

TESORO VIEJO



**TESORO VIEJO MASTER
MUTUAL WATER COMPANY**

STANDARD SPECIFICATIONS

April 2016

Prepared by:
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District Engineer

PREFACE

MADERA COUNTY DEPARTMENT OF PUBLIC WORKS



Ahmad M. Alkhayyat, R.C.E. 67605
Public Works Director



Date

These Standard Specifications are found to be acceptable and/or meet the design criteria and standards of Madera County

MADERA COUNTY FIRE PREVENTION FOR LAND DEVELOPMENT

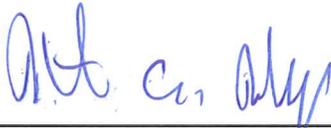


Deborah Mahler
Fire Marshal/Deputy Director



Date

TESORO VIEJO MASTER MUTUAL WATER COMPANY



Keith A. Jolly, P.E. 82923
District Engineer



Date

TESORO VIEJO MASTER MUTUAL WATER COMPANY
STANDARD SPECIFICATIONS

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APPENDIX 163

GENERAL PROVISIONS

SECTION 1 - DEFINITIONS AND TERMS

1-1 General

Unless the context otherwise requires, wherever in these Standard Specifications and other contract documents the following terms, or pronouns in place of them, are used, the intent and meaning shall be interpreted as provided in this Section 1.

Reference to a particular section in these Standard Specifications is made by section number without denoting “of these Standard Specifications.” Reference to standard specifications or standards of other agencies or organizations is so noted. See Section 4-8, “Incorporation of Referenced Specifications.”

Where used in these Standard Specifications or any referenced Specifications, the following abbreviations shall have the titles affixed thereto in the table below.

AAN	American Association of Nurserymen.
AASHTO	American Association of State Highway and Transportation Officials.
ACI	American Concrete Institute
AISC	American Institute of Steel Construction.
AISI	American Iron and Steel Institute.
ANSI	American National Standards Institute.
APHA	American Public Health Association.
API	American Petroleum Institute.
AREMA	American Railway Engineering and Maintenance-of-Way Association.
ASME	American Society of Mechanical Engineers.
ASTM	American Society for Testing and Materials.
AWG	American Wire Gage.
AWPA	American Wood-Preservers' Association.
AWS	American Welding Society.
AWWA	American Water Works Association.
EIA	Electronic Industries Association.
IEEE	Institute of Electrical and Electronics Engineers.
NEMA	National Electrical Manufacturers Association.
UL	Underwriters' Laboratories Inc.

1-2 Acceptance

The formal acceptance by the TVMMWC of an entire contract, which has been completed in all parts and requirements in accordance with the Plans and Specifications and any modifications thereof, previously approved. The “Notice of Completion” shall mean the document recorded with the Madera County Recorder indicating the formal acceptance of a specified Contract.

1-3 Bidder

Any individual, firm, partnership, corporation, or combination thereof, submitting a proposal for the work contemplated, acting directly or through a duly authorized representative.

1-4 California Manual On Uniform Traffic Control Devices (California MUTCD)

The California Manual on Uniform Traffic Control Devices for streets and highways, dated 2014, and amendments thereto. Supersedes the MUTCD and MUTCD California Supplement.

1-5 District (Owner)

The Tesoro Viejo Master Mutual Water Company, California, acting as a municipal corporation and/or a trustee for improvement districts within the Tesoro Viejo Specific Plan. The term “Owner” and “TVMMWC” shall have the same meaning.

1-6 Completion

- A. For purposes of a Notice of Completion and Civil Code sections 3082-3106 and 3179-3214, “completion” means the date of acceptance of the Work as complete by the TVMMWC, pursuant to Civil Code section 3086.
- B. For purposes of retention release under Public Contract Code section 7107, “completion” means any of the following:
 - 1. The occupation, beneficial use, and enjoyment of a work of improvement, excluding any operation only for testing, startup, or commissioning, by the District, or its agent, accompanied by cessation of labor on the work of improvement.
 - 2. The acceptance by the District, or its agent, of the work of improvement.
 - 3. After the commencement of a work of improvement, a cessation of labor on the work of improvement for a continuous period of 100 days or more, due to factors beyond the control of the contractor.
 - 4. After the commencement of a work of improvement, a cessation of labor on the work of improvement for a continuous period of 30 days or more, if the District files for record a notice of cessation or a notice of completion.
- C. For all other purposes (including but not limited to assessment of liquidated damages), “completion” means the point where Contractor has fully and correctly performed all Work in all parts and requirements, a Final Inspection has been made, all corrective and punch list Work has been performed, and the Engineer has certified that the Work is ready for acceptance by the TVMMWC. “Completion” does not mean substantial completion or any other form of partial or insufficient performance of the Work

1-7 Contract

The written agreement covering the performance of the work and the furnishing of labor, materials, tools and equipment in the construction of the work. The Contract shall include the Agreement, Notice Inviting Bids, Proposal, Plans, these Standard Specifications, the Contract Specifications, Contract Bonds, Permits, any and all supplemental agreements amending or extending the work contemplated and which may be required to complete the work in a substantial and acceptable manner. Supplemental agreements are written agreements covering alterations, amendments or extensions to the contract and include contract change orders.

1-8 Contract Specifications

The booklet containing the Notice Inviting Bids, Proposal Form, Reference to Standard Specifications, Special Provisions, Technical Provisions (where used), Proposal Requirements and Conditions, Description of Bid Items, Appendices, and any other documents which may be added to the booklet.

1-9 Contractor

The person or persons, firm, partnership, corporation, or combination thereof, private or municipal, who have entered into a contract with the TVMMWC, as party or parties of the second part or their legal representatives.

1-10 Days

Unless otherwise specified in these Standard Specifications or the Contract Specifications, “days” mean calendar days.

1-11 Encroachment

Any structure or object of any kind or character placed, without the authority of law, either in, under, or over any TVMMWC right-of-way. An encroachment can include, but not be limited to, any tower, pole, pole line, pipe, pipeline, driveway, fence, stand, private roadway, billboard or sign.

1-12 Engineer

The TVMMWC District Engineer, acting either directly or through properly authorized agents, the agents acting within the scope of the particular duties delegated to them.

1-13 Engineer's Estimate

The list of estimated quantities of work to be performed as contained in the Proposal Form.

1-14 Extra Work

Any obligations, construction, or service outside the scope of the contract.

1-15 Finish Grade

The elevation or slope shown on the plans assigned to the design finished surface of an improvement, including earthwork which will receive no paving or other surfacing, after all work on the improvement has been completed.

1-16 Grading Plane

The surface of the basement material (subgrade) upon which the lowest layer of subbase, base, pavement, surfacing or other specified layer is placed.

1-17 Inspector

A duly authorized agent of the Engineer.

1-18 Laboratory

Established commercial laboratories authorized by the TVMMWC to test materials and work involved in the contract.

1-19 Legal Holidays

Those days designated as TVMMWC holidays as designated by the TVMMWC in observance of which TVMMWC offices are closed.

1-20 Line and Grade

The term used to describe the horizontal and vertical lines, elevations and slopes shown on the plans to which all improvements and earthwork are to be constructed.

1-21 Liquidated Damages

The amount prescribed in the Contract Specifications to be paid to the TVMMWC or to be deducted from any payments due or to become due the Contractor for each day's delay in completing the whole or any specified portion of the work beyond the time allowed in the Contract Specifications.

1-22 Manual On Uniform Traffic Control Devices - California

The California Manual on Uniform Traffic Control Devices for streets and highways, (California MUTCD), dated 2014, and amendments thereto. Supersedes the MUTCD and MUTCD California Supplement.

1-23 Pavement

The uppermost layer of material placed on the traveled way or shoulders. This term is used interchangeably with surfacing.

1-24 Permit

As used in these Standard Specifications, the document issued by a jurisdictional agency specifying the terms and conditions under which the permittee is authorized to perform certain work typically associated with a Contract awarded by the TVMMWC. Permits may be issued by one or more agencies which have jurisdiction by law or by ownership over various aspects of the work. Permits may take the form of providing authorization to perform general roadwork, to install, construct, or repair certain encroachments, or govern such things as air pollution and storm water pollution prevention. The term "Encroachment Permit" describes the permit issued by the TVMMWC Engineering Division and does not apply to Building Permits issued by the County of Madera Building Division. See Section 1-11, "Encroachment."

1-25 Permittee

The person or persons, partnership or corporation, private or public, who has obtained a permit from the TVMMWC or other jurisdictional agency and who has agreed to do work encompassed by said permit in conformance with the requirements thereof.

1-26 Plans

The official Construction Plans which show the location, character, dimensions and details of the work to be performed. Standard Drawings (sometimes referred to as Standard Plans), profiles, typical cross sections, working drawings and supplemental drawings, or reproductions thereof, approved by the Engineer, are to be considered as a part of the Plans. As used in this definition, the term Standard Drawings refers to the Tesoro Viejo Master Mutual Water Company Standard Drawings.

1-27 Proposal

The written offer of the bidder for the work when made out and submitted on the prescribed proposal form, properly signed and guaranteed.

1-28 Proposal Form

The approved document upon which the TVMMWC requires formal bids be prepared and submitted for the work.

1-29 Proposal Guaranty

The cash, cashier's check, certified check or bidder's bond accompanying the proposal submitted by the bidder, as a guarantee that the bidder will enter into a contract with the TVMMWC for the performance of the work if the contract is awarded to the bidder.

1-30 Right-of-Way

The whole right-of-way or area which is reserved for and secured for use in constructing the roadway and its appurtenances.

1-31 Roadbed

The roadbed is that area upon which a traveled surface will be installed, generally between curbs delineating the edges of the traveled way. The roadbed rises in elevation as each increment or layer of subbase, base, surfacing or pavement is placed.

1-32 Roadway

That portion of the right of way included between the outside lines of sidewalks, or curbs, slopes, ditches, or channels, including all the appertaining structures, and other features necessary to proper drainage and protection.

1-33 Shoulders

The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses. Shoulders may be paved or unpaved.

1-34 Special Provisions

The Special Provisions and other specifications included in them by virtue of reference. See Section 1-8, "Contract Specifications."

1-35 Specifications

Where used in these Standard Specifications, the term "Specifications" without modifier shall mean collectively these Standard Specifications and the Contract Specifications, embodying all the applicable specification documents therein.

1-36 Standard Drawings

The latest edition of the Standard Drawings of the Tesoro Viejo Master Mutual Water Company.

1-37 Standard Specifications

These Standard Specifications and other specifications included in them by virtue of reference.

1-38 State

The State of California Department of Transportation. This term is used interchangeably with Caltrans and has the same meaning.

1-39 Subbase

A layer of specified material of planned thickness between a base and the basement material.

1-40 Subgrade

That portion of the roadbed on which pavement, surfacing, base, subbase, or a layer of any other material is placed.

1-41 Surety

"Surety" or "Corporate Surety" refers to a corporate surety company included on the State of California, Department of Insurance, Admitted Sureties List, most current edition, and acceptable to the TVMMWC.

1-42 Surfacing

The uppermost layer of material placed on the traveled way, or shoulders. This term is used interchangeably with pavement.

1-43 Traffic Lane

The portion of a traveled way for the movement of a single line of vehicles.

1-44 Traveled Way

The portion of the roadway for the movement of vehicles, generally between faces of curbs.

1-45 Work

All the obligations and construction specified, indicated, shown, required or contemplated in the Contract and Contract Documents, including all alterations, amendments or extensions thereto made by Contract Change Order or other written orders of the Engineer, and including all punch list, corrective work, as-built or as-constructed drawings, and manuals at the end of the construction. The Work shall constitute "work" and "work of improvement" under Civil Code sections 3082-3106, and a "work of improvement" shall not include work being performed by the Owner (by itself or through other contractors) that is merely related to the Work

SECTION 2 - PROPOSAL REQUIREMENTS AND CONDITIONS

2-1 General

The TVMMWC will receive at TVMMWC Office, _____, Madera, California, _____, prior to the hour and day specified in the "Notice Inviting Bids", sealed proposals for furnishing material, supplies, equipment and labor for performing the work as specified in the Plans, these Specifications, and the Contract Specifications. Proposals submitted at or after the hour specified for receipt of bids will be returned unopened.

2-2 Examination Of Site Of Work, Plans, Specifications And Contract Documents

The bidder is required to carefully examine the site of the proposed work, the Plans and Specifications for the work contemplated. Bid submission shows the bidder has investigated the site and is satisfied as to the conditions to be encountered and the scope of work, and understands the requirements of the Plans and Specifications.

Prospective bidders must satisfy themselves, by such means as they prefer, as to local conditions and all other matters which influence their bid for the work. The TVMMWC or Engineer shall not be liable on account of any obstructions of any nature, unforeseen difficulties in construction, or unreliable information from any source.

2-3 Form Of Proposal

All proposals must be made upon blank forms to be obtained from the office of the TVMMWC Engineer, 7020 N. Van Ness Boulevard, Fresno, CA 93711. All proposals must give the unit price where indicated, or lump sum where unit prices are not called for, for each of the items. Proposals are to be filled out completely and must be signed by the bidder, all as indicated on the proposal form. The Bid Proposal Form includes the following documents, all of which are to be completed in all respects and submitted as a complete package: Bid Proposal, Bid Summary, Bidder's Information, Subcontractors List, Noncollusion Declaration, and Bid Security. Depending on the nature of the project, other documents may be included by the TVMMWC and shall be completed in all respects and submitted by the bidder with the Bid Proposal Form or as otherwise indicated by the TVMMWC. All proposals must be submitted under sealed cover.

2-4 Quantities

The estimates of the quantities of work to be performed and materials to be furnished given in the Notice Inviting Bids, Bid Proposal and in the Contract Specifications are approximate only, being given as a basis for the comparison of bids. The TVMMWC does not expressly or by implication agree that the actual amount of work will correspond therewith, but reserves the right to increase or decrease the amount of any class or portion of the work or to omit portions of the work that may be deemed necessary or expedient by the TVMMWC Engineer. Reference is made to Section 4-10, "Changes," regarding changes to quantities.

2-5 Unit Or Lump Sum Prices

The unit or lump sum prices inserted in the bid form by the bidder will be considered to be the bid prices for the various bid items of work performed. In case of a discrepancy between the unit price bid and the calculated total for any bid item, the unit price shall govern. In case of a discrepancy between the unit or lump sum price in words and figures provided on the Bid Proposal, the lump sum or unit price quoted in words shall prevail.

2-6 Proposal Guaranty

All proposals must be accompanied by either a cashier's check, certified check or bidder's bond of a corporate surety in a sum equal to at least 10 percent of the total amount of the bid. Checks or bonds must be payable to the Tesoro Viejo Master Mutual Water Company. Corporate Sureties must comply with the definition in Section 1-41, "Surety." Such securities will be retained by the TVMMWC as a guarantee that the bidder, if the bidder's bid is accepted, will enter into a satisfactory Contract twelve (12) calendar days from the date notice of award is mailed to the bidder, and will furnish good and sufficient bonds for the faithful performance thereof and for the payment of labor and material costs in accordance with the requirements of Section 3-3, "Required Contract Securities, Insurance Certificate, Business License, Injury and Illness Prevention Plan."

2-7 Designation Of Subcontractors

The Contractor shall comply with the California Subletting and Subcontracting Fair Practices Act, commencing with Section 4100 of the State Public Contract Code. The Contractor shall file with the bid the name and address of each subcontractor who will perform more than one-half of one percent ($\frac{1}{2}$ %) of the contract amount, or in the case of a project designated by the TVMMWC as a Street Project, one half of one percent of the contract amount or ten thousand dollars (\$10,000), whichever is greater. To determine the value of work subcontracted, where an entire item is subcontracted, the value of work subcontracted will be based on the contract item bid price. When a portion of an item is subcontracted, the value of work subcontracted will be based on the estimated percentage of the contract item bid price, determined from information submitted by the Contractor, subject to approval by the Engineer.

Only one subcontractor shall be listed for each portion of the work. The portion shall be defined as to its nature and extent. The failure of the Contractor to specify a subcontractor constitutes a statement that the Contractor is qualified and intends to perform said work.

Designation of subcontractors must be made upon forms included with the bid package or to be obtained from the office of the TVMMWC Engineer at TVMMWC office. The bidder must give the names of all the subcontractors and the form must be signed by the bidder.

The Contractor must have the consent of the TVMMWC and approval of the TVMMWC Engineer, in writing, to substitute a subcontractor other than that designated in the original bid, to permit any subcontract to be assigned or transferred, to allow a subcontract to be performed by other than the original subcontractor, or to subcontract work for which no subcontractor was designated in the original bid and which is more than one-half of one percent ($\frac{1}{2}$ %) of the contract amount, or in the case of a TVMMWC- designated Street Project, one half of one percent or ten thousand dollars (\$10,000), whichever is greater.

Violation of any of the above provisions is a violation of the Contract and cause for ordering any unapproved subcontractor from the work site. The Contractor shall comply with Section 8-3, "Subcontracting," which contains additional regulations regarding subcontractors.

2-8 Withdrawal Of Proposals

Any bid may be withdrawn at any time prior to the time fixed in the public notice for the opening of bids, but only upon filing with the TVMMWC a written request of the withdrawal. The bidder, or the bidder's duly authorized representative, shall execute the request. The withdrawal of a bid does not prejudice the right of the bidder to file a new bid. A bid will not be received, and no bid may be withdrawn after the time fixed in the Notice Inviting Bids for the opening of bids.

2-9 Relief Of Bidders

The provisions of Public Contract Code Sections 5100 to 5107, inclusive, applies to all Contracts. If the bidder claims a mistake was made in the bid presented, the bidder shall give the Engineer written notice within 5 days after the opening of the bids of the alleged mistake, specifying in the notice in detail how the mistake occurred.

2-10 Rejection Of Proposals

The TVMMWC reserves the right to reject any or all proposals. Proposals may be rejected if they show any alteration of form, additions not called for, conditional or alternative bids, incomplete bids, erasures, or irregularities of any kind. Proposals in which the prices are obviously unbalanced may be rejected. The TVMMWC may reject all bids for budgetary reasons.

More than one proposal from an individual, a firm or partnership, a corporation or an association under the same or different names, will not be considered. Reasonable grounds for believing that any bidder is interested in more than one proposal for the work contemplated may cause the rejection of all proposals in which such bidder is interested.

SECTION 3 - AWARD AND EXECUTION OF CONTRACT

3-1 Award Of Contract

The award of the Contract, if it is awarded, will be to the lowest responsible bidder whose proposal complies with all the requirements described. For projects with no alternates, the award shall be determined by comparing the base bids. When alternative bids are included in the bid proposal, the award shall be determined by comparing the lowest totals of the base bid plus the bids of those alternatives specifically identified in the bid proposal to be used for the purpose of determining the lowest bid. The TVMMWC reserves the right to add or subtract any of the alternatives after the lowest bid has been determined.

The award, if made, will be made within forty-five (45) calendar days after the opening of the proposals. If the lowest responsible bidder refuses or fails to execute the Contract, the TVMMWC may award the Contract to the second lowest responsible bidder; the award, if made, will be made within sixty (60) calendar days after the opening of the proposals. If the second lowest responsible bidder refuses or fails to execute the Contract, the TVMMWC may award the Contract to the third lowest responsible bidder; the award, if made, will be made within seventy-five (75) calendar days after the opening of the proposals. The periods of time specified above within which the award of a Contract may be made will be subject to extension for further periods agreed upon in writing between the TVMMWC and the bidder concerned.

All bids will be compared on the basis of the Engineer's Estimate of quantities of work to be done as shown in the bid proposal. Bids shall be submitted on base bids and all alternate bids, if any, in order to be considered responsive.

3-2 Execution Of Contract

The Contract shall be signed by an authorized representative of the successful bidder and returned within twelve (12) calendar days after the bidder has received notice that the Contract has been awarded. No proposal shall be considered binding upon the TVMMWC until execution of the Contract by all parties, including the TVMMWC.

Failure to execute and submit the Contract within (12) calendar days after the bidder has received notice that the Contract has been awarded, shall be just cause for the annulment by the TVMMWC of the award and the forfeiture of the proposal guarantee as liquidated damages. The Contractor shall submit to the Engineer along with the executed Contract, the documents required in Section 3-3, "Required Contract Securities, Insurance Certificate, Business License, Injury and Illness Prevention Plan," and Section 7-4, "Contractor's Insurance Requirements and Hold Harmless."

3-3 Required Contract Securities, Insurance Certificate, Business License, Injury And Illness Prevention Plan

The bidder to whom the Contract has been awarded will be required to furnish a Labor and Material Bond equal to one hundred percent (100 %) of the Contract price, and a Faithful Performance Bond equal to one hundred percent (100%) of the Contract price. Said bonds shall be secured from a corporate surety, and are to be submitted to the TVMMWC Engineer with the executed Contract. Corporate Sureties are to comply with the definition in Section 1-41, "Surety."

In addition to furnishing the above required sureties, the bidder to whom a contract has been awarded shall furnish and submit with the executed contract an original Insurance Certificate indicating coverage in compliance with Section 7-4, "Contractor's Insurance Requirements and Hold Harmless."

The Contractor shall comply with Section 7-10, "Permits and Licenses." The Contractor to whom the contract is awarded, and all Subcontractors listed on the Contractor's Bid Proposal, or any Subcontractor substituted or added after a contract is awarded and in accordance with these Specifications, must obtain a County of Madera Business License and pay all fees associated therewith. Business Licenses are to be obtained from the County of Madera. Bidders must contact the Finance Department to determine fee amounts prior to submitting a bid. This requirement applies regardless of the business address or location of the Contractor or any Subcontractor. Evidence showing the Contractor and all subcontractors have obtained a County of Madera Business License shall be submitted to the Engineer with the executed Contract.

In compliance with Section 7-12 "Safety Provisions; First Aid; Injury and Illness Prevention Plan," the Contractor shall submit with the above documents a copy of the Contractor's Injury and Illness Prevention Plan.

3-4 Return Of Proposal Guaranties

All proposal guaranties will be held until the Contract has been awarded, after which the guaranties accompanying proposals no longer considered in making the award will be returned to the bidder whose proposal they accompanied. Retained proposal guaranties will be held until the Contract has been executed, after which all guaranties will be returned, except those forfeited as required in Section 3-2, "Execution of Contract."

3-5 Material Statement, Samples, And Guarantees

As permitted in Section 6, "Control of Materials," before any Contract is awarded, the bidder may be required to furnish a complete statement of the origin, composition, and manufacturer of any or all materials to be used in the construction of the work together with samples which may be subjected to the tests provided for in these Specifications to determine their quality and fitness for the work.

