognized as corrected by the SBMWD.

3-02 PRECONSTRUCTION DETAILS

3-02.01 PERMITS AND LICENSES

The Contractor shall have a Class "C-34" or Engineering "A" Contractor’s License valid in the State of California and shall meet all the applicable requirements of the SBMWD. The Contractor shall have a current, valid City of San

Bernardino Business License. The Contractor shall obtain all necessary permits, licenses, or agreements required by any legally constituted agency. A street cut permit from the City Engineer shall be required for excavation in the public right-of-way within the City of San Bernardino. A copy of all licenses and permits required for the project shall be provided to the SBMWD prior to starting work.

The Contractor shall observe all safety procedures as required by CAL-OSHA. All provisions of these permits, licenses, or agreements shall be binding upon the Contractor as though stated herein. The SBMWD will not be responsible for actions involving the agencies controlling such permits, licenses, or agreements.

3-02.02 TRAFFIC CONTROL

The Contractor shall furnish all materials, labor, and traffic controls necessary to safeguard the work and the public safety.

Traffic and pedestrian control shall comply with the applicable provisions as contained in the latest edition of the Manual of Traffic Controls - Warning Signs, Lights, and Devices for the Use in Performance of Work Upon Highways. All traffic control plans shall be reviewed and approved by the City.

3-02.03 SURVEYING

The Contractor shall provide equipment, method, and labor to locate accurately all proposed water facilities. The Contractor shall further guarantee the accurate location of all water facilities by constructing curb and gutter prior to the beginning of any water improvements. If, in the opinion of the SBMWD, this sequence of construction cannot be followed, the Contractor will sign a "Waiver of Curb and Gutter Requirements" and assume all responsibility and costs for correcting any resulting errors or omissions.

Contractor shall be required to submit cut sheets for all pipelines and appurtenances from the Surveyor in accordance with the shop drawings requirements listed in Section 2-5.4 of Section 1, of these Specifications.

3-03 REMOVALS AND TRENCH EXCAVATION

3-03.01 REMOVAL OF PAVEMENT

a. Furnish all labor, material, equipment, and incidentals required to remove and properly dispose of the entire section of pavement over the trenches used to install the water mains on the attached Plans.

b. Furnish all labor, material, and equipment necessary to remove and dispose of all excess spoil after the ground asphalt has been returned to the trench for use as a temporary driving surface until main construction is complete.

c. Furnish all labor, material, and equipment necessary to maintain all ground pavement surfaces free from potholes and large loose gravel areas.

d. Furnish all labor, material, and equipment necessary to remove any and all concrete underlayment beneath the pavement as encountered during the pavement removal process.

e. Use locally available materials and aggregate gradations that exhibit a satisfactory record of previous installations. Any imported material, necessary to fill potholes or soft spots in the ground trench, shall comply with "Green Book" requirements for Class II base.

f. Layout and Alignment

The Plans contain enough information for the Contractor to determine horizontal and vertical controls within the tolerances required by the SBMWD. The Contractor may elect to contact the surveyor of record directly for construction staking services (at no additional expense to the owner) or supply an alternate method of laying out the project. It is the sole responsibility of the Contractor to layout the pipeline in the field. All cut sheets or survey notes generated during the process of laying out the pipeline must be submitted to the SBMWD for their records.

g. Asphalt Removal

Asphalt shall be removed by either of the following two methods:

Grinding
Saw-cut and removal

Whether the pavement is cut or ground, the machine must cut entirely through the pavement before removal takes place.

At the end of each business day and upon completion of work, all driving surfaces shall have the following characteristics:

The uncut pavement surface shall be clear of all loose material.

The cut trench shall be approximately level with the surrounding area.

All surfaces shall be free of soft or loose material.

h. Concrete Removal and Pavement – It is the opinion of the SBMWD that the roadbed may contain concrete underlayment. The following process shall be followed whenever concrete underlayment is encountered:

When concrete underlayment is encountered, it shall be clearly marked so that the area of concrete removal can be clearly calculated.

The Contractor shall meet the SBMWD Representative in the field and review the concrete prior to removal.

The Contractor shall submit an invoice to the SBMWD clearly identifying the concrete needing removal (from station to station in a specific street), the area of concrete, the unit price for removal submitted on the bid schedule, and the total price for each section of concrete.

The SBMWD will then review the invoice and provide the Contractor with written permission to proceed with concrete removal.

Payment for concrete removal will be issued upon verification of the completion of work.

The unit price provided the SBMWD on the bid schedule shall include removal, disposal, and overhead profit. The unit price shall apply to all concrete regardless of condition or thickness.

Disposal of concrete shall be done in a safe and legal manner.

It is the opinion of the SBMWD that the Contractor may encounter the removal of concrete underlayment on this project. For the purpose of this Specification, the Contractor shall include in the base bid the amount of concrete removal as stated in the bid proposal documents. The SBMWD will add or deduct from the Contract the number of square feet, greater or less than the amount stated in the bid proposal documents, based on the unit price in the bid schedule.

i. Maintenance – Upon completion of the asphalt removal, the Contractor shall maintain all surfaces free from potholes and large loose gravel areas until the final pavement is placed.

3-03.02 REMOVAL OF UTILITIES

Utilities shall be removed only as stated on the construction plans. Structures or piping not shown on the construction plan shall be brought to the attention of the SBMWD. Disposition of these structures shall be determined by the SBMWD prior to proceeding with the work.

The Contractor shall notify and coordinate with representatives of any utility which must be removed or relocated.