In compliance with Sections 5-23, "Guarantee of Workmanship," 6-10, "Guarantee of Materials," and 7-23, "Guarantee," the Contractor is required to guarantee all materials, equipment and workmanship for a period of one year from the date of Acceptance as denoted in Section 8-14, "Acceptance of Contract." In addition to the overall guarantee, the bidder may also be required by the Contract Specifications to furnish a written or other form of guaranty such as a bond covering certain items of work for varying periods of time from the date of recordation of said Notice of Acceptance. When the guaranty is required, the form and the time limit of the guaranty shall be as specified in the Contract Specifications. The signed written guaranty or the bond, whichever is required by the Contract Specifications, shall be delivered to the Engineer before Acceptance of the Contract.

All costs for compliance with this Section 3-5 shall be included in the various bid items; no additional payment will be made therefor.

SECTION 4 - SCOPE OF WORK

4-1 Intent Of Plans And Specifications

The intent of the Plans and Specifications is to prescribe the details for the construction and completion of the work which the Contractor undertakes to perform in accordance with the terms of the contract. Where the Plans or Specifications describe portions of the work in general terms, but not in complete detail, it is understood that only the best general practice is to prevail and that only materials and workmanship of the first quality are to be used. The Contractor shall furnish all labor, materials, tools, equipment, and incidentals, and do all the work involved in completing all of the contract requirements in a satisfactory and workmanlike manner.

The Plans, Specifications and other Contract documents will govern the work. Anything in the Specifications and not on the Plans, or on the Plans and not in the Specifications, shall be as though shown or mentioned in both.

The Contractor shall keep at the worksite a copy of the Plans and Contract Specifications, to which the Engineer shall have access at all times.

While it is believed that much of the information pertaining to physical conditions which may affect the cost of the proposed work will be shown on the Plans or indicated in the Contract Specifications, the TVMMWC does not warrant the completeness or accuracy of such information. The Contractor shall ascertain the existence of any such conditions affecting the cost of the work which would have been disclosed by reasonable examination of the site.

No test, investigation, statement or estimate of a factual situation not incorporated in the Contract Documents shall be relied on by the Contractor. Any test, investigation, statement, or estimate of fact incorporated in the Contract shall be considered by the Contractor to be a suggestion only and he shall request equal access to the underlying or background informative material or source and shall arrive at his own opinion thereon, including his determination of how reliable might be any conclusion appearing in or inferred from the Contract Documents.

In general, the drawings will indicate dimensions, position and kind of construction, and the written Specifications will indicate qualities and methods. Any work indicated on the Plans and not mentioned in the written Contract Specifications, or vice versa, shall be furnished by the Contractor as though fully set forth in both. Work not particularly detailed, marked or specified, shall be as similar parts that are detailed, marked or specified.

All alterations authorized by the Engineer which affect the requirements and information given on the approved plans shall be in writing. No changes shall be made in any plan or drawing after the same has been approved by the Engineer, except by direction of the Engineer.

During the course of the work, if the Contractor discovers any discrepancies between the Plans and the conditions in the field, or any errors or omissions on the Plans or in the Specifications which will significantly affect the work, it shall be the Contractor's duty to inform the Engineer immediately in writing, and the Engineer shall promptly verify the same. Any work done after such discovery, until authorized, will be done at the Contractor's risk.

4-2 Coordination, Interpretation, And Precedence Of Plans And Specifications

The Plans, Specifications, and all supplementary documents are essential parts of the Contract and a requirement occurring in one is as binding as though occurring in all. They are intended to be cooperative, to describe, and to provide for a complete work.

Whenever any conflict appears in any portions of the Contract, it shall be resolved by application of the order of precedence given below, unless the Engineer shall order otherwise.

1. Change Orders and Supplemental Agreements;
2. Agreement;
3. Pre-bid Addenda;
4. Contract Specifications;
5. Contract Construction Plans or Drawings;
6. TVMMWC Standard Specifications (including General Provisions);
7. TVMMWC Standard Drawings;
8. Madera County Standard Specifications;
9. Madera County Standard Drawings;
10. Any other referenced and incorporated specifications;
11. Any other referenced and incorporated plans or drawings.

Detailed plans and specifications shall take precedence over general plans and specifications, even within the same level of precedence. Dimensions called out on the Plans shall control and supersede scaled dimensions. No scaled dimension shall be used in the execution of the work, unless no dimension is called out on the Plans and the use of a scaled dimension is authorized by the Engineer.

4-3 Interpretations

Should it appear that the work to be done, or any matter relative thereto, is not sufficiently detailed or explained on the Plans or Specifications, the Contractor shall apply to the Engineer for such further explanations as may be necessary, and shall conform to such explanation or interpretation as part of the Contract, so far as may be consistent with the intent of the original Plans and Specifications. In the event of doubt or question relative to the true meaning of these documents, reference shall be made to the Engineer, whose decision thereon shall be final.

4-4 Working Drawings

When working drawings or shop drawings are required by the Plans or Specifications, or requested by the Engineer, they shall be prepared in accordance with modern engineering practice by the Contractor at the Contractor's expense. Shop or working drawings shall be of a size and scale to clearly show all necessary details. Unless otherwise specified, shop or working drawings shall be submitted in quadruplicate to the Engineer for approval or correction at least fifteen (15) calendar days before approved drawings will be required for the work. If corrections are required, the Contractor shall make corrections as directed by the Engineer and shall deliver four (4) copies of the corrected shop or working drawings to the Engineer. Upon final approval, one set will be returned to the Contractor marked "approved" or "approved as corrected". For items requiring shop drawings, no materials shall be furnished or work done before approval of the drawings.

Approval of shop or working drawings by the Engineer means that there is substantial and acceptable conformance with the Plans and Specifications, but details of design may not necessarily be checked for adequacy or accuracy. An approval shall not relieve the Contractor from the responsibility for errors or omissions in the drawings or from deviations from the Contract documents unless such errors, omissions, or deviations were specifically called to the attention of the Engineer in writing. The Contractor is responsible for the correctness of the shop or working drawings, for shop fits and field connections, and for the results obtained by use of such plans.

In the event of discrepancy between the scaled dimension on any drawing and the figures written thereon, the figures shall be taken as correct, unless otherwise determined by the Engineer.

4-5 Conformity With Plans And Allowable Deviations

Finished surfaces including the completed final surface of earth, concrete, pavement or other material, or the completed top of a layer of subgrade, base or surfacing, in all cases shall conform with the lines, grades, cross sections, and dimensions shown on the Plans. Where tolerances are indicated in

the Specifications, the work shall be constructed within the tolerances. Deviations from the Plans required by the exigencies of construction will be determined in all cases by the Engineer and authorized only in writing.

4-6 Existing Facilities And Structures Shown On Plans

Where underground and surface facilities or structures are shown on the Plans, the locations, depth and dimensions of such facilities or structures are believed to be reasonably correct, but are not guaranteed. Such facilities or structures are shown for the information of the Contractor, but information so given is not to be construed as a representation that such facilities or structures will, in all cases, be found or encountered just where shown, or that they represent all the structures which may be encountered. The Contractor shall comply with the provisions in Section 8-15, "Utility and Non-Street Facilities; Potholing."

4-7 Omissions In Plans And Specifications

Omissions from the Plans or the Specifications of the materials or details of work which are manifestly or obviously necessary to carry out the intent of the Plans and Specifications, or which are customarily furnished or performed, shall not relieve the Contractor of the responsibility for furnishing such omitted materials or performing such omitted work, but shall be furnished or performed as if fully shown or described in the Plans or Specifications.

Any materials or work mentioned in the Specifications and not shown on the Plans, or shown on the Plans and not mentioned in the Specifications, shall be of the same effect as if shown or mentioned in all.

4-8 Incorporation Of Referenced Specifications

Where referenced thereto on the Plans or the Specifications, the work embraced herein shall be done in accordance with the provisions of the "State of California, Department of Transportation Standard Specifications," latest revision, which Specifications are hereinafter referred to as the State Standard Specifications, and the Madera County Standard Specifications, latest revision, in accordance with the following provisions.

In case of a conflict between the TVMMWC's Standard Specifications and any other referenced and/or incorporated set of specifications such as the State or Madera County Standard Specifications, the TVMMWC's Standard Specifications take precedence over and shall be used in lieu of such conflicting portions in the other specifications, in accordance with Section 4-2, "Coordination, Interpretation, and Precedence of Plans and Specifications."

4-9 Work To Be Done

The work to be performed under the Contract consists of furnishing all materials, equipment, supplies, labor and transportation, and performing all Work as required by the Contract in strict accordance with the contract documents in a satisfactory and workmanlike manner. The Work includes all work, material and services not expressly called for in the Contract Specifications or not shown on the Plans, but which may be necessary for completion and proper construction to carry out the Contract in good faith. The site of Work shall be left in a neat condition. The cost of all Work performed, furnished and installed is to be included in the amount bid for the various items of Work with no separate compensation allowed therefor.

4-10 Changes

The TVMMWC reserves the right to make such alterations, deviations, additions to, or deletions from the plans and specifications, including the right to increase or decrease the quantity of any item or portion of the Work or to delete any item or portion of the Work (see Section 2-4, "Quantities") as may be deemed by the Engineer to be necessary or advisable, and to require such Extra Work as may be determined by the Engineer to be required for the proper completion or construction of the whole work contemplated. No adjustment will be made in the contract unit price of any contract item as a result of quantity changes, regardless of the amount of the increase or decrease, including deletion, of any item. Other changes required by the Engineer will be made in accordance with Section 4-1.05, "Changes," of the State Standard Specifications. In said Section 4-1.03, reference to Section 8-1.07 shall mean Section 8, "Progress and Prosecution," of these Standard Specifications; and reference to Section 9-1.03 shall mean Section 9-1.03 of the State Standard Specifications. For all changes, the TVMMWC shall reasonably compensate Contractor with money (including overhead and profit) and/or time for any Extra Work ordered by the TVMMWC to be performed; and the TVMMWC shall receive a reasonable credit for money (including overhead and profit) and/or time saved by any deletion of work.

4-11 Extra Work

The Contractor shall be compensated for Extra Work. In the event portions of such work are determined by the Engineer to be covered by some of the various items for which there is a bid price or combinations of such items, the remaining portion of such work will be classed as Extra Work. Extra Work also includes work specifically designated as Extra Work in the Plans, Specifications or the Contract Specifications.

Unless otherwise specifically indicated in the Plans or the Specifications, any work or responsibility of the Contractor set forth in the Specifications or on the Plans and not set forth as a separate bid item shall be considered incidental or appurtenant to the work and full compensation for the cost thereof included in the various bid items of work. Such work or responsibility will in no case be considered as Extra Work.

When work is classified as Extra Work by the Engineer, the Contractor shall do such Extra Work and furnish labor, materials, and equipment therefor upon receipt of an approved Contract Change Order or other written order of the Engineer, and in the absence of such approved Contract Change Order or other written order of the Engineer, the Contractor shall not be entitled to payment for such Extra Work.

Extra Work, when ordered and accepted, shall be paid for in accordance with the terms of this Section 4-11 and Section 9-5, "Payment For Extra Work."

4-12 Notices, Change Orders, And Claims

If the Contractor requests additional compensation, whether money or time, or otherwise believes that it is entitled to a modification of the Contract terms and conditions, then Contractor shall follow the procedures for pursuing such requests specified in the Contract, otherwise Contractor shall have waived its rights to such pursuit and any later attempts to recover such compensation or modification shall be barred.

4-12.1 Definition Of "Claim"

A "Claim" is a separate demand by the Contractor for (a) a time extension, (b) payment of money or damages arising from work done by, or on behalf of, the Contractor, payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to, or (c) an amount the payment of which is disputed by the District. However, a "Claim" does not include a proposed change order submitted pursuant to these provisions since a proposed change order is a less formal procedure that is preliminary to a Claim. In addition, a "Claim" does not include vouchers, invoices,

progress payment applications, or other routine or authorized forms of requests for progress payments on the Contract. The responsibility to substantiate Claims shall rest with the Contractor.

4-12.2 Notice Requirements

Written notices of potential extra work, potential delay, and/or potential Claims based on Extra Work or delay, shall be submitted to TVMMWC by Contractor within seven (7) days of becoming aware of the facts and/or issue creating such potential for Extra Work, delay or Claim, unless such facts and/or issue are, or may soon be, affecting the costs or critical path of the Work, in which case the written notice(s) shall be submitted immediately so the TVMMWC may take immediate action to mitigate cost and schedule impacts for the Work. The written notice shall explain the nature of the potential Extra Work, delay or Claim so the TVMMWC may take such action, if necessary. Failure to timely submit a written notice of potential Extra Work, delay and/or Claim shall act as a waiver by Contractor of any right to later submit a proposed change order or pursue a Claim on that issue. Contractor acknowledges that these written notices are critical to the Owner's management of the project and the mitigation of project costs and scheduling.

4-12.3 Proposed Change Orders

If Contractor disagrees with an approved change order issued pursuant to Section 4-10, "Changes," then Contractor shall submit a written protest pursuant to said Section 4-10 (including but not limited to Section 4-1.05, "Changes," of the State Standard Specifications).

If Contractor otherwise believes that it is entitled to additional compensation for money and/or time (including but not limited to grant of a time extension; payment of money or damages arising from work done by, or on behalf of, the Contractor, payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to; or an amount the payment of which is disputed by the local agency), then Contractor shall submit a proposed change order within twenty (20) days of (i) becoming aware of the potential right to additional compensation, or (ii) the date by which it should have become aware of the potential right to additional compensation. Failure to timely submit a proposed change order shall act as a waiver by Contractor of any right to later submit a proposed change order or Claim on that issue. The proposed change order shall indicate the grounds for the additional compensation (money and/or time) requested and the amount of compensation (money and/or time) requested, and Contractor shall include all information supporting the proposed change order. The TVMMWC may accept the proposed change order, reject it (in whole or in part), or request additional information. If TVMMWC does not respond to the proposed change order within thirty (30) days, the proposed change order shall be deemed rejected in whole as of the thirtieth day. If the TVMMWC requests additional information, then the Contractor shall submit it within fifteen (15) days and the TVMMWC shall have fifteen (15) days after such submission to accept or reject (in part) the proposed change order. If the TVMMWC fails to respond within fifteen (15) days after such submission of additional information, then the proposed change order shall be deemed rejected in whole as of the fifteenth day.

Any written protest to an approved change order (see Section 4-10, "Changes," of these Standard Specifications and Section 5-1.43, "Potential Claims And Dispute Resolution," of the State Standard Specifications) and any proposed change order (see previous paragraph) shall be certified, pursuant to Section 4-12.5, "Content of Claim," of these specifications.

4-12.4 Time For Submittal Of Claim

Any Claim must be submitted by Contractor within sixty (60) days after (i) written protest to an approved change order under Section 4-10, "Changes," or (ii) TVMMWC's rejection of Contractor's proposed change order under Section 4-12.3, "Proposed Change Orders;" however, notwithstanding the above, any and all Claims must be submitted no later than seven (7) days after the Engineer certifies the Work as complete and ready for acceptance by the TVMMWC. Failure to timely

submit a Claim acts as a complete waiver of Contractor's right to recover money or time on the issues for which a Claim was required. In no event will the Contractor be allowed to reserve its rights to assert a Claim for time extension or additional cost later than as required by this provision unless the Owner agrees in writing to allow such reservation. Before expiration of the time for submitting a Claim, Contractor may ask once in writing for a fifteen (15) day extension of any deadline for submission of a Claim, and Owner shall grant such extension if reasonable grounds exist. However, no further extensions shall be permitted, and any failure by Contractor to timely ask for an extension waives Contractor's right to an extension.

4-12.5 Content Of Claim

4-12.5.1 Claim Format

Every Claim shall be in writing. In addition, the Contractor shall certify each and every Claim at the time of submission, as follows:

I, [name of declarant], declare the following:

[Contractor company name] has contracted with TVMMWC for the [name of project] project. I am authorized by my employer ([contractor company name]) to prepare the attached claim for compensation (in other words, for money and/or time extensions) to TVMMWC regarding this project (dated _____, 20__, entitled _____, and requesting \$ _____ and/or _____ additional working days), and I prepared said attached claim. I am the most knowledgeable person at [contractor company name] regarding this claim.

I am aware of all law that relates to and governs this claim, including but not limited to California Penal Code section 72, Government Code sections 12650 et seq. (False Claims Act), and Business and Professions Code sections 17200 et seq. (Unfair Business Practices Act). I am aware that submission or certification of false claims, or other claims that violate law or the contract, may lead to fines, imprisonment, and/or other severe legal consequences for myself and/or [contractor company name].

The attached claim is prepared and submitted in good faith, does not breach the contract between [contractor company name] and TVMMWC for this project, is not a false claim, does not violate any law, satisfies all provisions of the contract, only contains truthful and accurate supporting data, and only requests an amount that accurately reflects the adjustments to money and time for which I honestly and in good faith believe that TVMMWC is responsible under its contract with [contractor company name].

So that I could declare that the statements in this declaration and the attached claim were true and correct, while preparing this declaration and claim I consulted with others (including attorneys, consultants, or others who work for [contractor company name]) when necessary to assure myself that said statements were true and correct.

I declare under the penalty of perjury under the laws of the State of California that the foregoing is true and correct. Executed _____, 20__, at _____, California.

[name of declarant]

Contractor understands and agrees that any Claim submitted without this certification does not meet the terms of the Contract Documents; that Owner, or Owner's representatives, may reject the Claim on that basis; and that unless Contractor properly and timely files the Claim with the certification, Contractor cannot further pursue the Claim in any forum and all rights to further compensation (money or time) regarding the issues covered by the Claim are waived due to a condition precedent not having been satisfied.

4-12.5.2 Claims For Additional Payment

If the Contractor wishes to make a Claim for additional monetary payment from Owner, the Claim shall include all facts and documents supporting the Claim, including but not limited to (a) the amount being claimed, including calculations, (b) why the claimed cost was incurred, (c) why the claimed cost is the responsibility of the Owner, and (d) why the claimed cost is a reasonable amount.

4-12.5.3 Claims For Additional Time And Cost

4-12.5.3.1 Notice And Extent Of Claim

If the Contractor wishes to make a Claim for an increase in the Contract time, the Claim shall include all facts supporting the Claim, including but not limited to (A) a current schedule and delay analysis explaining (i) the nature of the delay, (ii) the Owner's responsibility for the claimed delay, (iii) the claimed delay's impact on the critical path, and (iv) the claimed delay's impact on completion date (including an analysis of float previously used and still remaining), and (B) all facts and documents supporting any claim for additional compensation related to the increase in Contract time (see 4-12.5.2, "Claims for Additional Payment." In the case of a continuing delay, only one (1) initial Claim is necessary that is based on estimates of when the continuing delay will end, but within thirty (30) days of the end of the continuing delay an updated final Claim must be submitted.

4-12.5.3.2 Adverse Weather Claims

If unusually severe weather conditions (i.e., those conditions beyond the weather conditions that are within Contractor's scope (see Section 8-8, "Time of Completion") are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were excessive, could not have been reasonably anticipated, and had an unavoidable adverse effect on the critical path of the scheduled construction.

4-12.5.4 "Pass Through" Claims

If any portion of a Claim is based on a request for additional compensation (money or time) by one of Contractor's subcontractors or suppliers, the Contractor must prepare and submit (as part of its Claim) its own analysis of the subcontractor's request, and the Claim must include a copy of the subcontractor's request along with any other necessary supporting documentation. In addition to conforming to all requirements of this Section 4-12, "Notices, Change Orders and Claims", regarding Claims, the Contractor's analysis of the subcontractor's request must include a detailed explanation by Contractor of why the request by subcontractor or supplier is the TVMMWC's responsibility, including Contractor's analysis of (a) why the amount of damages is appropriate, (b) how a breach by Contractor caused the subcontractor or supplier to incur these damages, and (c) how the Contractor's breach was caused by a breach by TVMMWC. A subcontractor or supplier may not submit a claim directly to the TVMMWC since it does not have a contract with the TVMMWC, and a Contractor may not simply forward such a claim to the TVMMWC.

4-12.6 Procedures For Claims Less Than Or Equal To \$375,000

(Public Contract Code §20104.2)

4-12.6.1 Claims Less Than \$50,000

For Claims of less than fifty thousand dollars (\$50,000), the TVMMWC shall respond in writing to any written Claim within 45 days of receipt of the Claim, or may request, in writing, within 30 days of receipt of the Claim, any additional documentation supporting the Claim or relating to defenses to the claim the TVMMWC may have against the Contractor.

If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the TVMMWC and Contractor.

The TVMMWC's written response to the Claim, as further documented, shall be submitted to the Contractor within 15 days after receipt of the further documentation, or within a period of time no greater than that taken by the Contractor in producing the additional information, whichever is greater.

4-12.6.2 Claims Over \$50,000 And Less Than \$375,000

For claims over fifty thousand dollars (\$50,000) and less than or equal to three hundred seventy-five thousand dollars (\$375,000), the TVMMWC shall respond in writing to all written Claims within 60 days of receipt of the Claim, or may request, in writing, within 30 days of receipt of the Claim, any additional documentation supporting the Claim or relating to defenses to the Claim the TVMMWC may have against the Contractor.

If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the TVMMWC and Contractor.

The TVMMWC's written response to the Claim, as further documented, shall be submitted to the Contractor within 30 days after receipt of the further documentation, or within a period of time no greater than that taken by the Contractor in producing the additional information, whichever is greater.

4-12.6.3 Meet And Confer

If the Contractor disputes the TVMMWC's written response, or the TVMMWC fails to respond within the time prescribed, the Contractor may so notify the TVMMWC, in writing, either within 15 days of receipt of the TVMMWC's response or within 15 days of the TVMMWC's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the TVMMWC shall schedule a meet and confer conference within 30 days for settlement of the dispute. The conference may take place during regularly scheduled project meetings.

4-12.6.4 Government Code Claims

Following the meet and confer conference, if the Claim or any portion remains in dispute, the Contractor **must** file a claim as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code (a "Government Code Claim"). The process of filing of a Government Code Claim is specifically required in addition to the contractual claims process in these Standard Specifications; such contractual claims process described above does not act as a substitute for the Government Code Claim process, and the two procedures shall be sequential.

Failure to timely file a Government Code Claim shall act as complete waiver by Contractor of the disputed item. The Government Code Claim shall be handled by Contractor and TVMMWC as required by the Government Code, commencing with Section 900. For purposes of the applicable Government Code provisions, the running of the period of time within which a Government Code Claim must be

filed shall be tolled from the time the Contractor submits his or her written Claim pursuant to this Section 4-12, "Notices, Change Orders and Claims", until the time that such Claim is denied as a result of the meet and confer process in Section 4-12.6.3, including any time utilized by such meet and confer process.

4-12.7 Procedures For Claims Over \$375,000

Claims over \$375,000 shall be handled by Contractor and TVMMWC in the same manner as Claims of \$375,000 or less (see Section 4-12.6, "Procedures for Claims Less Than or Equal to \$375,000"), except that TVMMWC shall (a) respond in writing to all written Claims within 90 days of receipt of the Claim, or may request, in writing, within 45 days of receipt of the Claim, any additional documentation supporting the Claim or relating to defenses to the Claim the Owner may have against the Contractor, and (b) respond within 45 days after receipt of the further documentation, or within a period of time no greater than that taken by the Contractor in producing the additional information, whichever is greater.

4-12.8 Closeout Meet And Confer

Before the submission of a final payment application, Contractor may request a closeout meet and confer session with the TVMMWC to discuss any previously submitted Claims that the TVMMWC did not grant in full. TVMMWC is under no obligation to meet and confer, but may in its discretion choose to do so. Nothing related to this closeout meet and confer process tolls the running of the period of time for Contractor to present a Government Code Claim pursuant to Sections 4-12.6, "Procedures for Claims Less Than or Equal to \$375,000," and 4-12.7, "Procedures for Claims Over \$375,000."

4-12.9 Continuing Contract Performance

Despite submission or rejection of a Claim, the Contractor shall proceed diligently with performance of the Contract as directed by TVMMWC, and the TVMMWC shall continue to make any undisputed payments in accordance with the Contract.

4-13 Interim Cleanup

During the construction of the project, the Contractor shall provide periodic cleanup as the work progresses, such cleanup is to be accomplished as soon as practicable and as public necessity and convenience require, as determined by the Engineer. In general, daily interim cleanup will be required.

If the Contractor fails to provide periodic cleanup measures so ordered within a reasonable time period as determined by the Engineer, the Contractor shall pay to the TVMMWC a liquidated damage of a minimum of Two Hundred Fifty Dollars (\$250.00) for each calendar day, or portion thereof, that elapses from the time the penalty is ordered into effect by the Engineer, until periodic cleanup measures ordered by the Engineer are completely carried out and the nuisance eliminated or prevented. Such penalty shall be deducted in accordance with Section 9-7, "Stop Notices; TVMMWC's Right To Withhold Payments," from any monies owed the Contractor, or levied as a fine in the case of non-public work. In addition to the liquidated damage as specified above, if conditions warrant, the Engineer may order other forces to provide interim cleanup. The full cost thereof, in addition to the liquidated damage as herein provided, shall be deducted from any monies owed the Contractor or shall be levied as a fine in the case of non-public work.

Full compensation for cleanup during construction shall be included in the prices bid for the various items of work; no separate payment will be made therefor.

4-14 Detours

Detours installed or constructed by the Contractor around the work or any portions thereof, whether requested by the Contractor or required by the Plans or the Specifications for use by traffic shall conform to Sections 7-17, "Public Convenience," 7-18, "Public Safety," and Section 12, "Temporary Traffic Control," of the State Standard Specifications. Unless otherwise specified in the Contract Specifications, payment for installing and removing detours shall be included in the price bid for Traffic Control, or if there is no bid item, included in the various bid items of work. No additional payment will be made therefor. The Contractor shall be aware that detours which pass through jurisdictions other than the Tesoro Viejo Master Mutual Water Company may be subject to special requirements by those jurisdictions. Any costs thereof shall be paid for as above provided.

When traffic is routed through the work, provisions for a passageway through construction operations shall also conform to the foregoing Sections, but will not be considered as detour construction or detour maintenance. This work shall conform to and be paid for as provided in Section 7-17, "Public Convenience," unless otherwise specified in the Contract Specifications.

In accordance with Section 8-11, "Temporary Suspension of Work," the failure or refusal of the Contractor to construct and maintain detours at the proper time or route traffic through the works as required shall be sufficient cause for closing down the work until the detours or rerouting are in satisfactory condition for use by traffic.

Any damage caused by the Contractor's operations or by traffic to detours installed solely for the convenience of the Contractor and not required by the Plans, Specifications, or the Engineer, shall be promptly repaired by the Contractor to the satisfaction of the Engineer.

SECTION 5 - CONTROL OF WORK

5-1 Authority Of The Engineer

The Engineer shall decide all questions which may arise as to the quality or acceptability of materials furnished and work performed and as to the manner of performance and rate or progress of the work, all questions which may arise as to the interpretation of the Plans and Specifications, all questions as to the acceptable fulfillment of the Contract on the part of the Contractor, and all questions as to compensation, including any claims and change orders under Section 4-10, "Changes," Section 4-12, "Notices, Change Orders, and Claims," and Section 9-5, "Payment for Extra Work." The Engineer's decision shall be final and binding upon the Contractor. The Engineer shall also have the authority to enforce and make effective such decisions and orders which the Contractor fails to carry out promptly. In accordance with Section 5-17, "Inspection during Construction; Meetings", the Engineer will delegate authority to representative inspectors to assure compliance with Plans and Specifications.

5-2 Standards

The Engineer shall establish such standards as may be necessary for the proper construction of a finished product. In the absence of specific standards, recognized standards of construction or approved practices shall govern the work.

5-3 Contractor's Responsibility For The Work

Except as specifically provided in these Standard Specifications, until the formal acceptance of the work by the TVMMWC, the Contractor shall have the charge and care thereof and shall bear the risk of injury or damage to any part thereof by the action of the elements or from any other cause, whether arising from execution or from the nonexecution of the work. The Contractor shall rebuild, repair, restore and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof, except such injuries or damages occasioned by acts of the Federal Government or the public enemy. The TVMMWC shall not be held responsible for the care or protection of any material or parts of the work prior to final acceptance, except as expressly provided in the Specifications.

The Contractor shall comply with the requirements of Sections 5-9, "Preservation of Property," and 7-16, "Injury or Damage to Persons or Property."

5-4 Contractor's Equipment

The Contractor shall provide adequate and suitable equipment and means of construction to meet all the requirements of the work. When ordered to do so by the Engineer, the Contractor shall remove unsuitable equipment from the work and discontinue the operation of unsatisfactory equipment. The use of any equipment which is obsolete as to type, in bad condition, or worn out will not be permitted on the work.

5-5 Suitable Methods

The Contractor shall use such methods for the performance of the work embraced under these Specifications as will secure a satisfactory quality of work and rate of progress. Such methods shall meet the approval of the Engineer, and shall be submitted for approval before being used on the work. The Engineer reserves the right, during the progress of the work, to make suggestions and revisions in the methods in order that a high quality of work and satisfactory rate of progress may be obtained. When ordered by the Engineer, the Contractor shall discontinue unsuitable methods of work.

5-6 Order Of Work

Where required by the Plans or Specifications, the Contractor shall follow the sequence of operations as set forth therein.

Full compensation for conforming to those requirements will be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefor.

5-7 Superintendence And Personnel

The Contractor shall designate in writing before starting work, an authorized representative who shall have the authority to represent and act for the Contractor, to receive suggestions or direction from the Engineer or Inspector and to see them faithfully executed. The Contractor shall provide the name, address, and phone number of each such superintendent or foreman so designated. When the Contractor is comprised of 2 or more persons, firms, partnerships or corporations functioning on a joint venture basis, the Contractor shall designate in writing before starting work, the name of one authorized representative who shall have the authority to represent and act for the Contractor.

The authorized representative shall be present at the site of the work at all times while work is actually in progress on the contract. When work is not in progress and during periods when work is suspended, arrangements acceptable to the Engineer shall be made for any emergency work which may be required.

Whenever the Contractor or the Contractor's authorized representative is not present on any particular part of the work where it may be desired to give direction, orders will be given by the Engineer which shall be received and obeyed by the superintendent or foreman who may have charge of the particular work in reference to which the orders are given.

Any order given by the Engineer, not otherwise required by the Specifications to be in writing, will on request of the Contractor, be given or confirmed by the Engineer in writing.

If any subcontractor, workman, or person employed by the Contractor shall fail or refuse to carry out the directions of the Engineer, or shall appear to the Engineer to be incompetent or to act in a disorderly or improper manner, that person shall be removed from the work immediately upon notice by the Engineer and may not be employed again on the work.

All work shall be under general observation and inspection of the Engineer or the Inspector and any work done without the sanction or presence of the Engineer or Inspector will be subject to rejection.

5-8 Emergency Availability

The Contractor shall furnish to the Engineer, prior to the issuance of a "Notice to Proceed," a list of persons, together with their addresses and 24-hour telephone numbers, who are authorized to act on behalf of the Contractor in an emergency arising out of conditions at the work site after normal working hours. The Contractor shall conform to the requirements in Section 7-18, "Public Safety."

5-9 Preservation Of Property

In accordance with Sections 5-3, "Contractor's Responsibility For Work," and 7-16, "Injury or Damage to Persons or Property," the Contractor shall be liable for any and all damage done to any public or private property, structure, facility or improvement due to his operations. Due care shall be exercised to avoid injury to existing street improvements or facilities, roadside trees and landscaping that are not to be removed, pole lines, fences, signs, survey markers and monuments, buildings and structures, conduits, pipelines under or above ground, all street facilities, and any other improvements or facilities within or adjacent to the work area, or on private property adjacent to the work area, and all such facilities shall be protected from injury or damage. The Contractor shall provide and install suitable, approved safeguards to protect property or improvements from injury or damage.

If property or improvements are injured or damaged by reason of the Contractor's operations, they shall be replaced or restored to a condition as good as when the Contractor entered upon the work or as good as required by the specifications being performed under this Contract. In certain cases, where the Contractor damages an existing facility such as a curb return and or landing, the Engineer may require the Contractor at his expense to reconstruct the return to meet current Americans With Disabilities Act (ADA) requirements and standards.

The Engineer may make or cause to be made such temporary repairs as are necessary to restore to service any damaged facility. The cost of such repairs shall be borne by the Contractor and may be deducted by the TVMMWC from any monies due or to become due to the Contractor under the Contract.

5-10 Protection Of The Work

The Contractor shall provide and maintain proper barricades, fences, signal lights or watchmen to properly protect the work, persons, animals, and property against injury. The cost of such protection shall be included in the amount bid for the various items of work.

In accordance with Section 7-18, "Public Safety," the Engineer reserves the right to remedy any situation, condition, or neglect on the part of the Contractor as regards the protection of the work, the public, or property and to deduct the cost of such remedy from money due the Contractor, or levy as a fine in the case of non-public work.

5-11 Rights-Of-Way

The TVMMWC will provide the right-of-way for the work to be constructed as shown on the Plans. The Contractor shall procure at no cost to the TVMMWC all temporary construction easements not shown in the Plans, which the contractor may deem necessary to carry out the work to be done under the Contract. The Contractor shall bring said temporary construction easements to a condition at least equal to that existing prior to their use, to the satisfaction of the Engineer. The Contractor shall not occupy property outside the right-of-way shown on the Plans, except by written agreement with the owner of said property, a copy of which shall be provided the Engineer.

Nothing in these Standard Specifications shall be construed as allowing the Contractor to make any arrangements with any person to permit occupancy or use of any land, structure, or building within the limits of the Contract for any purpose whatsoever, either with or without compensation, in conflict with any agreement between the owner, former owner, or tenant of such land, structure or building.

5-12 Disposal Of Material Outside The Right-Of-Way

The Contractor shall make arrangements for the legal disposal of non-hazardous materials outside the right-of-way and shall pay all costs involved. Disposal of hazardous material shall be handled in accordance with Section 7-14, "Trenches and Excavations; Hazardous Waste." No recyclable material shall be disposed of at any landfill. All disposable recyclable materials shall be disposed in a manner that facilitates recycling. A certificate of compliance stating disposal location and manner of disposal of recyclable materials shall be submitted to the Engineer.

When any material is 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 with the Engineer said permit or a certified copy thereof. When material is disposed of as above provided, the Contractor shall conform to all requirements of the Madera County Municipal Code pertaining to grading, hauling and filling of earth, including any permits or bonds so required. Hauling of any materials from the work site shall conform to the provisions in Section 6-12, "Materials Hauling."

The contractor shall clean up and dispose of all excess materials and other debris in any right-of-way

or ground occupied by him and shall restore utilities and improvements on public or private property that has been used or damaged by his operations. Full compensation for all costs involved in disposing of materials as specified in this Section 5-12, including all costs of hauling and any landfill or other fees, shall be considered as included in the price paid for the Contract items of work involving such materials and no additional compensation will be allowed therefor. No additional payment will be granted the Contractor for inconvenience or delays encountered in complying with the requirements of this Section 5-12.

5-13 Electric And Water Service

The Contractor shall provide and pay for electric service for power and lighting required for the construction of the work of the Contract and shall maintain such service until the completion of the Contract.

The Contractor shall make arrangements for and shall acquire a water supply for the work done under the Contract. The Contractor shall pay for all water so used. In accordance with the provisions of Section 17, "Water Use," water to be used in work contracted to the TVMMWC may be taken from the TVMMWC's water system, at a location approved by the TVMMWC. If taken from the TVMMWC's water system, the Contractor shall obtain a water meter from the TVMMWC, and pay any deposits or fees required therefor, including charges for water used. Failure to return the meter at specified intervals for reading, and/or late return of the meter when the work is completed, will result in additional fees. A backflow prevention device may be required by the TVMMWC and shall be furnished and installed by the Contractor prior to any water being taken from the TVMMWC's system.

Water taken from a source other than the TVMMWC system shall be approved by the Engineer in advance. Such water shall be chemically and biologically suitable for the intended use.

In conformance with Section 21, "Landscape Irrigation Systems," the water supply for landscape planting and irrigation systems shall be provided by the Contractor in accordance with the Plans and Specifications. A permanent water meter will be furnished by the TVMMWC for each irrigation system connection to the TVMMWC water system unless otherwise specified. The Contractor will be charged for all water consumed through these connections, in addition to water consumed through the hydrant meter, including water consumed for testing purposes and for landscape irrigation through the 90-day maintenance period and up to final acceptance of the work by the Engineer.

All costs for furnishing electric service and water, including water consumed for landscape irrigation and irrigation system testing, shall be included in the various related bid items of work; no additional payment will be made therefor.

5-14 Construction Surveying/Staking

Unless otherwise specified in the Contract Specifications, construction surveying and staking shall be provided by the Contractor. Surveying and staking shall be conducted only by a person licensed by the State of California to practice Land Surveying. Surveying shall conform to the quality and practice required by the Engineer. The Engineer shall be notified before surveying and/or construction staking commences. The contractor shall furnish cut-sheets prepared by the surveyor to the Engineer immediately upon the setting of the grades.

The Contractor shall preserve construction survey stakes and marks for the duration of their usefulness. The Contractor shall be responsible for the replacement cost of any lost or disturbed construction staking necessary to complete the work.

The Contractor shall immediately inform the Engineer in writing of any discrepancies discovered during the course of the work between the Plans and the construction staking, and the Engineer shall promptly verify the same. Any work done after such discovery, until authorized, will be done at the Contractor's risk.

Three consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variation shall be reported to the Engineer. Any deviation of constructed facilities from the grades shown on the Plans and staked in the field shall be the responsibility of the Contractor.

Grades for underground conduits will be set at the surface of the ground and the Contractor shall be responsible for transferring such grades to the bottom of the trench.

The Contractor shall preserve property line and corner survey markers, except where their destruction is unavoidable when the Contractor is proceeding in accordance with accepted practice. Markers that are lost or disturbed by his operations shall be replaced at the Contractor's expense by a person appropriately licensed by the State of California for Land Surveying. The Contractor shall comply with the provisions in Section 70-2, "Survey Monuments."

The costs for furnishing Construction Surveying and Staking by the Contractor shall be included in the amount bid for the various items of work; no separate payment will be made therefor.

5-15 Cooperation

The Contractor shall cooperate in all respects with all public and private agencies, including the County of Madera, Madera Irrigation District, Cable TV and Telephone Companies, Pacific Gas and Electric Company, TVMMWC, County Service Area #22, Sewer, Parks, Solid Waste, Streets and Traffic, Fire and Madera County Sheriff Departments.

The Contractor shall comply with the provisions in Section 8-15, "Utility and Non-Street Facilities; Potholing." Should construction be under way by other forces or by other contractors within or adjacent to the limits of the work specified or should work of any other nature be under way by other forces within or adjacent to those limits, the Contractor shall cooperate with all the other contractors or other forces to the end that any delay or hindrance to their work will be avoided. The right is reserved to perform other or additional work at or near the site (including material sources) at any time, by the use of other forces.

When two or more contractors are employed on related or adjacent work, or obtain materials from the same material source, each shall conduct their operations in such a manner as not to cause any unnecessary delay or hindrance to the other. Each contractor shall be responsible to the other for all damage to work, to persons or property caused to the other by their operations, and for loss caused the other due to unnecessary delays or failure to finish the work within the time specified for completion.

5-16 Maintaining Drainage

The Contractor shall provide and maintain drainage to the area of work. Temporary provisions for drainage of any area during construction where existing drainage facilities have been damaged or altered or where normal drainage patterns of adjacent areas will be interrupted by the Contractor during his operations, shall be made by the Contractor and as directed by the Engineer.

The Contractor shall be responsible for all damages to public or private property upstream or downstream of the work incurred due to failure to provide adequate drainage within and through the construction area or due to blockage of existing drainage facilities or pathways at or upstream from the area of work, or for re-routing flows to areas not historically receiving such drainage.

In the performance of Maintaining Drainage, the Contractor shall comply in all respects with Section 7-7, "Water Pollution Prevention."

The costs for Maintaining Drainage by the Contractor shall be included in the amount bid for the various items of work; no separate payment will be made therefor.

5-17 Inspection During Construction; Meetings

As provided in Section 5-1, "Authority of the Engineer," the Engineer will delegate authority to a representative Inspector who shall at all times have access to the work during construction and shall be furnished with every reasonable facility for ascertaining full knowledge relative to the progress, workmanship, and character of materials used and employed in the work. The Contractor shall provide facilities necessary to ensure the safety of the Engineer, TVMMWC inspectors, and the personnel of authorized testing firms as appropriate. The TVMMWC and its agents, employees, inspectors and testing firms may videotape, audiotape, or photograph any aspect of the Work or Contractor's activities as part of their documentation of the project and certain issues.

Whenever the Contractor varies the day, or period of the day, during which work is performed, he shall give due notice to the Engineer or Inspector so that proper inspection may be provided. Any work done in the absence of the Engineer or Inspector is subject to rejection.

For non-public work conducted under a TVMMWC Permit, inspection fees and re-inspection fees shall be applied in accordance with the fee schedule in effect at the time of permit issuance.

The inspection, approval and/or acceptance of the work shall not relieve the Contractor of any obligations to fulfill the Contract as prescribed. Defective work shall be made good and unsuitable materials may be rejected, notwithstanding the fact that such defective work and unsuitable materials may have been previously overlooked by the Engineer or Inspector and accepted, or estimated for payment.

Projects financed in whole or in part with funds from sources other than the TVMMWC shall be subject to inspection at all times by the agency providing said funds or its authorized agent.

When specified in the Contract Specifications, the Contractor shall meet no less than weekly with the TVMMWC to review all construction issues. The TVMMWC shall prepare minutes for each meeting and forward them to Contractor; Contractor's failure to correct the minutes within four (4) days shall be deemed agreement with the content of the minutes. Either party has the right to audiotape or videotape the weekly meeting.

5-18 Differing Site Conditions

During the progress of the work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the contract or if unknown physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work provided for in the contract, are encountered at the site, the party discovering those conditions shall promptly notify the other party in writing of the specific differing conditions before they are disturbed and before the affected work is performed.

Upon written notification from the Contractor, the Engineer will investigate the conditions, and if the Engineer determines that the conditions materially differ and cause an increase or decrease in the cost or time required for the performance of any work under the contract, an adjustment, excluding loss of anticipated profits, will be made and the contract modified in writing accordingly. The Engineer will notify the Contractor of the Engineer's determination whether or not an adjustment of the contract is

warranted. No contract adjustment which results in a benefit to the Contractor will be allowed unless the Contractor has provided the required written notice.

No contract adjustment will be allowed under the provisions specified in this section for any effects caused on unchanged work.

Any contract adjustment warranted due to differing site conditions will be made in conformance with the provisions in Section 4-10, "Changes," and Section 4-12, Notices, Change Orders, and Claims."

5-19 Removal Of Defective Or Unauthorized Work

All work which is defective in its construction or deficient in any of the requirements of the contract documents shall be remedied or removed and replaced by the Contractor in an acceptable manner and no compensation will be allowed for such correction.

Any work done beyond the lines and grades shown on the Plans or established by the Engineer or any extra work done without written authority will be considered as unauthorized and will not be paid for.

5-20 Surface Restoration

The Contractor shall replace all graded surface material adjacent and/or appurtenant to the work removed, disturbed, or damaged by the Contractor's operations, and shall restore paving, curbing, sidewalks, gutters, landscaping, fences, lawn and other surfaces disturbed, to a condition equal to that before the work began or as indicated in the Contract Specifications or Plans, and shall furnish all labor and material incidental thereto. Where bid items are not provided for each type of restoration, full compensation therefor shall be included in the amount bid for the various items of Contract work. The Contractor shall comply with the provisions Section 19-3.05, "Restoration of Surfaces."

5-21 Final Cleanup

When construction is completed, and prior to application for acceptance of the work, the Contractor shall clean all work areas and all grounds occupied by him in connection with the work of all debris, excess materials, temporary structures and equipment. All portions of the work shall be left in a neat, presentable condition. The roadways in which construction operations have been accomplished, as well as all haul roads upon which spillage has occurred, shall be swept clean, as directed by the Engineer. Roads adjacent to construction activity which have received dirt or debris tracked from the construction area shall also be swept and cleaned. Upon completion of Final Cleanup, the Contractor shall notify the Engineer in writing that the work is complete in all parts and requirements and ready for final inspection as provided in Section 5-22, "Final Inspection."

If the Contractor fails to provide Final Cleanup to the satisfaction of the Engineer, a final inspection will not be performed by the Engineer until such cleanup is provided. If the contract time is exceeded due to the Contractor's failure to provide, or is late in providing, the required final cleanup, the provisions of Section 8-9, "Liquidated Damages," will be applied.

All costs for providing Final Cleanup shall be included in the various bid items of work; no additional payment will be made therefor.

5-22 Final Inspection

Whenever the Work provided and contemplated by the Contract has been completed in all parts and requirements and the final cleanup performed in accordance with Section 5-21, "Final Cleanup," the Contractor shall request in writing a final inspection be made by the Engineer. The written request shall include a statement that the Work has been completed in all parts and requirements of the Contract. For projects involving landscaping and irrigation systems, the 90-day maintenance period provisions of Section 21-12, "Maintenance Period," apply.

The Engineer will determine the adequacy of the final cleanup, and if found not to be in compliance with said Section 5-21, will not make the final inspection and instead direct the Contractor to perform additional cleanup as required until compliance is reached.

Upon making a determination that the final cleanup is in compliance with said Section 5-21, the Engineer will conduct a final inspection. Representatives from the TVMMWC as well as other agencies who will own, operate, and maintain the improvements constructed by the Contractor will participate in the final inspection. The inspection will be completed within a maximum of ten (10) working days. The time required by the Engineer and others to conduct the final inspection will not be counted against the allotted time for completion of the contract.