3-03.03 TRENCH EXCAVATION

Trench excavation shall include any excavation in which the depth is greater than the width at the bottom of the excavation. Such excavations as required for vaults, thrust blocks, boring pits, and service laterals shall be considered as trench excavations. All earthen material and water that will interfere with the placement of the pipe shall be removed. Contractor shall use sufficient means to protect any existing utilities from damage during trench excavation. Contractor shall also use Best Management Practices (BMP) to prevent silt, mud, or other pollutants from entering storm drains or catch basins as a result of trenching or excavating activities.

SECTION 3 - CONSTRUCTION METHODS AND CONTROL

All excavation, trenching, backfilling, and pavement refurbishing of existing and proposed streets shall be performed in accordance with California Code of Regulations, Title 8 (Cal/OSHA), San Bernardino City Public Works requirements, or any other agency having jurisdiction, except as noted in these specifications.

In case of conflict in requirements for excavation, trenching, and backfilling between these specifications and any statutes, laws, ordinances, rules, regulations, and/or specifications of any political subdivision or agency having jurisdiction, it shall be understood that the more exacting requirements shall govern. In general, these specifications will apply in City of San Bernardino right-of-ways and easements while the aforementioned statutes, laws, ordinances, rules, regulations, and specifications of any political subdivision or agency having jurisdiction will apply within the political boundaries of public right-of-ways to which they apply.

The maximum length of open trench shall be 500 feet or the length of pipe installed in one day, whichever is greater. An open trench of up to 1,000 feet is permissible only in areas not subject to public traffic. The width of the trench at the bottom of the excavation shall not exceed twelve (12) inches on either side of the pipe. Bell and coupling holes shall be used as required to complete a satisfactory pipe joint.

Water main installation will not be permitted until subgrade is established and the storm drain and sewer installation have been completed. Pipe shall be placed to the grade and depth specified on the construction drawings. When not specified, pipe shall be placed as follows:

a. Right-of-Way Without an Established Street Grade

A sixty (60) inch minimum depth of cover shall be maintained over any pipe where there is not an established street grade. The Engineer shall consider possible, and probable, future development and grading to achieve the minimum depth of cover as described in Section 3-03.03 b and following development of the area.

b. Right-of-Way With an Established Street Grade

Right-of-Way (Feet)	Pipe Diameter (Inches)	Minimum Depth of Cover (Inches)
Sixty (60) or less	Twelve (12) and smaller	Thirty-six (36)
Sixty (60) or less	Greater than twelve (12), Less than twenty-four (24)	Forty-two (42)
Sixty (60) or less	Twenty-four (24) and greater	Forty-two (42)
Greater than sixty (60)	Eight (8) and smaller	Thirty-six (36)
Greater than sixty (60)	Greater than eight (8), Less than twenty-four (24)	Forty-two (42)
Greater than sixty (60)	Twenty-four (24) and greater	Forty-two (42)

In all cases pipe shall be installed so that there is a minimum of thirty-six (36) inch cover between top of pipe and top of finished pavement.

The minimum cover and clearance herein stated applies to construction where there are existing underground facilities. These minimums are not intended as "design minimums" where all new underground facilities or two or more conflicting facilities are installed at the same relative time. The design shall

attempt to maximize clearance between conflicting facilities and provide standard cover as the minimum.

The trench bottom shall be graded to provide a smooth, firm, and stable foundation which is free of rocks and other obstructions. All soft, spongy, and unstable material shall be over excavated to a depth of two (2) feet, replaced with backfill material per Section 3-08 of these specifications, and compacted to provide a firm and stable foundation. All rocks or cobbles one (1) inch or greater in any dimension shall be removed to a depth of six (6) inches below pipe grade and replaced with compacted backfill material.

The Contractor will pothole all existing utilities, regardless of whether they are shown on the construction drawings, far enough in advance of construction to allow minor grade adjustments of pipe to avoid local high points.

All excavation shall be performed to the depths and alignment indicated on the construction drawings regardless of subsurface condition, or special circumstances unless otherwise authorized by the SBMWD. During excavation, material suitable for backfilling shall be piled in an orderly manner, a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. Roads, driveways, and pedestrian walkways shall not be obstructed by spoils or pipe. All excavated materials not required or not suitable for backfill shall be removed and disposed of by the Contractor at no expense to the SBMWD.

The width of the trench at the top level of the pipe shall be in accordance with the following table:

PIPE SIZE-INCHES INSIDE DIAMETER	NOMINAL TRENCH WIDTH-INCHES
2	24
4	28
6	30
8	32
10	34
12	36
14	38
16	40
20	40
24	48
30	54
36	60

Where the bottom of the trench is in rock, large boulders, hard materials, or when other utilities are encountered near the pipe alignment, the trench shall be excavated six (6) inches below the bottom of pipe elevation. Where the trench has been excavated below grade for any purpose, the trench shall be refilled to the proper trench grade with selected backfill material or SE 30 Sand and compacted to ninety percent (90%) of its maximum density as determined by ASTM 1556 and D 1557. (The SBMWD may, based on State, County, and/or City compaction requirements, modify this requirement. At no time shall the pipe be installed within a six (6) inch radius of a large rock or hard surface).

Excavation for the placement of concrete for structural support and thrust blocks shall be finished by hand in order to ensure a solid undisturbed native surface.

3-04 CONNECTION TO EXISTING FACILITIES

3-04.01 GENERAL

The Contractor shall make connection to the existing public facilities as shown on the construction drawings. All connections must be made under inspection by a SBMWD representative. The Inspector shall consider the means of chlorinating those sections of main, fittings, or valves in contact with the public system. When such connection provides a direct closure between the existing public system and that under construction, such valves shall become the property of the SBMWD and shall be operated only by the SBMWD. Test plates or the construction of a "physical disconnect of pipe" is required at all times during construction and prior to final tie-in of pipe.

3-04.02 HOT TAPPING

Steel, cast iron, ductile iron, or asbestos cement pipe can be tapped under pressure by the Contractor. The exterior surface of the pipe shall be cleaned to provide a smooth surface for the tapping sleeve. The tapping sleeve shall be secured to the pipe to prevent movement during the tapping process. Tapping contour nozzles shall be welded on. The SBMWD shall determine the necessity and requirements for a "doubler" or full wrap of pipe around the existing pipe. A full wrap nozzle shall always be required when the diameter of the tap is equal to the diameter of the existing pipe to be tapped.

3-04.03 SHUTDOWN OF MAIN

All work necessary to shut down an existing public water main for the benefit of a Contractor shall be by SBMWD Distribution personnel and shall require prior approval by the SBMWD. Unless under the direct supervision of the SBMWD Inspector, under no circumstances shall the Contractor operate valves, hydrants, and other appurtenant equipment on the

existing public system. It shall be the Contractor's responsibility to coordinate the necessary shutdown schedules through the SBMWD Inspector assigned to the project. Scheduled shutdowns shall require sufficient time to allow operations personnel to review, approve, and develop an appropriate Operation Program. The Contractor shall be responsible for coordinating all schedule deviations, which may occur from time to time with the SBMWD Inspector.

The SBMWD will make a concerted effort to isolate the system as planned with the Contractor. However, the Contractor shall be prepared to employ pumping equipment if a water tight seal cannot be achieved. SBMWD will not be responsible for any delays or extra work claims associated with system shutdown and isolation.

All emergency situations shall be reported immediately to the SBMWD (24-hour emergency number (909) 384-5141. When extensive main shutdown is required, the SBMWD will determine what temporary service connections may be required. The SBMWD shall furnish all necessary hose, piping, valves, water trucks, and associated labor required to provide such temporary service. All piping, hoses, and associated equipment used in temporary service connections shall be flushed and disinfected in accordance with Section 3-10, TESTING, DISINFECTION, AND FLUSHING.

3-05 LAYING OF DUCTILE IRON PIPE WATER MAIN

3-05.01 GENERAL

Installations of pipe and fittings shall be in accordance with AWWA Standard C600, “Installation of Ductile Iron Water Mains and Their Appurtenances” and the pipe manufacturer's installation manual. The DIPRA Publication “Guide for the Installation of Ductile Iron Water Mains” shall be used for details of pipe installation practice except as follows and where noted otherwise on plans.

Water mains constructed parallel to sanitary or storm sewers shall be installed to provide a ten (10) foot minimum horizontal separation between the outside wall of the water main and the outside wall of the sanitary or storm sewer. In addition, installation shall comply with Standard Drawing W5.1.

Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe laying crew cannot put the pipe into the trench and in place without getting soil into it, the Engineer may require that before lowering the pipe into the trench, a temporary plug be placed over each end and left there until the connection is to be made to the adjacent pipe. During laying operations, no debris, tools, clothing, or other materials shall be left in the pipe.

At times when pipe laying is not in progress, the open ends of pipe shall be closed by watertight plug or other means approved by the Engineer. This provision shall apply during the lunch hour breaks as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped.

The cutting of pipe for inserting tees, fittings, or closure pieces shall be done in a neat workmanlike manner without damage to the pipe or cement lining and so as to leave a smooth end at right angles to the axis of the pipe. No pipe shall be laid in water or when, in the opinion of the Engineer trench conditions are unsuitable. Field welding of Ductile Iron Pipe for repair or for joining is prohibited.

3-05.02 THRUST RESTRAINT

The Contractor shall be responsible for anchoring the pipe and fittings against movement due to water pressure. The materials specified in Section 2-12 will be used for restraining any movement of underground piping systems. In general, thrust

blocks are unacceptable as restraint devices to SBMWD. When approved by the SBMWD, concrete thrust blocks shall be poured in place against an undisturbed earth-bearing surface. Concrete shall be placed so as not to interfere with the fitting joint. Concrete shall be per Section 2-12.04. Thrust block locations and dimensions shall be per Standard Drawings W6.4A and Section 2-12.04 of these specifications.

3-05.03 STANDARD ASSEMBLIES

Fire hydrants shall be constructed per Standard Drawing W2.2 and Section 2-07 of these specifications.

Fire Hydrants shall be placed at a location shown on the construction drawing or as directed by the Inspector. The determination will be based on specific locations which, in the opinion of the inspector, could result in potential hazard from the fire hydrant being hit and broken, such as closeness to overhead power lines or water damage to property.

Water valves shall be installed at locations shown on the construction drawing or as directed by the SBMWD. Valves shall be set plumb and shall be stabilized and supported separately from the pipeline. Information regarding size, type, make, and number of turns to close shall be witnessed by the SBMWD. All valves shall be covered with a valve box assembly. Valve boxes shall be plumb, centered over the valve nut, and supported separately from the valve body per Standard Drawing W3.1. Valve boxes shall be lowered to below paving grade level prior to street paving and after final grade has been established and raised flush. In any event, Contractor shall ensure that all valve boxes will provide access to the operation of the valve by the SBMWD personnel. Valve boxes shall be flagged and barricaded during construction to divert traffic around their location. All valves located outside of the roadway shall have a blue

Carsonite marker placed adjacent to the valve can per Standard Drawing W3.1.

3-05.04 PROTECTION AND CLEANING OF PIPE AND FITTINGS

The Contractor shall take extreme care to insure cleanliness and protection of the inside coatings of all piping and fittings. The interior surfaces of all pipe, fittings, and other appurtenances shall be kept free of dirt or foreign matter at all times. In the event that any foreign matter has entered the pipe, the Contractor shall thoroughly remove all foreign matter and clean the pipe to the satisfaction of the Engineer. All lumps, blisters, excess lining, and coating materials shall be removed from the flanged end or bell and spigot end of each pipe or fittings. The outside of the spigot and the inside of the bell shall be wire brushed and wiped clean and free from oil and grease before the pipe is laid.