Upon completion of the final inspection, a list of items needing correction to comply with the contract documents, if any, will be provided by the Engineer to the contractor. The time required to make such corrections will be charged against the allotted time for completion of the Contract.

Failure to complete the work in all parts and requirements of the contract including providing Final Cleanup in a timely manner to allow sufficient time to accomplish corrective work, any of which results in an overrun in contract time, the provisions of Section 8-9, "Liquidated Damages," will be applied.

5-23 Guarantee Of Workmanship

In conformance with Sections 3-5, "Materials Statement, Samples and Guarantees," 6-10, "Guarantee of Materials," and 7-23, "Guarantee," the Contractor shall guarantee all materials, equipment and workmanship of the installation and Work for a period of one year from the date of Acceptance of the Work by the TVMMWC. Additional longer guarantees may be required by the Contract Specifications. Should any material or appliance or any work develop any defect or weakness due, in the opinion of the Engineer, to the use of imperfect materials, equipment or workmanship, or failure to follow the Contract, including the Plans and Specifications, the Contractor shall be notified within the time period of the Guarantee, and shall immediately perform, at Contractor's expense, the necessary repairs or replacements to make the defective item or items suitable and satisfactory. Expiration of the Guarantee time period shall not void an obligation of the Contractor which is based on a timely notice by the TVMMWC. Should exigencies necessitate the repairs before the Contractor could be notified, or should the Contractor refuse to make the repairs or replacements within a reasonable period of time, the Engineer shall have the right to make the necessary repairs or replacements at the expense of the Contractor, preserving as far as possible all available evidence of the cause of failure.

This guarantee provision applies to all work performed in TVMMWC right-of-way or property, whether by contract with the TVMMWC or work performed under Encroachment Permit by or for utility or communications companies or other private entities. For work done under Encroachment Permit, failure to correct or pay for defective workmanship or materials may result in denial of future permits to perform work in TVMMWC rights-of-way or property.

All costs for providing all required Guarantees of Workmanship shall be included in the various bid items; no additional payment will be made therefor.

5-24 Cost Reduction Incentive

The Contractor may submit to the Engineer, in writing, proposals for modifying the Plans, Specifications, or other requirements of the contract for the sole purpose of reducing the total cost of construction. The cost reduction proposal shall not impair, in any manner, the essential functions or characteristics of the project, including but not limited to service life, economy of operation, ease of maintenance, desired appearance, or design and safety standards.

Cost reduction proposals shall contain the following information:

1. A description of both the existing Contract requirements for performing the work and the proposed changes.
2. An itemization of the contract requirements that must be changed if the proposal is adopted.
3. A detailed estimate of the cost of performing the work under the existing contract and under the proposed change. The estimates of cost shall be determined in the same manner as if the work were to be paid for on a force account basis as provided in Section 9-1.04, "Force Account Payment," of the State Standard Specifications.
4. A statement of the time within which the Engineer must make a decision thereon.
5. The contract items of work affected by the proposed changes, including any quantity variation attributable thereto.

The provisions of this Section 5-24 shall not be construed to require the Engineer to consider any cost reduction proposal which may be submitted hereunder; proposed changes in basic design of a bridge or of a pavement type will not be considered as an acceptable cost reduction proposal; and the TVMMWC will not be liable to the Contractor for failure to accept or act upon any cost reduction proposal submitted pursuant to this section nor for any delays to the work attributable to any cost reduction proposal. If a cost reduction proposal is similar to a change in the Plans or Specifications under consideration by the TVMMWC for the project at the time the proposal is submitted, or if the proposal is based upon or similar to these Standard Specifications, the Contract Specifications or Standard Drawings adopted by the TVMMWC after the advertisement for the contract, the Engineer will not accept the proposal, and the TVMMWC reserves the right to make the changes without compensation to the Contractor under the provisions of this section.

The Contractor shall continue to perform the work in accordance with the requirements of the contract until an executed change order, incorporating the cost reduction proposal has been issued. If an executed change order has not been issued by the date upon which the Contractor's cost reduction proposal specifies that a decision thereon should be made, or such other date as the Contractor may subsequently have specified in writing, the cost reduction proposal shall be deemed rejected.

The Engineer shall be the sole judge of the acceptability of a cost reduction proposal and of the estimated net savings in construction costs from the adoption of all or any part of the proposal. In determining the estimated net savings, the right is reserved to disregard the contract bid prices if in the judgment of the Engineer, those prices do not represent a fair measure of the value of work to be performed or to be deleted.

The TVMMWC reserves the right where it deems such action appropriate, to require the Contractor to share in the TVMMWC's costs of investigating a cost reduction proposal submitted by the Contractor as a condition of considering the proposal. Where this condition is imposed, the Contractor shall indicate acceptance thereof in writing, and that acceptance shall constitute full authority for the TVMMWC to deduct amounts payable to the TVMMWC from any moneys due or that may become due to the Contractor under the contract.

If the Contractor's cost reduction proposal is accepted in whole or in part the acceptance will be by a contract change order, which shall specifically state that it is executed pursuant to this Section 5-24. The change order shall incorporate the changes in the plans and specifications which are necessary to permit the cost reduction proposal or that part of it as has been accepted to be put into effect, and shall include any conditions upon which the TVMMWC's approval thereof is based if the approval of the TVMMWC is conditional. The change order shall also set forth the estimated net savings in construction costs attributable to the cost reduction proposal effectuated by the change order, and shall further provide that the Contractor be paid 50 percent of that estimated net savings amount. The

Contractor's cost of preparing the cost reduction incentive proposal and the TVMMWC's costs of investigating a cost reduction incentive proposal, including any portion thereof paid by the Contractor, shall be excluded from consideration in determining the estimated net savings in construction costs.

Acceptance of the cost reduction proposal and performance of the work thereunder shall not extend the time of completion of the Contract unless specifically provided for in the contract change order authorizing the use of the cost reduction proposal. The amount specified to be paid to the Contractor in the change order which effectuates a cost reduction proposal shall constitute full compensation to the Contractor for the cost reduction proposal and the performance of the work thereof pursuant to the change order.

The TVMMWC expressly reserves the right to adopt a cost reduction proposal for general use on contracts administered by the TVMMWC when it determines that the proposal is suitable for application to other contracts. When an accepted cost reduction proposal is adopted for general use, only the Contractor who first submitted that proposal will be eligible for compensation pursuant to this section, and in that case, only as to those contracts awarded to that Contractor prior to submission of the accepted cost reduction proposal and as to which the cost reduction proposal is also submitted and accepted. Cost reduction proposals identical or similar to previously submitted proposals will be eligible for consideration and compensation under the provisions of this Section 5-24 if the identical or similar previously submitted proposals were not adopted for general application to other contracts administered by the TVMMWC. Subject to the provisions contained herein, the TVMMWC shall have the right to use all or any part of any submitted cost reduction proposal without obligation or compensation of any kind to the Contractor.

SECTION 6 - CONTROL OF MATERIALS

6-1 Source Of Supply And Quality Of Materials

The Contractor shall furnish all materials required to complete the work. Only materials conforming to the requirements of the specifications shall be incorporated in the work. The materials furnished and used shall be new, except as may be provided elsewhere in these specifications, on the plans or in the special provisions. The materials shall be manufactured, handled and used in a workmanlike manner to ensure completed work in accordance with the plans and specifications. Materials to be used in the work will be subject to inspection and tests by the Engineer or the Engineer's designated representative. The Contractor shall furnish without charge such samples as may be required.

The Contractor shall furnish the Engineer a list of the Contractor's sources of materials and the locations at which those materials will be available for inspection. The list shall be furnished to the Engineer in sufficient time to permit inspecting and testing of materials to be furnished from the listed sources in advance of their use. The Engineer may inspect, sample or test materials at the source of supply or other locations, but the inspection, sampling or testing will not be undertaken until the Engineer is assured by the Contractor of the cooperation and assistance of both the Contractor and the supplier of the material. The Contractor shall assure that the Engineer or the Engineer's authorized representative has free access at all times to the material to be inspected, sampled or tested.

It is understood that the inspections and tests if made at any point other than the point of incorporation in the work in no way shall be considered as a guaranty of acceptance of the material nor of continued acceptance of material presumed to be similar to that upon which inspections and tests have been made, and that inspection and testing performed by the Engineer shall not relieve the Contractor or the Contractor's suppliers of responsibility for quality control.

Manufacturers' warranties, guaranties, instruction sheets and parts lists which are furnished with certain articles or materials incorporated in the work, shall be delivered to the Engineer before acceptance of the contract. Reports and records of inspections made and tests performed, when available at the site of the work, may be examined by the Contractor.

6-2 Storage And Protection Of Materials

The Contractor shall provide and maintain storage facilities and employ such measures as will preserve the specified quality and fitness of materials to be used in the work. Stored materials shall be reasonably accessible for inspection. The Contractor shall also adequately protect new and existing work and all items of equipment for the duration of the Contract.

6-3 Defective Material

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 and shall be removed immediately from the site of the work unless otherwise permitted by the Engineer. No rejected material, the defects of which have subsequently been corrected, shall be used until approved by the Engineer.

Upon failure on the part of the Contractor to comply with any order of the Engineer made under the provisions of this article, the Engineer shall have authority to remove and replace defective material, and to deduct the cost of removal and replacement from any monies due or to become due to the Contractor.

6-4 Trade Names Or Equal

Whenever the material or article to be furnished is described by trade name, brand name, or other reference is made to specific manufacturer or supplier, "or approved equal," or "TVMMWC approved equal," it shall be understood that the use of a trade name or brand name is intended to describe a specific quality of material to be used in the project. The TVMMWC's intention shall not be interpreted to exclude or omit the products of any responsible manufacturer if such products are equal or superior in every respect to those specifically described.

No substitutions shall be used in the work without prior approval of the Engineer. The burden of proof as to the quality and suitability of alternatives shall be upon the Contractor, and the Contractor shall furnish all information necessary as required by the Engineer. The Engineer shall be the sole judge as to the quality and suitability of alternative articles or materials, and the Engineer's decision shall be final.

Upon submittal by the Contractor, the Engineer will determine the acceptability of the requested substitution, which may include such samples and tests as may be required by Section 6-8, "Samples and Tests," herein. In such cases of proving equal status, the Contractor shall pay the costs of required testing. No time extension to any Contract will be allowed due to any such proposed substitution, or the time required to determine the acceptability of such substitutions.

6-5 Certificates Of Compliance

A Certificate of Compliance stating that the materials to be used in the work comply in all respects with the requirements of the Plans and Specifications shall be supplied to the Engineer upon request, or if required to be submitted by the Contract Specifications. The certificate shall be signed by the manufacturer of the material or the manufacturer of assembled material delivered to the work, and the lot so certified must be clearly identified in the certificate. Certificates of Compliance shall be provided in triplicate and shall be submitted to the Engineer for review prior to the use of the product or material in the work.

All materials used on the basis of a Certificate of Compliance may be tested and sampled 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 of the Plans and Specifications, and any such material not conforming to such requirements will be subject to rejection whether in place or not.

The form of the Certificate of Compliance and its disposition shall be as directed by the Engineer. No additional payment will be made for furnishing certificates and all costs incurred shall be included in the prices bid for other items of work.

6-6 Foreign Materials

Materials which are manufactured, produced or fabricated outside of the United States shall be delivered to a distribution point in California, unless otherwise required in these Standard Specifications or the Contract Specifications, where they shall be retained for a sufficient period of time to permit inspection, sampling and testing. The Contractor shall not be entitled to an extension of time for acts or events occurring outside of the United States, and it shall be the Contractor's responsibility to deliver materials obtained from outside of the United States to the point of entry into the continental United States in sufficient time to permit timely delivery to the job site. The provisions in Section 8-9, "Liquidated Damages," will apply.

The manufacturer, producer, supplier, or fabricator of foreign material shall furnish to the Engineer a Certificate of Compliance in conformance with the provisions in Section 6-5 "Certificates of Compliance." In addition, certified mill test reports clearly identifiable to the lot of material shall be

furnished where required in these specifications, the Contract Specifications, or otherwise requested by the Engineer.

6-7 Local Materials

Local material is rock, sand, gravel, earth or other mineral material, other than local borrow or selected material, obtained or produced from sources in the vicinity of the work specifically for use on the project. Local material does not include materials obtained from established commercial sources. Local materials shall be furnished by the Contractor from any source the Contractor may elect, except that when mandatory local material sources of certain materials are designated in the special provisions or on the plans, the Contractor shall furnish material from those designated mandatory sources.

The Contractor shall make all arrangements necessary to obtain materials from any local material source other than a mandatory local material source. If the Contractor elects to obtain material from any other non-mandatory source, the Contractor shall furnish the Engineer with satisfactory evidence that the Contractor has entered into an agreement with the property owner for obtaining material from that source and with copies of any necessary permits, licenses and environmental clearances before removing any material from those sources.

The furnishing of local materials from any source is subject to the provisions of Section 2-2, "Examination of Site of Work, Plans, Specifications and Contract Documents." Unless described in the Contract Specifications or on the plans as a mandatory local material source, or approved in writing by the Engineer, material sources shall not be excavated at locations where the resulting scars will present an unsightly appearance from any street or highway. No payment will be made for material obtained in violation of this provision.

The Contractor shall, at the Contractor's expense, make any arrangements necessary for hauling over local public and private roads from any source. Local materials will be subject to the provisions of Section 6-8, "Samples and Tests."

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in conforming to the provisions in this Section 6-7, for furnishing and producing materials from any source shall be considered as included in the price paid for the contract item of work involving the material and no additional compensation will be allowed therefor. If there is no bid item for local materials, the cost shall be included in the various bid items of work; no additional payment will be made.

6-8 Samples And Tests

In accordance with Section 6-1, "Source of Supply and Quality of Materials," at the option of the Engineer, the source of supply of each of the materials shall be approved by the Engineer before delivery is started and before such material is used in the work. Representative preliminary samples of the character and quality prescribed shall be submitted by the Contractor or producer of all materials to be used in the work, for testing or examination as desired by the Engineer. The Contractor shall furnish and deliver such samples of materials as are requested by the Engineer, without charge. No material shall be used until it has been approved by the Engineer. Samples will be secured and tested whenever necessary to determine the quality of materials.

Whenever a reference is made in these Standard Specifications to a specification, manual or test designation either of the ASTM, the AASHTO, Federal Specifications, or any other recognized national organization, and the number or other identification representing the year of adoption or latest revision is omitted, it shall mean the specification, manual or test designation in effect on the day the Notice Inviting Bids for the work is dated.

Whenever the specification, manual or test designation provides for test reports (such as certified mill test reports) from the manufacturer, copies of those reports, identified as to the lot of material, shall be furnished to the Engineer by the Contractor. The manufacturer's test reports shall supplement the inspection, sampling and testing provisions in this Section 6, and shall not constitute a waiver of the TVMMWC's right to inspect. When material which cannot be identified with specific test reports is proposed for use, the Engineer may, at the Engineer's discretion, select random samples from the lot for testing. Test specimens from the random samples, including those required for retest, shall be prepared in accordance with the referenced specification and furnished by the Contractor at the Contractor's expense. The number of the samples and test specimens shall be entirely at the discretion of the Engineer. Unidentified metal products, such as sheet, plate and hardware shall be subject to the requirements of Section 55-1.02A(6), "Unidentified Stock Material," of the State Standard Specifications.

When requested by the Engineer, the Contractor shall furnish, without charge, samples of all materials entering into the work, and no material shall be used prior to approval by the Engineer, except as provided in Section 6-5, "Certificates of Compliance." Samples of material from local sources shall be taken by or in the presence of the Engineer; otherwise, the samples will not be considered for testing.

All tests of materials furnished by the Contractor shall be made in accordance with the commonly recognized standards of national organizations, and such special methods and tests as prescribed in these Specifications.

Whenever the specifications require compliance with specified values for the following properties, tests will be made by the California Test indicated unless otherwise specified:

Properties	California Test
Relative Compaction	216 or 231
Sand Equivalent	217
Resistance (R-value)	301
Grading (Sieve Analysis)	202
Durability Index	229

Unless provided otherwise in the Specifications, the cost of original testing shall be borne by the TVMMWC for work performed under Contract for the TVMMWC. Any retesting required because of failure of materials to pass the initial test shall be done at the expense of the Contractor. All other tests required for work not under contract with the TVMMWC, and located in TVMMWC streets and alleys, or on private property, shall be borne by the Contractor, or permittee in the case of non-public work performed under a TVMMWC Encroachment Permit.

6-9 Compaction Tests

Relative compaction of soil in trenches, embankment or structural backfill shall be determined by the laboratory standard of test procedure California Method 216, except that dry random sampling methods (dry weight basis testing) may be used. To be considered a "passing" test, all compaction tests must meet the required relative percent compaction and must indicate a moisture content within 2% ± of optimum. The Drive-Cylinder method (ASTM Designation D 2937), the Sand Cone Method (ASTM D1556), or other methods approved by the Engineer may be used for sampling of compacted soil. The Contractor's responsibility for costs associated with testing shall be in accordance with the provisions of Section 6-8, "Samples and Tests."

The contractor shall give notice to the Engineer two (2) working days in advance of when the required compaction tests are to be taken. Normally, the first series of tests will be taken at the expense of the TVMMWC. Any further tests needed to check recompacted areas because of a failure to pass the original test shall be at the expense of the Contractor. The Engineer shall specify the locations where compaction tests are to be taken.

6-10 Guarantee Of Materials

The Contractor shall comply with the provisions in Sections 3-5, "Materials Statement, Samples and Guarantees," 5-23, "Guarantee of Workmanship," and 7-23, "Guarantee." The Contractor shall guarantee all materials, including landscape plantings and irrigation systems, equipment, and workmanship of the installation for a period of one year from the date of the Acceptance of the Work by the TVMMWC. Additional guarantees may be required by the Contract Specifications. Should any material or appliance or any work develop any defect or weakness due, in the opinion of the Engineer, to the use of imperfect materials, equipment or workmanship, or failure to follow the Contract, including the Plans and Specifications, the Contractor shall be notified within the time period of the Guarantee, and shall immediately perform, at Contractor's expense, the necessary repairs or replacements to make the defective item or items suitable and satisfactory. Expiration of the Guarantee time period shall not void an obligation of the Contractor to repair or replace which is based on a timely notice by the TVMMWC. Should exigencies be such as to necessitate the repairs before the Contractor could be notified, or should the Contractor refuse to make the repairs or replacements within a reasonable period of time, the TVMMWC shall have the right to make the necessary repairs or replacements at the expense of the Contractor, preserving as far as possible all available evidence of the cause of failure.

All costs for providing guarantees shall be included in the various bid items; no additional payment will be made therefor.

6-11 Salvage Of Materials

Where salvage of material is indicated on the Plans or in the Contract Specifications, salvaged material shall remain the property of the TVMMWC and shall be delivered and deposited by the Contractor at the location specified in the Plans, Contract Specifications, or by the Engineer. No separate payment will be made for such salvaging and delivering of material; the cost thereof shall be included in the various bid items of work.

6-12 Materials Hauling

Hauling of all materials to, from, or on, the jobsite shall be performed in strict accordance with the Madera County Municipal Code, Article 2, Traffic Administration, and California Vehicle Code (CVC) Section 23114 as it relates to covering, spillage, and other requirements. All references to "highway" in the CVC shall mean TVMMWC streets as well as State highways.

SECTION 7 - LEGAL RELATIONS AND RESPONSIBILITY

7-1 Laws To Be Observed

The Contractor shall be and remain fully informed of all existing and future State and Federal laws, TVMMWC and County ordinances and regulations, and revisions thereto that in any way affect those engaged or employed in or on the work or in any way affect the conduct of the work, and of all orders or decrees of governmental or other bodies or officials having jurisdiction or authority over the same. The Contractor, and all subcontractors, persons, firms or corporations employed by or under the control of the Contractor, shall at all times observe and comply with all such laws, ordinances and regulations, orders and decrees. The Contractor shall protect and indemnify the TVMMWC and its officers, employees 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 the Contractor, the Contractor's employees, subcontractors, persons, firms or corporations employed by the Contractor. If any discrepancy or inconsistency is discovered in the Plans or Specifications for the work in relation to any such law, ordinance, regulation, order or decree, the Contractor shall forthwith report the same to the Engineer in writing.

7-2 Labor Code Requirements

The following requirements of the State Labor Code apply to all TVMMWC Contracts:

7-2(A) Hours Of Labor

Eight hours labor constitutes a legal day's work. The Contractor or any subcontractor under the Contractor shall forfeit, as a penalty to the State of California, twenty five dollars (\$25) or such other amount as may be amended by the Department of Industrial Relations from time to time for each worker employed in the execution of the contract by the respective Contractor or subcontractor for each calendar day during which that worker is required or permitted to work more than 8 hours in any one calendar day and 40 hours in any one calendar week in violation of the requirements of the Labor Code, and in particular, Section 1810 to Section 1815, thereof, inclusive, except that work performed by employees of Contractors in excess of 8 hours per day, and 40 hours during any one week, shall be permitted upon compensation for all hours worked in excess of 8 hours per day at not less than one and one-half times the basic rate of pay, as provided in Section 1815 thereof.

7-2(B) Deleted

7-2(C) Travel And Subsistence Payments

The Contractor shall make travel and subsistence payments to each workman, needed to execute the work, in conformance with the requirements in Labor Code Section 1773.8.

7-2(D) Deleted

7-2(E) Labor Nondiscrimination

The Contractor shall comply with Section 1735 of the Labor Code, which reads as follows:

"No discrimination shall be made in the employment of persons upon public works because of the race, religious creed, color, national origin, ancestry, physical handicap, medical condition, marital status, or sex of such persons, except as provided in Section 12940 of the Government Code, and every contractor for public works violating this section is subject to all the penalties imposed for a violation of this chapter."

The Contractor shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the contract.

7-2(F) Deleted

7-2(G) Workers' Compensation

Pursuant to the requirements in Section 1860 of the Labor Code, the Contractor will be required to secure the payment of workers' compensation to the Contractor's employees in conformance with the requirements in Section 3700 of the Labor Code and in accordance with the provisions of Section 7-4, "Contractor's Insurance Requirements And Hold Harmless."

7-2(H) Suits To Recover Penalties And Forfeitures

The Contractor is subject to Sections 1730 to 1733, inclusive, of the Labor Code concerning suits to recover amounts withheld from payment for failure to comply with requirements of the Labor Code or contract provisions based on those laws. Those sections provide that a suit on the Contract for alleged breach thereof in not making the payment is the exclusive remedy of the Contractor or the Contractor's assignees with reference to amounts withheld for those penalties or forfeitures; and that the suit must be commenced and actual notice thereof received by the awarding authority prior to 90 days after completion of the contract and the formal acceptance of the job. Submission of a claim pursuant to Section 9-10, "Final Progress Payment," for the amounts withheld from payment for those penalties and forfeitures is not a prerequisite for those suits, and these claims will not be considered.

7-3 Contractor's Licensing Laws

All bidders and contractors shall be licensed in accordance with the laws of this State, specifically the provisions the Business and Professions Code, Division 3, Chapter 9. Any bidder or contractor not so licensed is subject to the penalties imposed by such laws.

In accordance with the requirements in Public Contract Code Section 10164, in all contracts where Federal funds are involved, the Contractor shall be properly licensed at the time the Contract is awarded.

7-4 Contractor's Insurance Requirements And Hold Harmless Hold Harmless

The Contractor shall indemnify, defend, and hold harmless the TVMMWC and its officers, officials, employees, agents, and volunteers from and against all claims, damages, losses, actions, suits, demands, liability, and expenses including attorney fees arising out of the performance of the work described herein, caused in whole or in part by any act or omission of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, except where caused by the active negligence, sole negligence, or willful misconduct of the TVMMWC. The provisions of Section 7-1, "Laws to be Observed," Section 7-16, "Injury or Damage to Persons or Property," and Section 7-19, Patents," also apply.

Insurance Requirements For Contractors

The Contractor shall procure and maintain, for the duration of the contract, insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees or subcontractors.

The following insurance requirements are minimum, and may be amended by the Contract Specifications to include increased coverage limits and expanded coverage including Course of Construction (Builder's Risk) Insurance. The Course of Construction policy shall name the TVMMWC as Loss Payee.

Minimum Scope of Insurance

Coverage shall be at least as broad as:

1. Insurance Services Office (ISO) Commercial General Liability coverage (occurrence Form CG 00 01).
2. Insurance Services Office Form CA 00 01 covering Automobile Liability, Code 1 (any auto).
3. Workers' Compensation insurance as required by the State of California and Employer's Liability Insurance.
4. Builder's Risk (Course of Construction) insurance covering all risks of loss less policy exclusions.
5. Surety bonds as described below.
6. Professional Liability (if *Design/Build*).

Minimum Limits of Insurance

Contractor shall maintain limits no less than:

- | | | |
|--|--|--|
| 1. General Liability:
(Including operations, products and completed operations.) This coverage is to be maintained for 10 years after the completion of the Contract. | \$5, 000,000 * | per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit. |
| 2. Automobile Liability: | \$1,000,000 * | per accident for bodily injury and property damage. |
| 3. Workers' Compensation: | As required by the State of California | |
| 4. Employer's Liability: | \$1,000,000 * | per accident for bodily injury or disease. |
| 5. Builder's Risk (when required by the Contract Specifications): | Completed value of the project with no coinsurance penalty provisions. | |
| 6. Professional Liability: | \$1,000,000 * | as needed for design/build. This coverage is to be maintained for 3 years after expiration of the Contract |

*** These amounts are standard amounts and may vary by project. Unless otherwise specified in the Contract Specifications, the Contractor shall provide the coverage amounts above specified. Proof of coverage shall be submitted annually to the TVMMWC.**

Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and approved by the TVMMWC. At the option of the TVMMWC, either (a) the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the TVMMWC, its officers, officials, employees and volunteers or (b) the Contractor shall provide a financial guarantee satisfactory to the TVMMWC guaranteeing payment of losses and related investigations, claim administration, and defense expenses.

Other Insurance Provisions

The general liability and automobile liability policies are to contain, or be endorsed to contain, the following provisions:

1. The TVMMWC, its officers, officials, employees, and volunteers are to be covered as insureds with respect to liability arising out of automobiles owned, leased, hired or borrowed by or on behalf of the contractor; and with respect to liability arising out of work or operations performed by or on behalf of the Contractor including materials, parts or equipment furnished in connection with such work or operations. General liability coverage can be provided in the form of an endorsement to the Contractor's insurance, or as a separate owner's policy.
2. For any claims related to this project, the Contractor's insurance coverage shall be primary insurance as respects the TVMMWC, its officers, officials, employees, and volunteers. Any insurance or self-insurance maintained by the TVMMWC, its officers, officials, employees, or volunteers shall be excess of the Contractor's insurance and shall not contribute with it.
3. Each insurance policy required by this clause shall be endorsed to state that coverage shall not be canceled by either party, except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the TVMMWC.
4. Coverage shall not extend to any indemnity coverage for the active negligence of the additional insured in any case where an agreement to indemnify the additional insured would be invalid under Subdivision (b) of Section 2782 of the Civil Code.

Acceptability of Insurers

Insurance is to be placed with insurers with a current A.M. Best's rating of no less than A:VIII, unless otherwise acceptable by the TVMMWC. Only California admitted insurers may be used. Insurance is to be placed with insurers which are currently licensed by the State Insurance Commissioner and are acceptable to the TVMMWC.

Verification of Coverage

Contractor shall furnish the TVMMWC with original certificates and endorsements, including amendatory endorsements, effecting coverage required by this clause. All certificates and endorsements are to be received and approved by the TVMMWC before work commences; however, failure to do so shall not operate as a waiver of these insurance requirements. The TVMMWC reserves the right to require complete, certified copies of all required insurance policies, including endorsements effecting the coverage required by these Specifications at any time.

Waiver of Subrogation

Contractor hereby agrees to waive subrogation which any insurer of contractor may acquire from contractor by virtue of the payment of any loss. Contractor agrees to obtain any endorsement that may be necessary to effect this waiver of subrogation which shall extend/apply to not only the TVMMWC, but to all contractors and subcontractors of any tier on the TVMMWC project.

The workers' compensation policy shall be endorsed to contain a waiver of subrogation in favor of the TVMMWC for all work performed by the contractor, its agents, employees, independent contractors and subcontractors.

Subcontractors

Contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.

Surety Bonds

The Contractor shall provide the following surety bonds: Bid Bond; Performance Bond; and Payment Bond, all in the amounts specified in Section 3-3, "Required Contract Securities, Insurance Certificates, Business License, Injury and Illness Prevention Plan."

All costs for compliance with this Section 7-4 shall be included in the various items of work. No separate payment will be made therefor.

7-5 Vehicle Code

Pursuant to the authority contained in Vehicle Code Section 591, the TVMMWC has determined that within those areas that are within the limits of the project and are open to traffic, the Contractor shall comply with all the requirements set forth in Divisions 11, 12, 13, 14 and 15 of the Vehicle Code. In accordance with the statement in Vehicle Code Section 591, this section shall not relieve the Contractor or any person from the duty of exercising due care. The Contractor shall take all necessary precautions for safe operation of the Contractor's equipment and the protection of the public from injury and damage from the Contractor's equipment.

7-6 Air Pollution Control

For all projects, the Contractor shall comply with State air pollution control rules, regulations, ordinances and statutes which apply to any work performed pursuant to the contract, including any air pollution control rules, regulations, ordinances and statutes, specified in Section 11017 of the Government Code. The Contractor shall also comply with all of the requirements of Regulation VIII of the San Joaquin Valley Air Pollution Control District (APCD). It will be the Contractor's responsibility to contact the APCD to determine the requirements of said Regulation and any costs related to compliance therewith. All costs for compliance, including any permit fees, shall be included in the various items of work; no separate or additional payment will be made therefor. Reference is made to Section 7-10, "Permits and Licenses."

In addition to foregoing requirements, for projects specified in the Contract Specifications to be subject to Rule 9510 of the APCD, Contractors shall, before submitting a bid, contact the APCD and determine the project-specific requirements of said Rule. Any project-specific permit fee will be paid by the TVMMWC. All other costs for compliance with the Rule 9510 requirements, including submittal of all required documentation during the life of the project, shall be included in the various items of work. No separate or additional payment will be made therefor. Reference is made to Section 7-10, "Permits and Licenses."

The Contractor shall also comply with State and Regional dust control requirements.

7-7 Water Pollution Prevention

The Contractor shall exercise every reasonable precaution and shall conduct and schedule operations so as to protect all storm drain systems, storm water retention/detention basins, irrigation canals, or natural streams located within, adjacent to, or in any way connected with, the project from pollution with mud, silt, fuels, oils, bitumens, calcium chloride, pesticides, herbicides, and any other harmful materials. The Contractor shall conduct water pollution prevention on all contracts awarded by the TVMMWC, but for projects of one (1) acre or greater, the following special requirements shall apply.

7-7(A) Storm Water Pollution Prevention Plan (SWPPP) Requirements

The following provisions are required for all construction contracts awarded by the TVMMWC for sites one (1) acre in size or greater. Their purpose is to provide detailed instructions to contractors to ensure that construction practices do not cause pollutant discharges to the above-described storm water conveyance/storage systems. Contractors are encouraged to use these or similar requirements in their contracts with subcontractors. The requirements are based upon Best Management Practices developed by the California Storm Water Quality Task Force as presented in the California Storm Water Best Management Practices Handbook-Construction Activity and of Madera County and SWQMP for Tesoro Viejo. Whether or not such provisions are included in subcontracts, the Contractor is responsible for compliance by others retained by the Contractor in the performance of the Contract.

The goal of these requirements is to prevent as much as possible the pollution of storm water conveyance/storage systems by storm water runoff from construction sites by keeping storm water runoff containing pollutants out of drainage systems for sufficient time to reduce pollutant loads, reducing the exposure and discharge of materials and wastes to storm water, and by reducing erosion and sedimentation.

The work for which a Contract is awarded is subject to the provisions and requirements of the State General Construction Activity Storm Water Permit (General Construction Permit). The Contractor shall be responsible for complying with all General Construction Permit requirements, as adopted and enforced by the State Water Resources Control Board (SWRCB) in August 1999, including any future revisions to that permit. The Contractor shall indemnify, and hold harmless the TVMMWC for failure to comply with any provision or requirement of the General Construction Permit.

To insure permit compliance, the Contractor is directed to the official web site for the California Storm-water Quality Association (CASQA) <http://www.cabmphandbooks.com/Construction.asp>. The Contractor can obtain copies of the State General Construction Permit, Notice of Intent (NOI) and Notice of Termination (NOT) forms, instructions for completing the forms, and a Model Construction Activities Storm Water Pollution Prevention Plan (SWPPP).

In summary, the Contractor shall be required to comply with the following permit requirements. These requirements include:

7-7(A)1 Preparation Of A NOI And Vicinity Map

Unless otherwise provided in the Contract Specifications, the TVMMWC shall, at its expense, prepare and submit the executed NOI, map and permit fee to the SWRCB for General Construction Permit coverage prior to commencement of construction. The Contractor shall receive a copy of the executed NOI from the TVMMWC.

7-7(A)2 Preparation Of A Storm Water Pollution Prevention Plan (SWPPP)

The Contractor shall prepare a SWPPP that is project specific. At a minimum the SWPPP must address: general project information; a construction activity schedule; pollutant sources and best management practices (BMPs); maintenance, inspection, and repair of BMPs; Contractor training; site stabilization; a post construction management plan an overall permit compliance plan, and certifications. The Contractor shall submit a draft SWPPP for review, approval, and certification by the Tesoro Viejo Master Mutual Water Company

TVMMWC no later than two weeks after receipt of the Notice of Award.

Within 24 hours of approval by the TVMMWC, the Contractor shall provide the TVMMWC with a complete copy of the certified SWPPP. Any amendments to the SWPPP shall also be submitted to the TVMMWC for review, approval and certification. Within 24 hours of approval, the Contractor shall provide the TVMMWC with documentation and certification of such amendments.

7-7(A)3 Implementation Of SWPPP

The Contractor shall be responsible implementing and maintaining the SWPPP at all times throughout the entire construction site and for the duration of the project, including both dry and wet weather seasons. The Contractor shall maintain a copy of the SWPPP on-site for the duration of the contract, and shall prepare all required inspection, maintenance and training documentation with the SWPPP and shall provide same upon request by agency or TVMMWC enforcement personnel.

7-7(A)4 Site Stabilization

All soil disturbed by the work shall be stabilized by methods approved by the Engineer prior to terminating permit coverage.

7-7(A)5 Preparation Of NOT And Post Construction Storm Water Management Plan

Following completion of the construction project, the Contractor shall submit a completed Notice of Termination (NOT) and PCSWMP to the TVMMWC for review, approval, and signature. Within 24 hours of approval, the Contractor shall provide the TVMMWC with a final copy of the project's PCSWMP. The TVMMWC shall submit the executed NOT to the Central Valley Regional Water Quality Control Board (RWQCB) for termination of General Construction Permit coverage.

7-7(B) Payment

Unless otherwise provided by the Contract Specifications, and with the exception of the NOI fee, all costs for compliance with this Section 7-7, including preparation of the SWPPP, all inspection and other required reports, documentation, training, preparation of the PCSWMP and NOT, and any and all work associated with the maintenance of BMPs, shall be included in the price bid therefor. If no bid item is provided, the cost shall be included in the various items of work; no separate payment will be made therefor.

7-8 Use Of Pesticides

The Contractor shall comply with all rules and regulations of the California Department of Food and Agriculture, the Department of Public Health, the Department of Industrial Relations and all other State, Federal or Local agencies which govern the use of pesticides required in the performance of the work on the contract. Pesticides shall include but shall not be limited to herbicides, insecticides, fungicides, rodenticides, germicides, nematocides, bactericides, inhibitors, fumigants, defoliant, desiccants, soil sterilants and repellents. Any substance or mixture of substances intended for preventing, repelling, mitigating, or destroying weeds, insects, diseases, rodents, or nematodes and any substance or mixture of substances intended for use as a plant regulator, defoliant or desiccant shall be considered a pesticide.

7-9 Payment Of Taxes

The contract prices paid for the work shall include full compensation for all taxes which the Contractor is required to pay, whether imposed by Federal, State or local government, including, without being limited to, Federal Excise Tax.

No tax exemption certificate nor any document designed to exempt the Contractor from payment of any tax will be furnished to the Contractor by the TVMMWC as to any tax on labor, services, materials, transportation, or any other items furnished pursuant to the contract.

7-10 Permits And Licenses

Unless otherwise provided in the Contract Specifications, the Contractor shall procure all required permits and licenses and give all notice necessary and incidental to the due and lawful prosecution of the work. The Contractor shall secure any required permits from the appropriate agencies prior to making any preliminary soil investigations in public street rights-of-way, and shall abide by the provisions of said permits.

The Contractor and all subcontractors must comply with the Business License provisions of Section 3-3, "Required Contract Securities, Insurance Certificate, Business License, Injury and Illness Prevention Plan."

For all non-public work, an Encroachment Permit is required from the County of Madera and/or the TVMMWC before any work in street or other TVMMWC right-of-way is commenced. For public work for which a Contract has been awarded by the TVMMWC, the Contractor must obtain an Encroachment Permit from the County of Madera and/or the TVMMWC, prior to commencing work unless otherwise specified by the Contract Specifications.

Satisfactory evidence of obtaining all required permits and licenses, including the Contractor's and subcontractors' business licenses, shall be submitted to the Engineer with the executed contract and other documents required by the Specifications. The Contractor shall abide by the conditions of said permits and licenses and perform all work governed by said permits and licenses in conformance therewith and as directed by the Engineer. Compliance with this Section 7-10 shall be precedent to, and a condition of, issuance of the "Notice to Proceed."

Except as provided in Section 7-6, "Air Pollution Control," relating to Rule 9510, and unless otherwise provided in the Contract Specifications, full compensation for all costs involved in procuring all permits and licenses as indicated herein, including all fees and charges therefor, shall be included in the amount bid for the various items of work; no separate payment shall be made therefor.

7-11 Sanitary Regulations

Necessary housing accommodations shall be provided by the Contractor for the workmen for changing clothes and for protection during inclement weather. Toilet accommodations shall also be maintained for the use of employees on the work. The accommodations shall be in approved locations properly screened from public observation and shall be maintained in a strictly sanitary manner. The Contractor shall obey and enforce all State, County, and TVMMWC sanitary regulations and orders, and shall take precautions against infectious diseases and the spread of same, and shall maintain at all times satisfactory sanitary conditions around all shanties, tool and supply houses and on all other parts of the work.

The cost of compliance with this Section 7-11 shall be included in the various bid items of work; no separate payment will be made therefor.

7-12 Safety Provisions; First Aid; Injury/ Illness Prevention Program

The Contractor shall comply with the provisions of the State Labor Code, Division 5, "Safety in Employment," the State Division of Occupational Safety and Health Construction Safety Orders and General Industry Safety Orders of Title 8, California Code of Regulations, as well as all other applicable laws, ordinances and regulations.

In compliance with State Labor Code Section 6708, the Contractor shall maintain adequate emergency first aid treatment for his employees sufficient to comply with the Federal Occupational Safety and Health Act of 1970 (Public Law 91-596).

In compliance with Labor Code Section 6401.7, the Contractor shall have established, implemented, and maintains an Injury and Illness Prevention Plan. The Contractor shall comply with Section 3-3, "Required Contract Securities, Insurance Certificate, Business License, Injury and Illness Prevention Plan," for plan submittal requirements.

Except as provided in Sections 7-13, "Worker Protection From Toxic or Explosive Gases," 7-14, "Trenches and Excavations; Hazardous Waste," and 7-15, "Worker Protection From Caving Ground in Excavations," full compensation for all costs involved in providing job safety, worker protection, and emergency first aid treatment shall be included in the amounts bid for the various items of work; no separate payment will be made therefor.

7-13 Worker Protection From Toxic Or Explosive Gases; Confined Spaces Entry

In conformance with the provisions of the State Labor Code and the Safety Orders set forth in Section 7-12, "Safety Provisions; First Aid; Injury/Illness Prevention Program," the Contractor shall protect workers from toxic or explosive gases by providing whatever testing equipment and other special equipment that may be needed to detect the presence of and to remove such toxic or explosive gases found or suspected to exist in any above or below ground facilities whether newly constructed or existing, excavations, or other activities involved in the work. Detection and removal shall be accomplished by methods which comply with the regulations governing such detection and removal. The Engineer, the TVMMWC, and the Madera County Fire Department should be notified immediately after detection.

The Contractor shall also comply with the provisions of the California Code of Regulations Title 8 General Industry Safety Orders, Article 108, "Confined Spaces," whenever the contractor or any of his employees must enter a confined space, as defined in said Safety Orders, whether the confined space is new or existing.

The above requirements are minimum requirements. In addition, the Contractor shall provide for the life of the Contract similar protection for any person, including the Engineer or any of his authorized representatives, subcontractors, or any other person authorized or required to enter such underground facilities for inspection, repairs, or any other reason.

If the presence of toxic or explosive gases are due to the actions of the contractor, all costs for worker protection, detection, removal, or repairs are to be borne by the contractor. If the presence of toxic or explosive gases are the result of latent or other conditions outside the control of the Contractor, compensation will be paid in accordance with Section 4-10, "Changes." In the event of a dispute, nothing in this Section 7-13 shall free the contractor of the responsibility to immediately take the necessary actions to provide worker protection and to remove or repair the cause of the presence of toxic or explosive gases.

All costs for compliance with this Section 7-13 shall be included in the various bid items; no separate payment will be therefor.

7-14 Trenches And Excavations; Hazardous Waste

7-14.1 Trenches And Excavations 4 Feet Or Less In Depth Below The Surface

If the Contractor encounters conditions at the Site which are subsurface or otherwise concealed physical conditions, which differ materially from those indicated in the Contract Documents, or unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then notice by the Contractor shall be given to the TVMMWC promptly before conditions are disturbed and in no event later than ten (10) days after first observance

of the conditions. The TVMMWC will promptly investigate such conditions, and if they differ materially and cause an increase or decrease in the Contractor's cost of, time required for, or performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum, Contract Time, or both. If the TVMMWC determines that the conditions at the Site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the TVMMWC shall so notify the Contractor in writing, stating the reasons. Claims by Contractor in opposition to such determination must be made within ten (10) days after the TVMMWC has given notice of the decision. If the TVMMWC and the Contractor cannot agree on an adjustment in the Contract Sum or the Contract Time, Contractor shall proceed pursuant to Section 4-12, "Notices, Change Orders, and Claims."

7-14.2 Trenches And Excavations Greater Than 4 Feet In Depth; Hazardous Waste

Pursuant to Section 7104 of the State Public Contract Code, whenever the work requires digging trenches or other excavations that extend deeper than four feet below the surface, the following provisions apply:

- A. 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 by information about the site made available to bidders prior to the deadline for submitting bids.
 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.
- B. The Engineer shall promptly investigate the conditions, and if he finds that the conditions do materially so differ, or do 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 in accordance with Section 4-10, "Changes."
- C. In the event that a dispute arises between the Engineer and the Contractor whether the conditions materially differ, or involve hazardous waste, or 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 either by contract or by law which pertain to the resolution of disputes and protests between the contracting parties.

The Contractor shall comply with the requirements in Section 5-12, "Disposal of Material Outside the Right-of-Way."

7-15 Worker Protection From Caving Ground In Excavations

The Title 8 Construction Safety Orders of the Division of Occupational Safety and Health shall apply to all excavations. In compliance with Sections 341 and 341.1 of Title 8, California Code of Regulations, and Section 6500 of the State Labor Code, for any trenches or excavations that are 5 feet or more in depth, the Contractor must obtain a permit from the State Division of Occupational Safety and Health. The permit may be either a Project Permit (project specific) or an Annual Permit. The contractor shall comply with all the requirements of the permit and those of the Safety Orders.

In addition to the above permit requirement, in compliance with the provisions of State Labor submit to the Engineer, in advance of any excavation, a detail plan showing the design Code Section 6705, for trenches or excavations five feet or more in depth, the contractor shall of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground

during the excavation of such trenches or excavations. If such plan varies from the shoring system standards of the State Division of Occupational Safety and Health, the plan shall be prepared, stamped and signed by a Civil or Structural Engineer registered in the State of California. Nothing in this subsection shall be deemed to allow the use of a shoring, sloping, or protective system less effective than that required by the DOSH Construction Safety Orders.

The requirements as above set forth by the State Division of Occupational Safety and Health and the State Labor Code for the provision of worker protection from the hazard of caving ground are minimum requirements. In addition, the Contractor shall provide, for the life of the Contract, the same protection for any person, including the Engineer or any of his authorized representatives, subcontractors, or any other person required to be exposed to such hazard in the performance of the work, inspection of the work, or any other reason.

Payment for worker protection from caving ground in excavations during construction shall be made at the price bid therefor; no additional payment will be made. Payment shall include all materials, labor and equipment necessary to adequately brace, shore, shield or slope all excavations and trenches as required by and the Division of Occupational Safety and Health Title 8 Construction Safety Orders. Also included are any costs incurred by the Contractor in obtaining all required OSHA permits and preparing a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection as required by State Labor Code Section 6705.

If the bid item therefor is based on a lump sum amount, payment will be pro-rated on the basis of the ratio of completed length of trench or other excavation requiring Worker Protection to the total length of trench or other excavation requiring Worker Protection.