3-05.05 HANDLING PIPE AND OTHER MATERIALS

Proper implements, tools, and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe and convenient prosecution of the work. All pipes, fittings, and valves shall be carefully lowered into the trench in such a manner as to prevent damage to water main materials and protective coatings and linings. Under no circumstances shall water main materials be dropped or dumped into the trench.

3-05.06 PROTECTION OF METAL SURFACES

All noncoated surfaces of the valves, flanges, bolts, nuts, tie-rods, turn buckles, etc. in contact with the earth and backfill materials shall be coated with a minimum of 30 mils of bitumastic coating prior to backfilling.

3-06 LAYING OF PVC PIPE WATER MAIN
(NOT USED)

3-07 SERVICE LATERALS

3-07.01 GENERAL

One (1) inch, one and a half (1-1/2) inch, and two (2) inch diameter service laterals shall be installed per Standard Drawing W1.1 and W1.2, respectively. The service lateral shall consist of the double strap service saddle, corporation stop, angle meter valve, meter, meter box and lid, and Type K copper tubing. Service laterals shall be installed perpendicular to the centerline of the street.

Meters and meter boxes shall be supplied by the SBMWD and installed by the Contractor. Meter boxes located in areas subject to traffic loading or located within traffic areas shall be installed with an approved traffic bearing lid.

Special consideration shall be given to backfill and compaction in the area adjacent to the copper tubing that is "snaked" in the trench. The area adjacent to the tubing shall be considered to extend not less than four (4) inches below and (four) 4 inches above the copper tubing and shall include the entire width of the trench. Backfill material shall be compacted under the service lateral so as to create a firm laying bed prior to placing and compacting any material over the top of the lateral. Compaction of backfill material by mechanical means directly over the exposed service tubing shall not be allowed until six (6) inches of cover has been achieved.

For replacement projects, the Contractor shall be responsible for proper abandonment per Standard Drawing W1.16, including cut and cap at the main, of existing services and laterals under the direction of the SBMWD.

Some water service connections may require the installation of a backflow device in accordance with Section 5 of these specifications.

3-07.02 IRRIGATION SERVICES

Services installed for the primary purpose of providing irrigation of landscapes or commercial crops, and which may have booster pumps downstream of the meter, shall conform to the following requirements:

1. A hydraulically actuated, slow open/close valve shall be provided immediately downstream of the pump or a surge tank, properly sized and approved by the SBMWD.

2. A Reduced Pressure Principle (RPP) type backflow preventer will be required immediately downstream of the flow meter.

3-08 PIPE BEDDING AND BACKFILLING OF TRENCH

The Contractor shall backfill the pipe trench as soon after placement of pipe as practical with due regard of the requirements in this Section. All fittings, valves, utility crossings, and assemblies shall be visually inspected by the Engineer prior to backfilling. Pipe bedding shall be defined as that material supporting, surrounding and extending to a minimum of twelve (12) inches above the top of pipe and shall consist of imported sand Native free draining material having a sand equivalent (SE) of not less than thirty (30) or other material may be substituted only when approved by the Engineer. All backfill for pipe or conduit shall be densified to a relative compaction of 90 percent minimum by water densification, mechanical tampers or rollers, or other mechanical means in accordance with ASTM D1556 and ASTM D1557 and the maximum particle size shall not exceed one (1) inch. No hard sharp or otherwise objectionable objects shall be placed within a six (6) inch radius of the exterior of the pipe. Reference is made to Standard Drawing W5.1.

All buried valves and fittings are to be backfilled with clean sand. The sand shall be installed in such a manner that after compaction no earth or other backfill will be less than six (6) inches from any part of the valve, fitting, flanges, bolts, or nuts. The sand shall be compacted as specified for other backfill.

Air Voids - Special attention shall be given to the underside of the pipe during construction to ensure full compaction and to avoid the possibility of air voids in the soil.

Compaction Tests - The backfill soil shall be tested for compaction at a minimum rate of one test every 300 feet for every 2 feet of fill. Additional tests may be required at the discretion of the Engineer. If test results indicate a lower than acceptable density, additional compaction will be required and retesting taken under the direction of the Engineer. All compaction testing and associated reports shall be completed at no cost to the SBMWD. Copies of compaction tests and written results shall be provided to the Engineer within three (3) working days of the compaction test.

Damage Assessment - Where trench settlement occurs or where it is determined that damage is caused by inadequate compaction in a trench, the Contractor shall reopen the street and recompact the backfill material to an acceptable level. The Contractor shall repair all damage at no cost to the SBMWD.

Non-Compactable Soils - For the purpose of this specification, "non-compactable soils", shall be defined as follows: Soils that are made up primarily of fines that when compacted do not compact down to the required 90 percent compaction, regardless of the energy put into compaction. This condition must be determined by the Engineer after at least 1/2 hour of observation of the compaction and after consulting with the Soils Engineer.

When "non-compactable soil" is encountered, the Contractor shall notify the Engineer immediately to determine if it meets the definition. Once the Engineer has determined that "non-compactable soil" exists, he shall authorize the Contractor to import Class II Base at the unit price defined in the Contract and bid documents. The soil conditions shall be reevaluated at least two (2) times per day by the Engineer to verify that it continues to meet the definition of "non-compactable soil".

It is the opinion of the SBMWD that the Contractor may encounter "non-compactable soil" on this project. For the purpose of this specification, the Contractor shall include in the base bid the amounts of "non-compactable soil" as stated in the bid proposal documents. The SBMWD will add or deduct from the Contract the number of linear feet, greater or less than the amount stated in the bid proposal documents, based on

the unit price in the bid schedule.

Sewer Laterals - It is the opinion of the SBMWD that the Contractor may encounter sewer laterals on this project. For the purpose of this specification, the Contractor shall include in the base bid the quantity of sewer lateral relocations stated in the bid documents. The SBMWD will add or deduct from the Contract the number of sewer lateral relocations, greater or less than the quantity stated in the bid documents, based on the unit price in the bid schedule.

Sewer laterals shall be replaced with like material placed on a fully compacted soil bed with a flexible coupling at each connection to the existing lateral.

All soil below and adjacent to sewer laterals shall be compacted to a minimum of ninety percent (90%).

3-09 REPAVING AND FINISHING

3-09.01 GENERAL

All pavement work shall be completed in accordance with these specifications and SBMWD Standard Drawing No. W5.1, whichever is more exacting. The Contractor shall furnish all labor, materials, equipment, and incidentals required to replace pavement removed over trenches and install approximately one (1) inch final cap, per Section 3-09.05. It is the responsibility of the Contractor to field measure the entire project. Should the lead agency require any other pavement cap other than the trench width itself and one (1) foot wide by one (1) inch deep beyond the edge of both sides of the trench, the Contractor shall provide the SBMWD a written notification of the change in square footage quantity. The change in quantity shall be multiplied by the add or deduct unit price provided in the Bid Schedule for an adjusted contract amount at the end of the project.

Furnish all labor, materials, equipment, and incidentals required to repair, replace, or restore streets, traffic stripping, drain ribbons, driveways, parking areas, or sidewalk pavements damaged or disturbed during construction.

All work shall be in a manner satisfactory to the SBMWD.

3-09.02 REFERENCE SPECIFICATIONS

Except as otherwise specified herein, the current Standard Specifications for Construction, (a.k.a. "Green Book"), shall apply to materials and workmanship required for the work of this Section.

3-09.03 MATERIALS

A. Use locally available materials and aggregate gradations that exhibit a satisfactory record of previous installations and as follows:

(1) Tack Coat: Per "Green Book" Section 302-5.4 either AR/4000 or Grade SS-1h.

(2) Asphalt Cement: Per "Green Book" Section 203-6 having the following Specifications:

a. Asphalt shall consist of AR 4000 oil as defined in Section 203-1.

b. Aggregate for base pavement shall consist of 3/4" crushed rock as defined in Section 200-1, Table 200-1.2(A).

c. Aggregate for final cap shall consist of 3/8" crushed rock as defined in Section 100-1, Table 100-1.2(A).

B. Calcium chloride shall conform to AASHTO M144, Type I or Type II.

3-09.04 PREPARATION FOR PAVEMENT

Removal of Material - All cold mix asphalt and/or excess backfill material shall be removed from the compacted trench to a depth of 7" below finish grade or to a depth as required by the agency having jurisdiction over the pavement repairs.

Damaged Pavement – All damaged pavement adjacent to the edge of trench shall be saw cut and removed in rectangular sections beyond the limits of damage. The Contractor may, at the time of saw cut, review a specific damaged area in the field with the Engineer or distribution superintendent and receive approval for alternate removal methods. All material below the removed pavement area shall be excavated to a depth of 7" below finish grade.

Adding of Subbase Material - The trench shall be backfilled with Class II subbase and compacted to 95 percent compaction so that once compacted the elevation of the surface of the trench is equal to the bottom of the existing pavement or three (3) inch whichever is greater.

Should the lead agency responsible for the pavement repair require a section other than the one specified above, the contract amount will be adjusted only in accordance with the unit prices specified in the Bid Schedule as follows:

It is the opinion of the SBMWD that the Contractor will encounter the need for a pavement cap on this project. For the purpose of this specification, the Contractor shall include in the base bid the amount of pavement cap as stated in the bid proposal documents. The SBMWD will add or deduct from the Contract the number of square feet, greater or less than the number stated in the bid proposal documents.

3-09.05 PLACEMENT OF NEW PAVEMENT

Tack Coat – All surfaces of the existing pavement, which may come in contact with the new pavement, shall be clean, dry, and tack coated with tack coat as defined in Section 3-09.03, "Materials".

Base Pavement - Asphalt concrete as defined in Section 3-09.03, "Materials", shall be placed and compacted flush with existing pavement adjacent to the trench.

(1) Provide joints between old and new pavements and between successive days' work for continuous bond between adjoining works. Clean and dry contact surfaces and apply tack coat.

(2) Place mixture at not less than 260ºF (127ºC). Place each course to required grade cross-section and compacted thickness.

(3) All paving shall be compacted to a minimum of 95 percent using a smooth drum roller or approved equal.

(4) All Asphalt base pavement shall be placed by a self-propelled paving machine; use of a dump truck ditch gate is not an approved method.

Maintenance - The compacted pavement shall be maintained for thirty (30) days with regular traffic over it. At the end of the thirty (30) days period, the finished repaired surface shall not vary more than 1/8" above or 1/2" below the design grade for the base pavement.

Pavement Rework - If at the end of the thirty (30) days period the new pavement surface is outside the parameters stated in the above "Maintenance" paragraph C, the pavement shall be reworked in the following manner:

(1) The top three (3) inches of the newly installed asphalt shall be ground and the material removed.

(2) The remaining asphalt shall be compacted in place to achieve 95 percent compaction as measured at a depth of 4-1/2" below finish grade.

(3) All the newly ground dry surface shall then be tack coated and repaved as described above.

(4) The repaved section of trench shall be maintained for another thirty (30) days and then rechecked for conformance.

All pavement rework shall be at no additional cost to the SBMWD.