7-16 Injury Or Damage To Persons Or Property

Reference is made to Section 5-3, "Contractor's Responsibility For The Work," Section 5-9, "Preservation of Property," Section 7-4, "Contractor's Insurance Requirements and Hold Harmless," and Section 7-16, "Injury or Damage to Persons or Property." Neither the TVMMW, the Engineer, nor any other officer, authorized agent, employee or volunteer shall be personally responsible for any liability arising under the Contract. The Contractor shall indemnify and hold harmless the TVMMWC, the TVMMWC, the Engineer, and all TVMMWC Officers, Employees, agents and volunteers from any suits, claims, damages, losses, liability, demands, or actions brought by any person or persons for or on account of any injuries or damage sustained in or arising out of the construction of the Work or in consequence thereof. The TVMMWC may retain as much of the money due the Contractor as shall be considered necessary until disposition has been made of such suits or claims for damages as aforesaid.

If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, any of the other party's employees or agents, or others for whose acts such party is legally liable, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding ten (10) days after first observance. The notice shall provide sufficient detail to enable the other party to investigate the matter. If a Claim for additional cost or time related to this Claim is to be asserted, it shall be made as provided in Section 4-12, Notices, Change Orders, and Claims."

7-17 Public Convenience

This Section 7-17 defines the Contractor's responsibility with regard to convenience of the public and traffic in connection with the Contractor's operations. Section 7-18, "Public Safety," provides requirements relating to the Contractor's responsibility for the safety of the public. The provisions in Section 7-18 are in addition to the provisions in this Section 7-17, and the Contractor will not be relieved of the responsibilities as set forth in Section 7-18 by reason of conformance with any of the

provisions in this Section 7-17.

The Contractor shall adhere to the provisions of Section 4-14, "Detours," and Section 12, "Temporary Traffic Control," of the State Standard Specifications, concerning traffic control requirements, flagging and traffic-handling equipment and devices used in carrying out the provisions in this Section 7-17 and said Section 7-18, and for provisions relating to the passage of traffic over or around the work by detours, and other traffic.

In the event of a suspension of the work, the provisions of Section 8-11, "Temporary Suspension of Work," will apply.

The Contractor shall so conduct operations as to offer the least possible obstruction and inconvenience to the public and shall have under construction no greater length or amount of work than can be prosecuted properly with due regard to the rights of the public. Unless otherwise provided in the Contract Specifications or approved by the Engineer, all public traffic shall be permitted to pass through the work with as little inconvenience and delay as possible. Where possible, traffic shall be routed on new or existing paved surfaces.

Existing traffic signals and highway lighting within the project area or affected by the work shall be kept in operation for the benefit of the traveling public during progress of the work. Unless otherwise provided in the Contract Specifications, the Contractor shall be responsible for routine maintenance of existing systems.

Construction operations shall be conducted in such a manner as to cause as little inconvenience as possible to abutting property owners. Convenient access to driveways, houses, and buildings along the line of the work shall be maintained and temporary approaches to crossings or intersecting streets shall be provided and kept in good condition. When the abutting property owner's access across the right-of-way line is to be eliminated, or to be replaced under the contract by other access facilities, the existing access shall not be closed until the replacement access facilities are usable. Spillage resulting from hauling operations along or across any public traveled way shall be removed immediately by the Contractor at the Contractor's expense.

Water or dust palliative shall be applied if ordered by the Engineer for the alleviation or prevention of dust nuisance and comply with State and Regional dust control requirements.

The Contractor will be contacted when a situation or condition is identified as a PUBLIC INCONVENIENCE. An appropriate response time will be granted (usually 24 hours). The contractor must resolve the issue within the response time granted. Liquidated damages will accrue at the rate of \$250 per calendar day for each day beyond the resolution date that the situation remains unresolved. The TVMMWC may, at its option, take corrective action following the expiration of the granted time. All costs incurred by the TVMMWC for taking such corrective action, plus a \$250 administrative fee, will be deducted from monies owed the Contractor or billed to the Contractor in the case of non-public work being done under permit.

The foregoing process shall apply to all Contracts awarded by the TVMMWC and also to Encroachment Permits issued by the TVMMWC to Contractors for non-public work. The provisions of Section 9-7, "Stop Notices; TVMMWC's Right to Withhold Payments," will apply.

Full compensation for conforming to the provisions in this Section 7-17 shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefor.

7-18 Public Safety

The Contractor shall provide for the safety of traffic and the public during construction. The Contractor's attention is directed to the provisions of Section 7-4, "Contractor's Insurance Requirements and Hold Harmless," Section 7-16, "Injury or Damage to Persons or Property," and Section 7-17, "Public Convenience," relating to the Contractor's responsibility for providing for the convenience and safety of the public in connection with the Contractor's operations.

The provisions of Section 12, "Temporary Traffic Control," of the State Standard Specifications, concerning flagging and traffic-handling equipment and devices used in carrying out the requirements of Section 7-17, "Public Convenience," apply to this Section 7-18.

Whenever the Contractor's operations create a condition hazardous to traffic or to the public, the Contractor shall, at the Contractor's expense and without cost to the TVMMWC, furnish, erect and maintain those fences, temporary railing (Type K), barricades, lights, signs and other devices and take such other protective measures that are necessary to prevent accidents or damage or injury to the public. Fences, temporary railing (Type K), barricades, lights, signs, and other devices furnished, erected and maintained by the Contractor, at the Contractor's expense, are in addition to any construction area traffic control devices for which payment is provided for elsewhere in these specifications.

The Contractor shall also furnish such flaggers as are necessary to give adequate warning to traffic or to the public of any dangerous conditions to be encountered, and payment therefor will be made as provided in Section 12, "Temporary Traffic Control," of the State Standard Specifications.

Signs, lights, flags, and other warning and safety devices and their use shall conform to the requirements set forth in Part 6 of the California MUTCD. Signs or other protective devices furnished and erected by the Contractor, at the Contractor's expense, as above provided, shall not obscure the visibility of, nor conflict in intent, meaning and function of either existing signs, lights and traffic control devices or any construction area signs and traffic control devices for which furnishing of, or payment for, is provided elsewhere in the specifications. Signs furnished and erected by the Contractor, at the Contractor's expense, shall be approved by the Engineer as to size, wording and location.

The installation of general roadway illumination shall not relieve the Contractor of the responsibility for furnishing and maintaining any of the protective facilities herein before specified.

All movements of workmen and construction equipment on or across lanes open to public traffic shall be performed in a manner that will not endanger public traffic and be in conformance with Section 7-5, "Vehicle Code."

When leaving a work area and entering a roadway carrying traffic, the Contractor's equipment whether empty or loaded shall in all cases yield to traffic.

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 open for use by public traffic.

Temporary facilities which the Contractor uses to perform the work shall not be installed or placed where they will interfere with the free and safe passage of public traffic. Temporary facilities which could be a hazard to public safety if improperly designed shall comply with design requirements specified in the contract for those facilities or, if none are specified, with standard design criteria or codes appropriate for the facility involved. Working drawings and design calculations for the temporary facilities shall be prepared and signed by an engineer who is registered as a Civil Engineer in the State of California and shall be submitted to the Engineer for approval pursuant to Section 4-4, "Working Drawings." The submittals shall designate thereon the standard design criteria or codes used. Installation of the temporary facilities shall not start until the Engineer has reviewed and approved the drawings.

Should the Contractor appear to be neglectful or negligent in furnishing warning devices and taking protective measures as above provided, the Engineer may direct attention to the existence of a hazard and the necessary warning devices shall be furnished and installed and protective measures taken by the Contractor at the Contractor's expense. Should the Engineer point out the inadequacy of warning devices and protective measures, that action on the part of the Engineer shall not relieve the Contractor from responsibility for public safety or abrogate the obligation to furnish and pay for these devices and measures.

In accordance with Section 5-8, "Emergency Availability" in the event a condition or situation develops either during or after normal work hours which requires the attention of the Contractor, the following process applies:

If the condition or situation presents a clear and imminent public hazard and is deemed by the Engineer to be an EMERGENCY, and in the event the Contractor fails to immediately respond the Engineer's direction to correct the condition, or attempts to contact the after-hours emergency response personnel of the Contractor fail, or in the event contact is made and the Contractor is either unwilling or unable to respond in a timely manner to the condition or situation deemed an emergency by the Engineer, then the Engineer shall mobilize immediately the resources necessary to respond to the situation.

In the event a condition or situation is deemed by the Engineer to present a potential public hazard and is considered to be URGENT, and upon notification thereof by the Engineer to the Contractor the condition is not corrected within 3 hours, or in the event attempts to contact the after-hours emergency response personnel of the Contractor fail, or in the event contact is made and the Contractor is either unwilling or unable to respond within three hours of contact, then the condition or situation deemed a HAZARD will be upgraded to an EMERGENCY by the Engineer, and the appropriate measures as above provided will be taken.

Due care will be taken to effect only those measures necessary to remove the emergency or urgent condition or situation. The Contractor will be invoiced for all direct costs incurred by the TVMMWC, plus an emergency response fee of \$500 and an administrative fee of \$250. Once additional resources are deployed by the Engineer to resolve the emergency, the Contractor may still participate to reduce the cost of the deployment by the Engineer. All costs incurred by the TVMMWC for taking such corrective action will be deducted from monies owed the Contractor. Parties not under contract to the TVMMWC but subject to these Standard Specifications will be billed for the TVMMWC's costs.

The foregoing process shall apply to all Contracts awarded by the TVMMWC and also to Encroachment Permits issued by the TVMMWC to Contractors for non-public work. The provisions of Section 9-7, "Stop Notices; TVMMWC's Right to Withhold Payments," will apply.

Except as otherwise provided in this Section 7-18 or in the Contract Specifications, full compensation for conforming to all of the provisions in this Section 7-18 shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefor.

7-19 Patents

The Contractor shall be responsible for the use of patented materials, equipment, devices, or processes used on or incorporated in the work. 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 hold harmless the TVMMWC, the Engineer, and their duly authorized representatives, from all suits at law, losses, liability, demands, claims, or actions of every nature for, or on account of the use of any patented materials, equipment, devices or processes.

7-20 Property Rights Of Materials

Nothing in the Contract shall be construed as vesting in the Contractor any right of property in the materials used after they have been attached or affixed to the work or the soil, or after payment has been made for 90 percent of the value of materials delivered to the site of the work or stored subject to or under the control of the TVMMWC. All such materials shall become the property of the TVMMWC upon being so attached or affixed or upon payment of 90 percent of the value of materials delivered to the site of the work or stored subject to or under the control of the TVMMWC. As provided in Subsection 5-3, "Contractor's Responsibility For The Work," the Contractor shall care for and protect the work until final acceptance of the work by the TVMMWC.

7-21 Amendments To Contracts

Each and every provision of law and clause required by law to be inserted in the Contract for the work to be done under the Specifications shall be deemed to be inserted therein, and the Contract shall read and enforced as though it were included therein; and if, through mere mistake or otherwise, any such provision is not inserted or is not correctly inserted, then upon the application of either party thereto, the Contract shall forthwith be physically amended to make such insertion.

7-22 Verbal Statements Not Binding

It is understood and agreed that the written terms and provisions of the Contract shall supersede all verbal statements of the Engineer or other representatives of the TVMMWC and such statements shall not be effective, or be construed as entering into or forming a part of, or altering in any way whatsoever the written agreement.

7-23 Guarantee

Whether working under a TVMMWC Contract or under Encroachment Permit for Utility, Communications, or private work, the Contractor shall guarantee the proper installation and performance of all equipment, facilities and materials installed, including all landscape plantings and irrigation systems, or work performed pursuant to the Plans, Contract Specifications, these Specifications, or TVMMWC Encroachment Permit, for a period of one year from the date of the Acceptance of the Work by the TVMMWC, or other period set forth in the Contract Specifications. Any failure of equipment, facilities, landscape planting, or workmanship prior to the end of the one-year or other specified period shall be repaired or corrected by the Contractor at his sole expense in accordance with instructions of the Engineer. The provisions of Sections 3-5, "Material Statement, Samples and Guarantees," 5-23, "Guarantee of Workmanship," and 6-10, "Guarantee of Materials," also apply.

SECTION 8 - PROGRESS AND PROSECUTION

8-1 Sequence And Progress Of The Work

Unless otherwise provided in the Contract Specifications, the Contractor shall direct the order and sequence of work and coordinate the construction of the several parts of the Contract to a successful completion as rapidly as possible. If the Engineer determines, at any time, that appliances used, or to be used, are insufficient or improper for securing the quality of work required or the required rate of progress, the Engineer may order the Contractor to increase efficiency, or to improve their character. The Contractor shall conform to such order; but the failure of the Engineer to demand any increase of such efficiency or any improvement shall not release the Contractor from the obligation to secure the quality of work, or the rate of progress specified.

8-2 Assignment Of Contract

The Contractor shall not assign the Contract or any part thereof, without the approval of the TVMMWC or without the consent of surety unless the surety has waived its rights to notice of assignment. Consent will not be given to any proposed assignment which would relieve the original Contractor or the Contractor's surety of their responsibilities under the contract. All assignments of funds are subject to the prior lien for services rendered or materials supplied for the performance of the work called for in favor of all persons, firms, or corporation rendering such services or supplying materials, and all deductions provided for in the contract and particularly all monies withheld, whether assigned or not, shall be subject to being used by the TVMMWC for the completion of the work in the event that the Contractor should be in default therein.

8-3 Subcontracting

Section 2-7, "Designation of Subcontractors," sets forth the requirement that any subcontractor who performs in excess of one half of one percent (1/2 %) of the original contract price, or in the case of a street project so designated by the TVMMWC, one half of one percent (1/2 %) or \$10,000, whichever is greater, shall be designated on the Bid Proposal Form. At the time of the pre-construction conference, the Contractor shall file with the Engineer a written statement showing the work to be subcontracted, the names of the subcontractors and the description of each portion of the work to be subcontracted.

In accordance with Section 4109 of the State Public Contract Code, subcontracting of any portion of the work in excess of one-half of one percent of the Contractor's total bid for which no subcontractor was designated in the original bid shall only be permitted in cases of public emergency or necessity. It will be the Contractor's responsibility to submit to the Engineer the facts constituting a public emergency or necessity. If approved by the Engineer, a finding in writing will be made a part of the public record setting forth the TVMMWC's decision and the reasons therefor.

The Contractor shall give personal attention to the fulfillment of the contract and shall keep the work under the Contractor's control. No subcontractor will be recognized as such, and all persons engaged in the work of construction will be considered as employees of the Contractor and the Contractor will be held responsible for their work, which shall be subject to the provisions of the contract and specifications. When a portion of the work which has been subcontracted by the Contractor is not being prosecuted in a manner satisfactory to the Engineer, the subcontractor shall be removed immediately on the requisition of the Engineer and shall not again be employed on the work. The Contractor shall be responsible for the coordination of all trades, subcontractors, and material handlers engaged in the work. Neither the TVMMWC nor the Engineer will undertake to settle any differences between the Contractor and its subcontractors or between subcontractors.

Subcontracts shall include provisions that the contract between the TVMMWC and the Contractor is part of the subcontract, and that all terms and provisions of the contract are incorporated in the subcontract. Subcontracts shall also contain certification by the subcontractor that the subcontractor is experienced in and qualified to do, and knowledgeable about, the subcontracted work. Copies of subcontracts shall be available to the Engineer upon written request, and shall be provided to the Engineer at the time any litigation against the TVMMWC concerning the project is filed.

Pursuant to the provisions of Section 6109 of the Public Contract Code, the Contractor shall not perform work under the contract with a subcontractor who is ineligible to perform work on the project pursuant to Section 1777.1 or 1777.7 of the Labor Code.

The purchase of concrete, liquid asphalt, paving asphalt, pipelines, valves, fire hydrants, casing, or any other materials produced at and supplied from established and recognized commercial plants, together with delivery of such materials to the site of the work by means of vehicles owned or operated by such plants or by recognized commercial hauling companies, shall not be considered as subcontracting under these Standard Specifications.

Nothing contained in the Contract documents shall create any contractual relation between any subcontractor and the TVMMWC.

8-4 Preconstruction Conference

Prior to construction and when set forth in the Contract Specifications or at the discretion of the Engineer, a meeting will be called by the Engineer with the Contractor, subcontractors and interested agencies or parties affected by the work, to discuss the proposed work. The preconstruction meeting shall be the proper time and place for the Contractor to submit to the Engineer required documents including, as a minimum, the following:

- Construction Schedule - Section 8-5
- Traffic Management (Control) Plan
- Names of Superintendent - Section 5-7
- Emergency Contact List - Section 5-8
- Proposed Notice to Residents - Section 8-7
- Temporary Easements - Section 5-11
- Request for TVMMWC Approved Water Source - Section 5-13

8-5 Construction Schedule

After notification of award and prior to start of any work, at the pre-construction conference the Contractor shall submit to the Engineer for acceptance his proposed construction schedule. Acceptance or lack of rejection by TVMMWC of a proposed construction schedule shall not be deemed approval and shall not create responsibility on the part of the TVMMWC for any defects or mistakes in the schedule. The Contractor bears sole responsibility for the accuracy, utility and reasonableness of the schedule. The construction schedule shall be in the form of a tabulation, chart, or graph and shall be in sufficient detail to show the chronological relationship of all activities of the project including, but not limited to, estimated starting and completion dates of various activities, (including early and late dates and float for each activity), procurement of materials, the critical path, and scheduling of equipment. The construction schedule shall be consistent in all respects with the time and order of work requirements of the Contract.

The Contractor shall submit an updated schedule on a monthly basis that includes an accurate as-built schedule and the current as-planned schedule. The Contractor shall submit its daily logs for the month with the updated schedule. Float shall be used by the parties on a “first come, first serve”

basis. If the Contractor desires to make a significant change in his method of operations after commencing construction, he shall submit to the Engineer a revised construction schedule in advance of beginning revised operations. If the Contractor's actual progress falls behind the scheduled progress, within seven (7) days of a TVMMWC request the Contractor shall prepare and submit a recovery plan. The recovery plan must include a revised schedule that would recover the lost time and still complete the Work by the scheduled completion deadline. The recovery plan shall also list any additional costs that would be incurred by Contractor during implementation of the recovery plan. If the TVMMWC directs Contractor to implement the recovery plan, then Contractor shall do so. If the Contractor believes that it is entitled to additional compensation (money or time) for implementing the recovery plan, then Contractor shall observe the Claims and change order procedures in Sections 4-10, "Changes," and 4-12, "Notices, Change Orders, and Claims."

All schedules submitted by the Contractor shall be certified as true and correct (using the general format of the certification form in said Section 4-12).

The Contractor may not maintain any Claim or cause of action against the TVMMWC for damages incurred as a result of its failure or inability to complete the Work in a shorter period than established in the Contract. The parties stipulate that the period set forth in the Contract is a reasonable time within which to perform the Work.

8-6 Beginning Of Work

Unless otherwise provided in the Contract Specifications, the Contractor shall commence work under the contract within fifteen (15) calendar days after the date of the Notice to Proceed and shall diligently prosecute the same to completion within the time limit provided in the Contract Specifications. Should the Contractor begin work in advance of receiving the Notice to Proceed, as above provided, any work performed shall be considered as having been done at the Contractor's sole risk and as a volunteer and no payment is guaranteed for any such work performed.

8-7 Notice To Residents

Not less than two (2) calendar days nor more than five (5) calendar days prior to proceeding with the work in any given area, the Contractor shall notify in writing all residents and tenants directly affected by the construction work. Such notice shall provide the nature of the work, the approximate time for the completion of work, and any anticipated inconveniences. The notice shall be on the contracting firm's letterhead and shall be signed and shall include the project superintendent's name and telephone number. Prior to commencing work in each given area, the Contractor shall furnish the Engineer a copy of the notice given to residents and tenants and shall certify the date, location and method by which the notice was delivered. The Contractor shall also comply with the requirements of the Traffic Control Plan; Notifications.

For every occurrence when property access, sewer service or water source is to be interrupted by the Contractor's work, the Contractor shall give written notice to all affected residents/tenants not less than two (2) calendar days nor more than five (5) calendar days prior to said interruption. The notice(s) shall be in addition to the initial notice to residents described above.

All costs for compliance with this Section 8-7 shall be included in the various bid items of work; no additional payment will be made therefor.

8-8 Time Of Completion

The Contractor shall complete all or any designated portion of the work called for under the contract in all parts and requirements within the time set forth in the Contract Specifications. The current controlling operation or operations (i.e., the critical path) is to be construed to include any feature of

the work (e.g., an operation or activity, or a settlement or curing period) considered at the time by the Engineer and the Contractor, which, if delayed or prolonged, will delay the time of completion of the contract.

For contracts whose completion schedule is based on working days, a working day is defined as any day, except as follows:

Saturdays, Sundays and legal holidays declared by the TVMMWC;

Days on which the Contractor is prevented by inclement weather or conditions resulting immediately therefrom adverse to the current controlling operation or operations, as determined by the Engineer, from proceeding with at least 75 percent of the normal labor and equipment force engaged on that operation or operations for at least 60 percent of the total daily time being currently spent on the controlling operation or operations; or

Days on which the Contractor is prevented, by reason of requirements in the Contract Specifications, from working on the controlling operation or operations for at least 60 percent of the total daily time being currently spent on the controlling operation or operations.

Should the Contractor prepare to begin work at the regular starting time of any day on which inclement weather, or the conditions resulting from the weather, or the condition of the work, prevents the work from beginning at the usual starting time and the crew is dismissed as a result thereof and the Contractor does not proceed with at least 75 percent of the normal labor and equipment force engaged in the current controlling operation or operations for at least 60 percent of the total daily time being currently spent on the controlling operation or operations, the Contractor will not be charged for a working day whether or not conditions should change thereafter during that day and the major portion of the day could be considered to be suitable for those construction operations.

Determination that a day is a non-working day by reason of inclement weather or conditions resulting immediately therefrom, shall be made by the Engineer. The Contractor will be allowed fifteen (15) days from the issuance of the weekly statement of working days in which to file a written protest setting forth in what respects the Contractor differs from the Engineer; otherwise, the decision of the Engineer shall be deemed to have been accepted by the Contractor as correct. The Engineer will furnish the Contractor a weekly statement showing the number of working days charged to the contract for the preceding week, the number of working days of time extensions being considered or approved, the number of working days originally specified for the completion of the contract and the number of working days remaining to complete the contract and the extended date for completion thereof, except when working days are not being charged in conformance with the provisions in Section 8-11, "Temporary Suspension of Work," of these Specifications.

For contracts whose completion schedule is based on calendar days, a calendar day shall mean every day of the calendar, including weekends and holidays. Exclusions for inclement weather which prevents the Contractor from performing, as above provided for working days will be permitted unless otherwise specified in the Contract Specifications.