Final Cap Placement - Final pavement cap shall be hot-mixed asphalt concrete as defined in "Materials" Section 3-09.03. Area of overlay shall be clean, dry, and uniformly tack coated. Asphalt concrete overlay must extend at least one (1) foot laterally and five (5) feet longitudinally beyond edges of trench excavation and/or pavement damaged by trenching or remove full depth of asphalt concrete section within the same limits. For streets that have been resurfaced within the past three (3) years prior to this trench excavation (as identified by public works records), grinding shall be extended a minimum one (1) foot beyond the trench limits, or a full traffic lane width, which ever is greater. Asphalt concrete overlay shall be placed parallel to the centerline. The pavement cap shall be placed to provide a dense and smooth riding surface. Compaction of the pavement cap shall be obtained by means of at least one (1) 2-axle, self-propelled, steel wheeled, five (5) to eight (8) ton roller unless otherwise permitted by the Engineer.

(1) Begin rolling when mixture will bear roller weight without displacement. Repair surface defects with hot material as rolling progresses. Cut out and patch defective areas and roll to blend with adjacent satisfactory paving. Continue rolling until maximum density is attained and roller marks are eliminated.

(2) Protect paving from damage and vehicular traffic until mixture has cooled and attained its maximum degree of hardness.

3-09.06 ENVIRONMENTAL CONDITIONS

Dry Subbase - Whenever the subbase becomes dry enough to cause dust problems, spread calcium chloride uniformly over the gravel surface in sufficient quantity to eliminate the dust.

Subbase – Shall be free of standing water and shall appear dry prior to asphalt pavement. All pavement surfaces coming in contact with new pavement shall be clean and completely dry prior to tack coating. It is the responsibility of the Contractor to only place asphalt under the above conditions regardless of weather or other circumstances.

Cold Temperature - When the air temperature falls below 50°F, extra precautions shall be taken in drying the aggregates, controlling the temperatures of the materials, and placing and compacting the mixture. No mixtures shall be placed when the air temperature is below 40°F, or when the material on which the mixtures are to be placed contains frost or has a surface temperature not suitable to the Engineer.

Vehicle Traffic After Placement – No vehicular traffic or loads shall be permitted on the newly completed pavement until adequate stability has been attained and the material has cooled sufficiently to prevent distortion or loss of lines. If the climatic or other conditions warrant it, the period of time before opening to traffic may be extended at the discretion of the Engineer.

3-09.07 GUARANTEE

All pavement placed shall be maintained by the Contractor for a period of thirty (30) days. During this period all areas which have settled or are unsatisfactory for traffic shall be refilled and replaced.

3-10 TESTING, DISINFECTION, AND FLUSHING

3-10.01 GENERAL

The Contractor shall supply all material, labor, equipment and method necessary to conduct the required hydrostatic tests and flushing. All bacteriological tests shall be made by SBMWD Water Quality only and all bacteriological tests shall be performed at laboratories certified by the California Department of Health Services. All constructed facilities shall be isolated from the existing public system while being tested with the use of a test plate or “physical disconnect” of pipe.

3-10.02 HYDROSTATIC PRESSURE TESTING

Pressure and Leakage Test – After main, hydrant, and service lateral installation, backfill, and compaction is completed, but prior to connection to the City water system the pressure and leakage test procedures shall be followed.

Test pressure shall be 1.5 times the working pressure at the highest point along the test section. **(1.5 TIMES WORKING PRESSURE FOR THE PIPELINE SHALL BE NO LESS THAN 80 PSI.)**

The hydrostatic test shall be of at least 2 hour duration.

Test pressure shall not vary by more than 10± psi for the duration of the test.

All newly laid pipe shall be filled by a water truck or through an approved reduced pressure principal backflow device.

All air shall be expelled completely from the pipe, valves, hydrant, and service laterals. If permanent air release valves are not located at all high points, the Contractor shall install corporation cocks at such points so that the air can be expelled as the line is filled with water.

Leakage is defined as the quantity of water that must be supplied into the newly laid pipe to maintain pressure within ten (10) psi of the specified test pressure. Supply water shall be measured through an approved meter.

No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SD\sqrt{P\ (T)}}{133{,}200}$$

Where: L = Allowable leakage (in gallons)
S = Length of pipe tested (in feet)
D = Nominal Diameter of the pipe (in inches)
P = Average test pressure (in psi)
T = Time (in hours)

Should any test of a section of pipeline disclose leakage, the Contractor shall, at his own expense, locate and repair the defective joints until the leakage is within the permitted allowance described above. The pipe shall then be retested by the Contractor, at his expense.

3-10.03 DISINFECTION

3-10.03.1 GENERAL

All water mains, water services, attached appurtenances and connections shall be disinfected in accordance with AWWA Standard C651 "Disinfecting Water Mains", and as modified herein.

Contractor shall furnish all equipment, labor, materials, safety requirements, and water necessary for chlorinating and flushing the pipeline. Disinfection of new mains, including all chlorination, chlorine residual measurements, collection of samples, and certification of the pipeline disinfection shall be performed by trained personnel with a minimum of three (3) years experience. Gauges and apparatus used for chlorine injection shall bear the current State certification. The SBMWD shall collect the samples and a State Certified laboratory shall perform the bacteriological tests. All costs for disinfection, including laboratory retest fees, shall be paid for by the Contractor.

Contractor shall insure that all pipe, fittings, and appurtenances are kept free from dirt and foreign matter at all times. During construction all open pipe ends and fittings shall be fitted with a water tight plug. At the end of the work day the open pipe in the trench shall be plugged in an equally suitable manner.

The Contractor shall swab the interior surfaces of the new valves, pipes and appurtenances as well as interior surfaces of existing main; both upstream and downstream of the new pipe section, with a five percent concentration of hypochlorite disinfection solution before installation. During the chlorination or chlorinating process,

all valves shall be operated, and the chlorine solution shall be drawn through all laterals and appurtenances. Disinfection of mains and appurtenances, hydrostatic testing, and chlorine retention may run concurrently for the required minimum 24-hour period only if prior approval is obtained from the SBMWD.