8-9 Liquidated Damages

It is agreed by the parties to the Contract that in case all the Work called for under the Contract is not complete before or upon expiration of the time limit as set forth in the Contract Specifications, damage will be sustained by the TVMMWC. Since it is and will be impractical to determine the actual damage which the TVMMWC will sustain in the event of and by reason of such delay, and since the delay will cause incalculable inconvenience to the public, it is therefor agreed that the Contractor will pay to the TVMMWC the sum indicated in the Contract Specifications for each and

every calendar day's delay beyond the time prescribed to complete the Work; and the Contractor agrees to pay such sum as set forth in the Contract Specifications, and in case the same is not paid, agrees that the TVMMWC may deduct the amount thereof from any money due or that may become due the Contractor under the Contract. Liquidated damages will accrue without notice, and any failure by TVMMWC to withhold for some or all of them shall not act as a waiver by TVMMWC of its rights to later claim the liquidated damages. Any waiver of liquidated damages by the TVMMWC must be express and in writing.

It is further agreed that in case the Work is not finished and completed in all parts and requirements within the specified time, the TVMMWC shall have the right to extend or not to extend the time for completion as may seem best to serve the interest of the TVMMWC. If the TVMMWC decides to extend the time limit for the completion of the Contract, the TVMMWC shall further have the right to charge to the Contractor, his heirs, assigns, or sureties, and to deduct from the final payment for the work all or any part, as the TVMMWC may deem proper, of the actual cost of engineering, inspection, superintendence, and other overhead expenses which are directly chargeable to the Contract, and which accrue during the period of such extension, except that the cost of final surveys and preparation of the final estimate shall not be included in such charges.

The Contractor shall not be assessed with liquidated damages, or the cost of engineering and inspection, during any delay in the completion of the work caused by acts of God or acts of the public enemy, the TVMMWC, fire, epidemics, quarantine restrictions, strikes and freight embargoes, provided that the Contractor shall, within five (5) calendar days from the beginning of such delay, notify the Engineer in writing of the causes of delay; and the Engineer's finding of the facts thereon shall be final and conclusive.

No extension of time will be granted for a delay caused by a shortage of materials unless the Contractor furnishes to the Engineer documentary proof that the Contractor has made every effort to obtain the materials from all known sources within reasonable reach of the work in a diligent and timely manner, and further proof in the form of supplementary progress schedules, as required in Section 8-5 "Construction Schedule," that the inability to obtain the materials when originally planned, did in fact cause a delay in final completion of the entire work which could not be compensated for by revising the sequence of the Contractor's operations. The term "shortage of materials," as used in this Section 8-9, shall apply only to materials, articles, parts or equipment which are standard items and are to be incorporated in the work. The term "shortage of materials," shall not apply to materials, parts, articles or equipment which are processed, made, constructed, fabricated or manufactured to meet the specific requirements of the contract. Only the physical shortage of material will be considered under these provisions as a cause for extension of time. Delays in obtaining materials due to priority in filling orders will not constitute a shortage of materials.

If the Contractor is delayed by the TVMMWC in completion of the Work by reason of changes made under Section 4-10, "Changes," by failure of the TVMMWC to acquire or clear right of way, by Extra Work under Section 4-11, "Extra Work," or by any act of the Engineer or of the TVMMWC, not contemplated by the contract, an extension of time commensurate with the delay in completion of the work thus caused will be granted, provided that the Contractor shall notify the Engineer in writing of the causes of delay within 15 days from the beginning of the delay. The Engineer shall ascertain the facts and the extent of the delay, and the Engineer's findings thereon shall be final and conclusive.

Except for the additional compensation provided for in Section 8-10, "Right of Way Delays," and except as provided in Public Contract Code Section 7102, the Contractor shall have no claim for damage or compensation for any delay or hindrance.

It is the intention of the above provisions that the Contractor shall not be relieved of liability for liquidated damages or engineering and inspection charges for any period of delay in completion of the work in excess of that expressly provided for in this Section 8-9.

8-10 Right-Of-Way Delays

The TVMMWC makes a diligent effort at securing a clear right of way for the performance of the work required by the contract. For some contracts, it is in the best interests of the TVMMWC and/or the public to award a contract before all utility relocations, utility undergrounding, right-of-way purchases, removal of obstructions, relocation of underground facilities by others, or other potential causes of delay are removed. Where known, these will be shown on the Plans with the actions to be taken, and enumerated in the Contract Specifications. The TVMMWC will make every effort to ascertain the approximate time required to clear the right-of-way and so indicate in the Contract Specifications. The contractor shall also make a diligent effort by contacting the owner/agency/company of the time expected to clear the right of way before submitting a bid. In so doing, the contractor shall include in his costs any delays that can be expected or result from such relocations or acquisitions. The Engineer may grant a time extension deemed warranted due to such delays, or may temporarily suspend the contract in accordance with Section 8-11, "Temporary Suspension of Work." Section 7102 of the State Public Contract Code notwithstanding, no additional compensation will be paid for such delays.

If new and unforeseen right of way delays not contemplated before the award of the contract causes the Contractor to sustain a loss which could not have been avoided by the judicious handling of forces, equipment, and plant, there shall be paid to the contractor that amount that the Engineer may find to be a fair and reasonable compensation for that part of the Contractor's actual loss that, in the opinion of the Engineer, was unavoidable. Payment will be determined on the basis of extra work on a force account basis, or as otherwise agreed to by and between the Engineer and the Contractor, in accordance with Section 4-11, "Extra Work."

8-11 Temporary Suspension Of Work

The Engineer shall have the authority to suspend the Work wholly or in part for such period as TVMMWC desires. The Contractor shall immediately obey such order of the Engineer to suspend the Work, and shall not resume the Work until ordered in writing by the Engineer.

In the event that a suspension of Work is ordered as provided above, and should that suspension be ordered by reason of the failure of the Contractor to carry out orders or to perform any provision of the contract; or by reason of weather conditions being unsuitable for performing any item or items of Work, which Work, in the sole opinion of the Engineer, could have been performed prior to the occurrence of the unsuitable weather conditions had the Contractor diligently prosecuted the Work when weather conditions were suitable; then Contractor shall not be entitled to compensation (money or time) for the suspension, and the Contractor, at the Contractor's expense, shall do all the work necessary to provide a safe, smooth, and unobstructed passageway through construction for use by traffic during the period of that suspension as provided in Sections 7-17, "Public Convenience," and 7-18, "Public Safety," and as specified in the Contract Specifications. In the event that the Contractor fails to perform the Work above specified, the TVMMWC may perform that Work and the cost thereof will be deducted from moneys due or to become due the Contractor.

In the event that a suspension of Work is ordered by the Engineer due to unsuitable weather conditions, and in the sole opinion of the Engineer, the Contractor has prosecuted the Work with energy and diligence prior to the time that operations were suspended, the cost of providing a smooth and unobstructed passageway through the Work will be paid for as Extra Work as provided in Section 4-11, "Extra Work," or at the option of the Engineer, that Work will be performed by the TVMMWC at no cost to the Contractor. If the Engineer orders a suspension of all of the Work or a portion of the Work which is the current controlling operation (i.e., critical path) due to unsuitable weather conditions, and in the sole opinion of the Engineer, the Contractor has prosecuted the Work with energy and diligence prior to the time that operations were suspended, then Contractor shall be entitled to a time extension for the period of the suspension. If the portion of Work suspended is not a current controlling operation or operations, but subsequently does become the current controlling operation or operations, the determination of time extension will be made on the basis of the then current controlling operation or operations.

If a suspension of Work is ordered by the Engineer, due to the failure on the part of the Contractor to carry out orders given or to perform any provision of the contract, the days on which the suspension order is in effect shall be considered for time extension only if permitted under Section 8-8, "Time of Completion."

8-12 Use Of Completed Portions; TVMMWC's Right To Complete

The TVMMWC shall have the right to take possession of, use, or maintain and protect any completed portions of the Work. However, such possession, use, or maintenance and protection shall not be deemed as accepting any Work, regardless of whether it has or has not been completed in accordance with the Contract documents.

The TVMMWC has the right to perform some or all of the Contractor's remaining Work if the Contractor fails or refuses to carry out the Work in accordance with the Contract Documents. The TVMMWC may exercise this right at any time during the Contractor's work, including the closeout or punch list phases. The TVMMWC shall first provide written notice to Contractor of Contractor's failure or refusal to perform in accordance with the Contract Documents, and such notice shall demand commencement or correction of such failure or refusal to perform within a reasonable time not to be less than seven (7) days. Such notice need not specifically refer to this provision.

If the Contractor fails to commence correction within said reasonable time, or ever fails to continue correction after expiration of said reasonable time, the TVMMWC may instruct Contractor to stop performing such Work and notify Contractor that TVMMWC shall perform such Work itself. Any direction to Contractor to not perform such Work shall act as a deletion of such Work from Contractor's scope of Work, and TVMMWC may accept the Contractor's remaining contractual scope of Work as complete (pursuant to Section 8-14, "Acceptance of Contract") even though the deleted Work may not have been performed yet by TVMMWC. TVMMWC may perform the deleted Work at any time by whatever reasonable method the TVMMWC may deem expedient without prejudice to other remedies the TVMMWC may have. In the event the TVMMWC takes bids to complete the Work so deleted, Contractor shall not be eligible for the award of the contract.

The Contractor will be invoiced all of the TVMMWC's costs of performing the deleted Work, including compensation for additional professional and internally generated services and expenses made necessary by such deletion. The TVMMWC may withhold the estimated costs from any retention release and/or progress payments due the Contractor, pursuant to Section 9-7, "Stop Notices; TVMMWC's Right to Withhold Payments." If retention and payments withheld then or thereafter due the Contractor are not sufficient to cover the TVMMWC's actual costs of completing the deleted Work, the Contractor shall pay the difference to the TVMMWC.

Prior to performing any of the deleted work itself, TVMMWC may, at its option, tender completion of the work to the Contractor's surety for completion by someone other than Contractor.

8-13 Termination Of Contract

If the Contractor files for bankruptcy; if the Contractor makes a general assignment for the benefit of his creditors; if a receiver should be appointed on account of the Contractor's insolvency; if the Contractor or any subcontractors should violate any of the provisions of the Contract; if the Contractor should refuse or should fail, except in cases for which extension of time is provided, to supply enough skilled workmen or proper materials; if the Contractor should fail to make prompt payment to subcontractors or for material or labor; or if the Contractor should disregard laws, ordinances or the instructions of the Engineer, the TVMMWC may serve written notice upon the Contractor and its surety of the TVMMWC's intention to terminate the Contract, such notice to contain the reasons for such intention to terminate the Contract and to provide five (5) calendar days for the Contractor to cure such violations and make satisfactory arrangements for correction thereof. In the case of filing for bankruptcy, the Contractor agrees that by entering this Contract it also stipulates that the bankruptcy court may grant relief to the TVMMWC from any automatic stay as to this Contract (and as to any escrow agreement) so that TVMMWC may proceed pursuant to this provision and terminate the contract if necessary. If within five (5) calendar days after the serving of the notice of intent to terminate, such violations do not cease and satisfactory arrangements for correction thereof are not made, then the TVMMWC may, at its discretion, terminate the Contract at any time thereafter.

In the event of any such termination, the TVMMWC shall immediately serve written notice thereof upon the Contractor and its surety; and the surety shall have the right to take over and perform the Contract, provided, however, that if the surety within ten (10) calendar days after the serving upon it of notice of termination does not give TVMMWC written notice of its intention to take over and perform the Contract or does not commence performance thereof within the ten (10) calendar days stated above from the date of the serving of such notice of termination, the TVMMWC may take over the work and prosecute the same to completion by contract or by any other method it may deem advisable, for the account and at the expense of the Contractor and its surety, and the Contractor and its surety shall be liable to the TVMMWC for any excess cost incurred by the TVMMWC. In such event the TVMMWC may, without liability for so doing, take possession of and utilize in completing the work such materials, appliances, plant and other property belonging to the Contractor as may be on the site of the work and necessary therefor. In such case, the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the Contract price shall exceed the expenses of finishing the work, including compensation for additional managerial and administration services, such excess shall be paid to the Contractor. If such expense shall exceed such unpaid balance, the Contractor and its surety shall pay the difference to the TVMMWC. The expense incurred by the TVMMWC, as herein provided and damage incurred through the Contractor's default, shall be certified by the Engineer.

The TVMMWC may, at any time, terminate the Contract for the TVMMWC's convenience and without cause. Upon receipt of written notice from the TVMMWC of such termination for the TVMMWC's convenience, the Contractor shall (1) cease operations as directed by the TVMMWC in the notice; (2) take actions necessary, or that the TVMMWC may direct, for the protection and preservation of the Work; and (3) except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders. The Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, but not overhead and profit on the Work not executed.

Any termination by TVMMWC under this Section 8-13, or suspension by TVMMWC under Section 8-11, "Temporary Suspension of the Work," shall not act as a waiver of any claims by TVMMWC against Contractor or others for damages based on breach of contract, negligence or other

grounds.

Contractor does not have the right to terminate the Contract or to suspend or slow down its performance of the Work. If Contractor believes that it is entitled to additional compensation (money and/or time) for any reason, or that it has been wronged for any reason, then it may submit a request for additional compensation and/or modification of the Contract; however, despite such requests as Contractor may make or disputes as may exist, Contractor shall continue to diligently prosecute the Work, and acceptably perform the Work, as required by the Contract through completion.

8-14 Acceptance Of Contract

When the Engineer has made the final inspection as provided in Section 5-22, "Final Inspection," and determines that the Work has been fully performed, the Engineer will certify the Work as ready for Acceptance and recommend that the TVMMWC formally accept the Work, and immediately upon and after the Acceptance of the Work by the TVMMWC, the Contractor will be relieved of the duty of maintaining and protecting the work as a whole, and the Contractor will not be required to perform any further work thereon except for warranty work; and the Contractor shall be relieved of the responsibility for injury to persons or property or damage to the work which occurs after the formal Acceptance by the TVMMWC. Within ten (10) days of Acceptance by the TVMMWC, the TVMMWC shall record a Notice of Completion with the Madera County recorder's office.

Acceptance of any Work shall not be deemed a waiver of the TVMMWC's rights to remedy by the Contractor of (a) defective Work covered by warranty or guarantee for which the TVMMWC gives timely notice to Contractor, and (b) latent defects resulting from defective materials or workmanship discovered after the TVMMWC's recording of its Notice of Completion.

8-15 Utility And Non-Street Facilities; Potholing

Attention is directed to Sections 4-6, "Existing Facilities and Structures Shown on Plans," and 5-9, "Preservation of Property." The Contractor shall protect from damage utility and other non-street facilities that are to remain in place, or to be installed, relocated or otherwise rearranged. As used in this Section 8-15, "non-street facilities" means any above or below ground facilities which are not a part of the roadway structural section, curb and gutter, and sidewalk. Utility shall include sewer, water, recycled water, storm drain, and irrigation pipelines, above and below ground electrical and gas facilities, cable or other communications facilities.

It is anticipated that some or all of the utility and other non-street facilities, both above ground and below ground, that are required to be rearranged (as used herein, rearrangement includes installation, relocation, alteration or removal) as a part of the street improvement will be rearranged in advance of construction operations. Where it is not anticipated that the rearrangement will be performed prior to construction, or where the rearrangement must be coordinated with the Contractor's construction operations, the existing facilities that are to be rearranged will be indicated on the plans or in the Contract Specifications. Where a rearrangement is indicated on the plans or in the Contract Specifications, the Contractor will have no liability for the costs of performing the work involved in the rearrangement unless the Plans or Contract Specifications indicate such rearrangement is to be performed by the Contractor.

The right is reserved to the TVMMWC and the owners of facilities, or their authorized agents, to enter upon the street right of way for the purpose of making those changes that are necessary for the rearrangement of their facilities or for making necessary connections or repairs to their properties. In compliance with Section 5-15, "Cooperation," the Contractor shall cooperate with forces engaged in this work and shall conduct operations in such a manner as to avoid any unnecessary delay or hindrance to the work being performed by the other forces. Wherever necessary, the work of the Contractor shall be coordinated with the rearrangement of utility or other non-street facilities, and the

Contractor shall make arrangements with the owner of those facilities for the coordination of the work.

The Contractor shall be aware of the possible existence of underground main or trunk line facilities not indicated on the Plans or in the Contract Specifications and to the possibility that underground main or trunk lines may be in a location different from that which is indicated on the Plans or in the Contract Specifications. **Prior to commencing any trenching, excavation, or boring operations, or any work that may damage any of the facilities or interfere with their service, the Contractor shall, by potholing or other means approved by the Engineer, ascertain the exact location of underground main or trunk line facilities whose presence is indicated on the Plans or in the Contract Specifications, the location of their service laterals or other appurtenances, and of existing service lateral or appurtenances of any other underground facilities which can be inferred from the presence of visible facilities such as buildings, meters and junction boxes, or manholes.**

If the Contractor cannot locate an underground facility whose presence is indicated on the Plans or in the Contract Specifications, the Contractor shall so notify the Engineer in writing. If the facility for which the notice is given is in a substantially different location from that indicated on the plans or in the special provisions, the additional cost of locating the facility will be paid for as extra work as provided in Section 4-11, "Extra Work."

If the Contractor discovers underground main or trunk lines not indicated on the plans or in the Contract Specifications, the Contractor shall immediately give the Engineer, and the Utility Owner if not the TVMMWC, written notification of the existence of those facilities. The main or trunk lines shall be located and protected from damage as directed by the Engineer, and the cost of that work will be paid for as extra work as provided in said Section 4-11. The Contractor shall, if directed by the Engineer, repair any damage which may occur to the main or trunk lines. The cost of that repair work, not due to the failure of the Contractor to exercise reasonable care, will be paid for as extra work as provided in said Section 4-11. Damage due to the Contractor's failure to exercise reasonable care shall be repaired at the Contractor's cost and expense.

Where it is determined by the Engineer that the rearrangement of an underground facility is essential in order to accommodate the street or underground improvement and the Plans and Specifications do not provide that the facility is to be rearranged, the Engineer will provide for the rearrangement of the facility by other forces or the rearrangement shall be performed by the Contractor and will be paid for as extra work as provided in said Section 4-11. Alternatively, the Engineer may direct the rearrangement of the street or underground improvement if movement of the underground facility is not essential.

Should the Contractor desire to have any rearrangement made in any utility facility, or other improvement, for the Contractor's convenience in order to facilitate the Contractor's construction operations, which rearrangement is in addition to, or different from, the rearrangements indicated on the Plans or in the Contract Specifications, the Contractor shall make whatever arrangements are necessary with the owners of the utility or other non-street facility for the rearrangement and bear all expenses in connection therewith.

The Contractor shall immediately notify the Engineer of any delays to the Contractor's operations as a direct result of underground main or trunk line facilities which were not indicated on the Plans or in the Contract Specifications or were located in a position substantially different from that indicated on the Plans or in the Contract Specifications, or as a direct result of utility or other non-highway facilities not being rearranged as herein provided (other than delays in connection with rearrangements made to facilitate the Contractor's construction operations or delays due to a strike or labor dispute). These delays will be considered right of way delays within the meaning of Section 8-10, "Right-of-Way Delays," and compensation for the delay will be determined in conformance with

the provisions in said Section 8-10. The Contractor shall be entitled to no other compensation for that delay.

Any delays to the Contractor's operations as a direct result of utility or other non-highway facilities not being rearranged as provided in this Section 8-15, due to a strike or labor dispute, will entitle the Contractor to an extension of time as provided in Section 8-9, "Liquidated Damages." The Contractor shall be entitled to no other compensation for that delay.

Potholes or other excavations performed to determine the location of Utility and Non-Street Facilities, and which potholes or excavations will remain outside the area to be excavated for improvements shown on the Plans or specified in the Contract Specifications, shall be backfill, compacted, and the surface thereof restored in accordance with Section 19-3, "Trench and Structure Excavation, Backfill, Compaction, and Surface Restoration." Exception: Potholes or other excavations of diameter (or equivalent dimension if non-circular), of 9 inches or less, or any other pothole or excavation because of depth, shape, or other cause determined by the Engineer not to be feasible to apply the methods of said Section 19-3, shall be backfilled in accordance with the following manner: The bottom 1 foot of the pothole or other excavation shall be backfilled with clean sand; the remainder of the pothole or other excavation shall be backfilled with slurry cement conforming to Section 19-3.03F, "Slurry Cement Backfill," of the State Standard Specifications. The type of surface restoration for such locations shall be directed by the Engineer.

SECTION 9 - MEASUREMENT AND PAYMENT

9-1 Measurement Of Quantities

- A. All work to be paid for at a contract price per unit of measurement will be measured by the Engineer in accordance with the U.S. Customary Units of Measurement. A ton shall consist of 2,000 pounds avoirdupois.
- B. Quantities of work shall be determined from measurements or dimensions in horizontal planes. However, linear quantities of pipe, piling, fencing, and timber shall be considered as being the true length measured along the longitudinal axis.
- C. Volumetric quantities will be determined by the Engineer, and shall be the product of the mean area or vertical or horizontal sections and the intervening horizontal or vertical dimension.

When payment is to be made on the basis of weight, the weighing shall be done on scales furnished by and at the expense of the Contractor, or on other sealed scales regularly inspected by the State of California, Department of Food & Agriculture, Division of Measurements & Standards, or its designated representative. All scales shall be suitable for the purpose intended and shall conform to the Specifications of the State of California, Department of Food & Agriculture, Division of Measurements & Standards. The scales shall be operated by a weigh-master licensed in accordance with the provisions of the California Business and Professions Code. The Contractor shall furnish a Public Weighmaster's certificate, or a Private Weigh-master's certificate of certified daily summary weight sheets. The operator of each vehicle shall obtain a weight or load slip from the weigher and deliver said slip to the Engineer at the point of delivery of the material.

Other materials and items of work which are to be paid for on the basis of measurement shall be measured in accordance with the methods stipulated in these Specifications, or the Contract Specifications for the particular items involved.

Full compensation for all expense involved in conforming to the requirements specified for measuring and weighing materials shall be considered as included in the unit price paid for the materials being measured or weighed and no additional compensation will be allowed therefor.

9-2 Cost Breakdown

Upon request of the Engineer, the Contractor shall submit, in a form acceptable to the Engineer, a schedule showing the subdivision of lump sum bid prices, into their various parts, stating quantities and prices for each part, to be made a basis for checking or computing monthly estimates, if such partial payments for lump sum items are specified. The prices shall include all costs of each item. The schedule of values shall be balanced and shall not shift excessive portions of the contract price into any particular part of the Work, especially parts of the Work being performed earlier in the schedule. No partial payment will be made to the Contractor until such schedule has been submitted to and approved by the Engineer, if required by him.