In the event of leakage or where repairs are necessary, added disinfection shall be made only by injecting chlorine into the line whereby adequate mixing is assured. If the test results are not satisfactory, the Contractor shall provide additional disinfection, as required. Such additional disinfection shall be at the Contractor's expense.

Disinfection of pipelines shall be accomplished by chlorination using direct chlorine gas.

3-10.03.2 CHLORINE GAS FEED

The new system which is being disinfected shall be thoroughly pre-flushed, utilizing a minimum velocity of 2.5 feet per second throughout the entire system with a volume of three times the newly installed pipeline. The chlorinating agent shall be applied at a point not more than ten feet from the beginning of the section to be chlorinated and shall be injected through a two (2) inch flushing port, a hydrant, or other approved connection to ensure treatment of the entire system being disinfected. All required corporation stops and other plumbing materials necessary for chlorination or flushing of all parts of the main being disinfected shall be installed by and at the expense of the Contractor.

Chlorine gas shall be fed directly from the chlorine cylinder equipped with a suitable device capable of regulating the rate of flow and diffusion of gas within the pipe. Water shall be concurrently fed into the pipe at a rate which produces a residual between 50-70 (parts per million) PPM of chlorine in all sections of the pipeline and appurtenances being disinfected. Chlorinated water shall be retained in the system for a minimum duration of 24 hours to a maximum duration of 36 hours and shall produce at the end of the retention period not less than 1/2 dosage of chlorine in all sections of the pipeline being disinfected.

3-10.03.4 FINAL FLUSHING

Following the chlorination period of 24 hours, the newly laid line shall be thoroughly flushed to remove any foreign material. A suitable connection shall be provided by the Contractor at the end of each new line at the top of pipe large enough to achieve a flushing velocity in the line of at least five (5) feet per second.

Water shall be flushed from the line at its extremities and at all outlets until the chlorine residual of the water system being flushed is equal to or less than the distribution system level.

3-10.03.5 DISPOSAL OF TEST WATER

All water used in testing and disinfecting the portions of pipeline, including that used for retesting, shall be disposed of following such testing, retesting, and disinfecting by the Contractor at his sole expense. The

disposal of water shall, in all cases, be carried out in strict observance of the water pollution control requirements of the California Regional Water Quality Control Board - Santa Ana Region, 3737 Main Street, Suite 500, Riverside, CA 92501, Telephone (951) 782-4130.

For contracts administered by the SBMWD, the Contractor will be authorized to discharge under the National Pollution Discharge Elimination System (NPDES) permit issued to the SBMWD or Contractor if all requirements and procedures per such permit are followed. For all other projects, including Developer projects, Contractor or Developer shall obtain an NPDES permit and comply with that permit.

When necessary, the Contractor shall apply a reducing agent to the solution to neutralize residual chlorine remaining in the water. Additionally, the flow of water from the portions of pipeline shall be controlled to prevent erosion of surrounding soil, damage to vegetation, and altering of ecological conditions in the area and shall not contribute to silt, mud, debris, or other contaminants entering storm drains or surface waters.

The Contractor’s attention is directed to that portion of the pipe with a low elevation. All water used in testing and disinfecting in that portion of the pipe shall be pumped out by the Contractor, at his expense, as specified in the paragraph hereinbefore. The Contractor shall furnish and operate all necessary pumps, pipelines, valves, hoses and all other appurtenances needed for pumping out water from the said low portion.

3-10.03.6 BACTERIOLOGICAL TESTS

After the system has been flushed, the Contractor shall have tests conducted for chlorine residual by SBMWD Water Quality staff. Should the chlorine residual in any part of the disinfected system be higher than the distribution system level, the Contractor shall repeat the flushing procedure. If the chlorine residual, after flushing, is equivalent to the distribution system level, the Contractor may have SBMWD Water Quality staff proceed with the bacteriological tests. Samples shall be taken by SBMWD Water Quality Section or Engineer with at least one set of samples collected at 1,200 foot intervals along the new water main, plus one set at each dead-end main section, and at least one set from each branch (i.e., laterals four (4) inch and larger). The bacteriological sample shall be taken 24 hours after flushing. If bacteriological test results fail to pass the requirements, the Contractor shall take corrective actions and daily bacteriological sampling shall be continued until negative samples are demonstrated. All samples shall be collected and tested for bacteriological quality in accordance with *Standard Methods for the Examination of Water and Wastewater* and shall show the absence of coliform organisms.

All such testing will be conducted and paid for by the SBMWD; however, any retests that may be required will be at the Contractor's expense.

The following tests are required to provide information for water quality evaluation:

Presence/Absence of Total Coliform by any of the three methods: Multiple Tube Fermentation, Membrane Filtration, or Colilert/Colisure.

Report shall include:

a. Presence/Absence of Coliform Bacteria Count per 100 ml.

b. Total and Free Chlorine Residual, taken at time of sample collection.

All Coliform test results must be negative.

The results of these tests must be approved in writing by the SBMWD Water Quality Supervisor prior to activating any new water facilities. Should the test results from the State certified laboratory disclose that the water from the new line does not meet the above standards, the disinfection process shall be repeated until it meets the required standards.

Acceptance - The SBMWD will not accept the pipeline until backfill and pavement operations are complete, all gate valve boxes are raised to proper grade, and until the pipelines are proven free from leakage and other defects to the satisfaction of the SBMWD. The acceptance of the dedication of the water system by the SBMWD of the completed work as herein specified is subject to the written guarantee of the Contractor that any defects, excessive settlement of backfill, and/or leaks in such pipelines arising from defective workmanship or by any negligence of the Contractor which may develop within one (1) year from such acceptance, shall be repaired and made good by Contractor in accordance with the General Conditions and/or Developer-Installed Agreement.

3-11 SHEETING AND SHORING

All trench excavation shall be adequately protected to provide a safe working condition and protection to adjacent facilities and structures. The Contractor shall work in such a manner and install such protective devices, shoring, and bracing to comply with all rules, regulations, and orders of CAL-OSHA, Division of Industrial Safety.

Prior to any trench excavation where the depth is more than five (5) feet, the Contractor shall submit a detailed plan in accordance with Section 3-03.03 of these specifications to the SBMWD showing the design of shoring, bracing, sloping, or other provisions to protect the workers from the hazard of caving ground during the excavation of such trench. If the plan varies from the shoring system standards, the plan shall be prepared by a Civil or Structural Engineer registered in the State of California. No excavation shall start until the Engineer has accepted the plan and the Contractor has obtained a permit from CAL-OSHA, Division of Industrial Safety. A copy of the permit shall be submitted to the Engineer and available at the job site at all times.

Sheeting and shoring shall not place any undue strain on existing utilities or structures, nor on completed sections of construction. Sheeting and shoring may be removed during backfilling, provided adequate protection is provided at all times. The Contractor shall be responsible for any damage to existing utilities or structures due to placement, removal, or failure of any sheeting and/or shoring system. The Contractor shall repair or have repaired any damage as soon as practical.

3-12 JACKING OF STEEL CASING

Steel casing shall be placed at the location, elevations, and limits shown on the construction drawings. Any utilities or structures encountered, which will interfere with construction, shall be brought to the attention of the SBMWD. Only new steel casing shall be used for jacking. Jacking shall be at a rate that will not overstress the casing, causing failure. Any damage to the casing during placement of the pipe shall be brought to the attention of the SBMWD. The jacking and receiving pit shall be sheeted and shored as

required by CAL-OSHA and as provided in Section 3-11 of these specifications. The excavated area ahead of the casing shall not be larger than 0.1 foot greater than the outside diameter of the casing. Over excavation beyond the above described limits shall be sanded or pressure grouted as directed by the SBMWD. Sluicing or jetting ahead of the jacking casing shall not be permitted.

3-13 POLYETHYLENE PROTECTIVE WRAPPING

(NOT USED)

3-14 DEDICATION OF IMPROVEMENTS TO THE CITY

The SBMWD may serve temporary construction water through facilities installed by the Contractor. This use shall be permitted following written confirmations from the laboratory conducting bacteriological tests that all samples meet the requirements of the SBMWD and from the SBMWD. This use does not constitute acceptance of these facilities by the SBMWD.

The SBMWD will serve domestic water through facilities installed by the Contractor after the following items are received.

1. Written confirmation from the laboratory conducting bacteriological tests that all samples meet the requirements of the SBMWD.

2. Confirmation by the SBMWD that all water improvements have been constructed per applicable specifications and plans. Contractor shall be responsible to maintain accurate records of any changes made during the course of construction and shall submit such information to SBMWD.

3. Public Utility Easements dedicated to the City, as required to gain access to public water facilities located on private property.

4. Such agreements, fees, or other items as required by the SBMWD.

Prior to serving domestic water through the installed facilities, the Developer shall present all deeds or instruments of conveyance to the SBMWD and shall dedicate all water system improvements intended for public use to the

SBMWD. In addition, all service acquisition fees must be paid in full to the SBMWD prior to SBMWD providing domestic water service either through direct payment from the Contractor (non-deferred) or through escrow, by means of a mechanics lien recorded at the County placed by SBMWD on each parcel requiring service through a letter of guarantee signed and notarized by Contractor/Developer when service acquisition fees are deferred by the Contractor/Developer.

The Contractor shall warrant the quality of all material and workmanship for a period of one year from the date of acceptance of these facilities by the SBMWD. The Contractor shall make all repairs to facilities due to defect in material or construction method. Such repair shall not be the responsibility of the SBMWD. If the SBMWD representative should deem the repair of such defective work is an emergency situation, the Contractor shall be held liable for all costs required to correct such defective work.

3-15 RECORD DRAWINGS

The Contractor shall provide and maintain a complete, legible, and accurate record set of prints. Such prints shall be kept up to date as work progresses and shall be maintained at the job site during construction.

Record drawings shall be prepared in accordance with the Uniform Standards for Design and Construction and shall show all changes in the work constituting deviations from the original contract drawings. All conceptual or major design changes shall be approved by the SBMWD before implementing the change in the construction contract.

Upon completion of the work, all required information, dimensions, and adjustments to the original contract drawings shall be submitted to the SBMWD to be transferred to the record drawings. Facilities and items to be located and verified on the record drawings shall include the following:

a. Point of connections.

b. Utility locations.

c. Water Mains: Where deviations along installed water mains are more than 1/2 foot vertically and more than one (1)

foot horizontally, actual location (line and grade) shall be noted on the plans at intervals of 100 feet.

d. Services: Where service tie-in differs from the plan station by more than one (1) foot or when meter box is not perpendicular from the main, corporation stops shall be stationed. For all service lines that have directional changes, such as in the case of cul-de-sacs, the actual installation shall be noted regardless of field changes, and shall be adequately referenced to the satisfaction of the SBMWD Inspector.

e. Any material changes, including additions, deletions, and substitutions.

f. Other related facilities, as required by the SBMWD Inspector.

g. Contractor shall write on all sheets where the water improvements were built per plan that the construction was made “Per Plan”.

The SBMWD’s receipt and acceptance of all document submittals shall be a condition precedent to the release of the Contractor’s retention/final payment. For projects constructed by Developers, the SBMWD will not accept final conveyance of water system improvements to the SBMWD until approved record plans and other required documents per the Developer-Installed Agreement have been received and are correct.