9-3 Final Pay Items

When an item of work is designated as (F) or (S-F) in the Engineer's Estimate, or is otherwise indicated in the Contract Specifications as a Final Pay Item, the estimated quantity for that item of work shall be the final pay quantity, unless the dimensions of any portion of that item are revised by the Engineer, or the item or any portion of the item is eliminated. If the dimensions of any portion of the item are revised, and the revisions result in an increase or decrease in the estimated quantity of that item of work, the final pay quantity for the item will be revised in the amount represented by the changes in the dimensions. If a final pay item is eliminated, the estimated quantity for the item will

be eliminated. If a portion of a final pay item is eliminated, the final pay quantity will be revised in the amount represented by the eliminated portion of the item of work.

The estimated quantity for each item of work designated as (F) or (S-F) or indicated otherwise as a final pay item in the Engineer's Estimate shall be considered as approximate only, and no guarantee is made that the quantity which can be determined by computations, based on the details and dimensions shown on the plans, will equal the estimated quantity. No allowance will be made in the event that the quantity based on computations does not equal the estimated quantity.

In case of discrepancy between the quantities shown in the Engineer's Estimate for a final pay item and the quantity or summation of quantities for the same item shown on the Plans, payment will be based on the quantity shown in the Engineer's Estimate.

9-4 Scope Of Payment

The Contractor shall accept the compensation provided in the Contract as full payment for furnishing all labor, materials, tools, equipment, and incidentals necessary to the completed Work, for performing all Work contemplated and embraced under the Contract; also for loss or damage arising from the nature of the Work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the Work until the acceptance by the TVMMWC and for all risks of every description connected with the prosecution of the Work; also for the expenses incurred in consequence of the suspension or discontinuance of the Work as provided in the Contract; and for completing the Work according to the Plans and Specifications. Neither the payment of any estimate nor of any retained percentage shall relieve the Contractor of the obligation to make good any defective work or material.

No compensation will be made in any case for loss of anticipated profits.

The lump sums and/or unit prices shown in the bid proposal shall include full compensation for all Work and expenses appurtenant to the accomplishment of the project described in these Standard Specifications in the manner indicated herein, including all items delineated in the Contract documents for which specific bid items are not set up in the bid proposal. The Contractor shall proportionally spread all incidental costs associated with the work for which there are no separate bid items into the amount bid for those items of work for which there are bid items, and no separate or additional payment will be made for any requirement of the Contract not specifically listed on the bid proposal.

9-5 Payment For Extra Work

Extra Work as defined in Section 4-11, "Extra Work," when ordered and accepted, shall be paid for under a written contract change order in accordance with the terms therein provided. Payment for Extra Work will be made at the unit price or lump sum previously agreed upon by the Contractor and the TVMMWC, or on a force account basis.

When extra work is to be paid for on a force account basis, the Contractor shall be compensated in accordance with the provisions of Section 9-1.04, "Force Account," of the State Standard Specifications. Any references therein to "State" or "Department" shall mean "TVMMWC." References in said Section 9-1.04 to Section 9-1.06, "Partial Payments," shall mean Section 9-6, "Partial ('Progress') Payments and Retentions," of these Standard Specifications.

If the Contractor and the TVMMWC cannot agree on the force account price to be paid for Extra Work, or if the Contractor and the TVMMWC cannot agree that certain work is Extra Work, then the Contractor shall follow the claim and change order procedures of Sections 4-10, "Changes," and 4-12, "Notices, Change Orders, and Claims."

Payment as provided herein shall constitute full compensation to the Contractor for performance of Extra Work, and no additional compensation will be allowed therefor.

9-6 Partial (“Progress”) Payments And Retentions

By the twentieth day of each month, the Contractor shall, on forms approved by the Engineer, furnish the Contractor’s estimate of work completed prior to that date based on the schedule of values submitted by the Contractor pursuant to Section 9-2, “Cost Breakdown.” The estimate and application must include the Contractor’s previous month’s daily logs and updated monthly schedule, or the TVMMWC has the right to reject it. For materials delivered to the site and which are eligible for partial payment, the amount of any material to be considered in making an estimate will in no case exceed the amount thereof which has been reported by the Contractor to the Engineer on forms approved by the Engineer properly filled out and executed, including accompanying documentation as therein required, less the amount of the material incorporated in the work to the time of the estimate. Only materials to be incorporated in the work will be considered. The estimated value of the material established by the Engineer will in no case exceed the contract price for the item of work for which the material is furnished. Payment requests submitted after the 20th day of the month will not be processed for payment in the current month, but will be processed for payment in the next succeeding monthly payment period, when such payment will become due and payable.

The Engineer shall review, and revise if necessary, the Contractor’s progress payment application. If the TVMMWC determines that the application is not a proper payment request, the TVMMWC shall return it to Contractor as soon as practicable with an explanation of why it is not proper, but not later than seven (7) days after receipt. If the Contractor and TVMMWC cannot agree on the amount of work performed or other aspects of the application, then the Contractor shall resubmit using the Engineer’s version. (If the Contractor feels that it should be paid more, it may follow the claims process under Section 4-12, “Notices, Change Orders, and Claims.”) The TVMMWC shall make the payment within thirty (30) days of the Contractor’s submittal of an undisputed and properly submitted payment application.

The TVMMWC shall retain ten (10) percent of the estimated value of the work done and ten (10) percent of the value of materials so estimated to have been furnished and delivered and unused as part security for the fulfillment of the contract by the Contractor. At the discretion of the Engineer, at any time after fifty (50) percent of the work has been completed, if the Engineer finds that satisfactory progress is being made, the TVMMWC may reduce the amount retained from any of the remaining partial progress payments in accordance with Section 9203 of the State Public Contract Code.

The TVMMWC shall pay monthly to the Contractor, while carrying on the Work, the balance not retained, as aforesaid, after deducting therefrom all previous payments and all sums to be kept or retained under the provisions of the Contract. No monthly estimate or payment shall be required to be made when, in the judgment of the Engineer, the Work is not proceeding in accordance with the provisions of the contract. No monthly estimate or payment shall be construed to be an acceptance of any defective work or improper materials. Attention is directed to the prohibitions and penalties pertaining to unlicensed contractors as provided in Business and Professions Code Sections 7028.15(a) and 7031.

9-7 Stop Notices; TVMMWC’s Right To Withhold Payments

In addition to the ten (10) percent withheld pursuant to Section 9-6, “Partial (‘Progress’) Payments and Retentions,” the TVMMWC may withhold or nullify the whole or any part of any partial or final progress payment or any release of retention, to such extent as may reasonably be necessary to protect the TVMMWC from loss on account of:

- (a) Defective work not remedied, irrespective of when any such work is found to be defective;
- (b) Failure of the Contractor to make proper payments for labor, material, equipment, other facilities, or to subcontractors;
- (c) Any penalties provided in these Standard Specifications for failure of the Contractor to carry out specific orders of the Engineer.
- (d) Stop Notices pursuant to Civil Code section 3186, unless the Contractor at its sole expense provides a bond or other security satisfactory to the TVMMWC in the amount of at least one hundred twenty-five percent (125%) of the claim, in a form satisfactory to the TVMMWC, which protects the TVMMWC against such claim. Any stop notice release bond shall be executed by a California admitted, fiscally solvent surety, completely unaffiliated with and separate from the surety on the payment and performance bonds, that does not have any assets pooled with the payment and performance bond sureties. The TVMMWC may also withhold for the estimated reasonable cost of stop notice litigation to be incurred. For any stop notice resolved and/or released, the TVMMWC may withhold for any reasonable cost of litigation actually incurred for that stop notice;
- (e) Liquidated damages against the Contractor, whether already accrued or estimated to accrue in the future;
- (f) Reasonable doubt that the Work can be completed for the unpaid balance of any Contract Sum or by the completion date;
- (g) Damage to the property or work of the TVMMWC, another contractor, or subcontractor;
- (h) Unsatisfactory prosecution of the Work by the Contractor, and/or failure to perform all required Work;
- (i) Failure to store and properly secure materials;
- (j) Failure of the Contractor to submit on a timely basis, proper and sufficient documentation required by the Contract Documents, including, without limitation, monthly progress schedules, shop drawings, submittal schedules, schedule of values, product data and samples, proposed product lists, executed change orders, and verified reports;
- (k) Failure of the Contractor to maintain and submit record as-built drawings;
- (l) Erroneous estimates by the Contractor of the value of the Work performed, or other false statements in an Application for Payment;
- (m) Unauthorized deviations from the Contract Documents;
- (n) Failure of the Contractor to prosecute the Work in a timely manner in compliance with established progress schedules and completion dates;
- (o) Subsequently discovered evidence or observations nullifying the whole or part of a previously issued Change Order or Certificate for Payment;
- (p) Previous overpayment to Contractor;

- (q) Credits owed to the TVMMWC for reduced scope of work or work that the TVMMWC otherwise permits Contractor to not perform, and such credits will be based on the reasonable bid value of the unperformed work, including markups for overhead and profit;
- (r) The estimated value of performing work deleted pursuant to Section 8-12, "Use of Completed Portions; TVMMWC's Right to Complete;"
- (s) False claims by Contractor;
- (t) Breach of any provision of the Contract Documents;
- (u) Potential loss, liability or damages to the TVMMWC that is potentially caused by the Contractor; and
- (v) As permitted by other provisions in the Contract.

The TVMMWC shall provide written notice to Contractor of items for which the TVMMWC is withholding from a payment at the time that the payment is being processed. To claim wrongful withholding by the TVMMWC, or if Contractor otherwise disputes any amount being withheld, Contractor must follow the claim procedures of Section 4-12, "Notices, Change Orders, and Claims." Upon request of the Contractor from whose payment or release the TVMMWC withheld funds, the Contractor shall be given a written copy of the TVMMWC's reasons for withholding. When the grounds for withholding funds are removed, payment or release shall be made for amounts withheld because of them. No interest shall be paid on any amounts withheld due to the failure of the Contractor to perform in accordance with the terms and conditions of the Contract Documents.

In addition to withholding amounts permitted by the Contract and statutes (including but not limited to Public Contract Code section 7107), the TVMMWC may withhold an additional 50% contingency from any progress payment or retention release for any unknown, uncertain or estimated withhold amount. Once the withhold amount becomes known and certain, then the TVMMWC shall continue to withhold the known and certain amount and credit, pay or release the remainder, if any, to Contractor. If the known and certain amount exceeds the amount previously withheld, then the TVMMWC may withhold more from Contractor to cover the excess amount, if unpaid contract funds or retention funds are available for withholding.

The TVMMWC's withholdings of any unpaid or unreleased amounts for costs, damages and claims against the Contractor shall take priority over any third party claims against the unpaid or unreleased amounts, including stop notices.

Any overpayment to the Contractor by the TVMMWC, and any failure to withhold an amount from payment that the TVMMWC had the right to withhold, shall not constitute a waiver by the TVMMWC of its rights to withhold for such amounts from future payments to the Contractor or to otherwise pursue those amounts from the Contractor.

For any stop notice enforcement action against the TVMMWC filed by any of the Contractor's subcontractors or suppliers of any tier, the Contractor shall defend and indemnify the TVMMWC, and its officers, agents and employees, against any and all liability, loss, and damages.

9-8 Payment Of Withheld Funds (Substitutions for 10% retention)

Reference is made to the retention provisions of Section 9-6, "Partial (Progress) Payments and

Retentions." Upon the Contractor's request, pursuant to Public Contract Code Section 22300, the TVMMWC will make payment of funds withheld from progress payments to ensure performance of the contract if the Contractor deposits in escrow with the TVMMWC or with a bank acceptable to the TVMMWC, securities equivalent to the amount withheld. The Contractor shall be beneficial owner of any securities substituted for moneys withheld and shall receive any interest thereon. Upon satisfactory completion of the Contract, the securities shall be returned to the Contractor.

Alternatively, upon the Contractor's request, the TVMMWC will make payment of retentions earned directly to an escrow agent. The Contractor may direct the investment of the payments into securities, and the Contractor shall receive the interest earned on the investments upon the same terms provided for securities deposited by the Contractor. Upon satisfactory completion of the contract, the Contractor shall receive from the escrow agent all securities, interest and payments received by the escrow agent from the TVMMWC, pursuant to the terms in Section 22300 of the Public Contract Code.

Securities eligible for investment shall include those listed in Section 16430 of the Government Code, bank or savings and loan certificates of deposit, interest-bearing demand deposit accounts, standby letters of credit or any other security mutually agreed to by the Contractor and the TVMMWC.

The escrow agreement used pursuant to this Section 9-8 shall be substantially similar to the "Escrow Agreement for Security Deposits In Lieu of Retention" in Section 22300 of the Public Contract Code, deemed as incorporated herein by reference. The Contractor shall obtain the written consent of the surety to the agreement.

Any of the alternatives to the retentions normally withheld by the TVMMWC are subject to the provisions of Section 9-7, "Stop Notices; TVMMWC's Right To Withhold Payments," and to the approval of the TVMMWC.

9-9 Notice Of Potential Claim

In the event that a dispute over the conduct or payment of any portion of the Work was not resolved by issuance of a contract change order or other agreement between the Contractor and the Engineer, and it is the intent of the Contractor to submit a formal claim to resolve the matter, the Contractor shall file with the Engineer a written notice of such intent pursuant to Section 4-12, "Notices, Change Orders, and Claims." Such notice of potential claim shall be filed at the earliest possible time to permit early resolution, if possible, but in any case, within 5 calendar days of the time the dispute first arose. The notice shall provide the nature and circumstances involved in the dispute, which shall remain consistent throughout the dispute.

9-10 Final Progress Payment

Provided no notices of potential claim, proposed change orders, or claims are pending under Section 4-12, "Notices, Change Orders, and Claims," the Engineer shall, after the completion of the Contract, make a final estimate of the amount of work done thereunder and the value of such work; and the TVMMWC shall pay the entire sum so found to be due after deducting therefrom ten (10) percent of the final estimate, or other amounts as provided in Section 9-6, "Partial (Progress) Payments and Retentions" and Section 9-7, "Stop Notices; TVMMWC's Right To Withhold Payments," to be retained following completion of the work.

If a notice of potential claim, proposed change order, or claim is pending under Section 4-12, "Notices, Change Orders, and Claims," and is not resolved in time necessary for the processing of the final monthly progress payment as provided in the above paragraph, the Engineer shall cause a semi-final estimate to be prepared, and the Contractor shall be paid any amounts due less any retentions as provided in Section 9-6, "Partial (Progress) Payments and Retentions," and Section 9-7, "Stop Notices; TVMMWC's Right to Withhold Payments." Upon resolution of the procedures under said Section 4-12 "Notices, Change Orders and Claims", a final estimate will be prepared as above provided,

and a final progress payment shall be made.

9-11 Final Payment To Release Owner

The acceptance, without notice of potential claim, by the Contractor of the final payment shall be and shall operate as a release to the Owner (TVMMWC) of all claims and all liability to the Contractor for all things done or performed for or relating to the work and for every act and neglect of the TVMMWC and others relating to or arising out of the work, excepting only the Contractor's claims, if any, for amounts withheld by the TVMMWC, upon final payment. However, no payment, final or otherwise, shall operate to release the Contractor or his sureties from any obligation upon or under this Contract or the Contractor's bond.

9-12 Payment Of Retention

Retention shall be released at the latest sixty (60) days after the occurrence of any of the definitions of "Completion" for purposes of Public Contract Code Section 7107 (see definitions of "Completion" in Section 1-8B). Any final payment and release of retentions will exclude any amounts withheld in conformance with Section 9-7, "Stop Notices; Rights of the TVMMWC to Withhold Payments," and Public Contract Code section 7107. When specified in the Contract Specifications, certain portions of the amount retained pursuant to Section 9-6, "Partial ('Progress') Payments and Retentions," may be withheld until the satisfactory completion of a ninety (90) day maintenance period required for work pertaining to the installation of landscaping and irrigation facilities in accordance with Section 21-12, "Maintenance Period."

SECTION 17 - WATER USE

17-1 Description

This work shall consist of developing a water supply and furnishing all water required for the work, and applying all water. The Contractor shall comply with the provisions of Section 5-13, "Electric and Water Service."

Water for use in the work shall, at the option of the Contractor, be potable or non-potable, except for water used in connection with any phase or part of installing, repairing, cleaning, disinfecting, or pressure testing of sewers, sewer force mains, recycled water mains, and potable water systems. Water for such use shall be potable only. Sources of non-potable water supply shall be approved by the Engineer and such water shall be chemically and biologically suitable for the intended use.

Potable water may be furnished by the Contractor from an independent source, or may be obtained from the TVMMWC Water System.

In compliance with Section 21, "Landscape Irrigation Systems," the water supply for landscape planting and irrigation systems shall be provided by the Contractor in accordance with the Plans and Contract Specifications. A permanent water meter will be furnished by the TVMMWC for each irrigation system connection to the TVMMWC water system unless otherwise shown on the Plans or specified in the Contract Specifications. The Contractor will be charged for all water consumed through these connections, including water consumed through the temporary hydrant meter obtained in compliance with this Section 17, and water consumed for irrigation system testing purposes and for landscape irrigation through the 90-day maintenance period and up to final acceptance of the work by the Engineer. Water for construction purposes for landscape planting and installation of irrigation systems, such as for dust control, compaction, etc., shall be obtained in accordance with 5-13, "Electrical and Water Service," Section 17-1(A), "TVMMWC Water Permit," and Section 17-1(B), "Nonpotable Water."

17-1(A) TVMMWC Water Permit

Prior to taking any water from the TVMMWC water system, the Contractor shall obtain a Tesoro Viejo Master Mutual Water Company fire hydrant permit and water meter. Said permit and the required water meter are available at _____. All water taken from TVMMWC hydrants must be metered and the Contractor shall pay all fees relating to the use of the water meter and water consumed, as outlined in this Section 17. Any unpaid balance will be deducted from amounts owed the Contractor. A backflow prevention device approved by the Engineer shall be provided and connected between the hydrant water meter and the equipment receiving the water, or the equipment must have an approved backflow prevention device installed thereon.

17-1(B) Nonpotable Water

Non-potable water consists of non-potable water developed from other sources of water such as that furnished by an irrigation district. The Contractor shall pay all costs and fees and comply with all regulations or permit requirements of the supplier. The Contractor shall furnish the Engineer with a copy of the permit or other written authorization of the supplier before the use of any such water will be permitted on the work.

Non-potable water used in the mixing and curing of concrete shall conform to the provisions in Section 90-2.02D, "Water," of the State Standard Specifications. Non-potable water, if used, shall not be conveyed in tanks or drain pipes which will be used to convey potable water. There shall be no

connection between non-potable water supplies and potable water supplies. Non-potable water supply, tanks, pipes and any other conveyances of non-potable water shall be labeled:

NONPOTABLE WATER

DO NOT DRINK

17-2 Application

Water shall be applied in the amounts, at the locations, and for the purposes designated in the Contract Specifications and these Standard Specifications, and as ordered by the Engineer. Water for compacting embankment material, subbase, base and surfacing material, and for providing dust control shall be applied by means of pressure-type distributors or pipe lines equipped with a spray system or hoses with nozzles that will ensure a uniform application of water. Equipment used for the application of water shall be equipped with a positive means of shut-off.

Unless otherwise permitted by the Contract Specifications or the Engineer, or unless all the water is applied by means of pipe lines, at least one mobile unit with a minimum capacity of 1,000 gallons shall be available for applying water on the project at all times.

17-3 Chemical Additives

If the Contractor elects to do so, chemical additives may be used in water for compaction. If chemical additives are used, furnishing and applying the additives shall be at the Contractor's expense. The right is reserved by the Engineer to prohibit the use of a particular type of additive, to designate the locations where a particular type of additive may not be used, or to limit the amount of a particular type of additive to be used at certain locations, all if the Engineer has reasonable grounds for believing that such use will in any way be detrimental.

17-4 Payment

Full compensation for developing and furnishing water in compliance with this Section 17 shall be considered as included in the various contract items of work requiring water, including water required for irrigation systems testing and landscape watering through the 90-day maintenance period. No additional compensation will be paid therefor. In accordance with Section 4-10, "Changes," no separate or additional compensation for developing and furnishing additional water will be made for any increase or decrease in the quantity of water required, regardless of the reason for such increase or decrease.

SECTION 19 - EARTHWORK

19-1 General

19-1.01 Description

This work shall consist of all excavation, grading, removal and replacement of material, placement of embankment, subgrade preparation and compaction and all other operations required in the construction of the finished earth surface for roadways and other surface improvements, including performing all operations necessary to excavate all materials, regardless of character and subsurface conditions, from the roadway or areas adjacent thereto; excavation, backfill, compaction, and restoration of surfaces of trenches for the placement of pipelines, conduits and other utilities including, but not limited to, pipelines for sewer, water, non-potable water, storm drains, irrigation, and fiber optic conduits; excavation, backfill, compaction, and restoration of surfaces for the construction or installation of structures; excavation of drainage and irrigation ditches and channels; excavation of selected material from the roadway and borrow material for use as specified; construction of embankments, including the placing of selected material and imported borrow in connection therewith as specified; backfilling holes, pits and other depressions within the roadway area; applying water; removing and replacing unsuitable material; excavating and grading road approaches, driveways, and connections; removal of unstable material outside the roadway prism; preparation of basement material for the placing of other material thereon; all as shown on the Plans and Standard Drawings, as specified in the Specifications, and as directed by the Engineer; and furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work that may be required to construct and maintain the roadway, pipeline, or other facilities requiring earthwork.

For purposes of this Section 19, "roadway" shall include streets, alleys, easements, trails, parking lots, park sites, or the sites of other surface improvement work. Whenever reference to finished grade or finished surface is made, it shall be considered to be the finished surface of the completed facility.

All hauling of material from, to, or on the job site shall comply with Section 6-12, "Materials Hauling." Where loads are not required to be covered, if directed by the Engineer, the loads shall be watered after trimming to eliminate dust. The Contractor shall comply with the provisions of Sections 5-9, "Preservation of Property," and 5-10, "Protection of the Work," relative to protection and preservation of property, the work, and other utilities in performing earthwork operations.

Quantities of all types of existing subbase, base, surfacing, or pavement removed will be included in the quantities of the type of excavation in which they are located, and no separate payment will be made therefor.

Clearing and Grubbing for earthwork operations shall conform to the project specifications.

Applying water for earthwork operations shall conform to the provisions in Section 17, "Water Use."

19-1.02 Protection Of Property

The Contractor shall comply with the provisions of Section 5-3, "Contractor's Responsibility for the Work," Section 5-9, "Preservation of Property," Section 7-4, "Contractor's Insurance Requirements and Hold Harmless," Section 7-16, "Injury or Damage to Persons or Property," and Section 8-15, "Utility and Non-Street Facilities; Potholing." Operations shall be conducted in such a manner that existing roadway or other facilities, utilities, railroad tracks, and other non-street facilities which are to remain in place, shall not be damaged. The Contractor, at the Contractor's expense, shall furnish

and install sheet piling, cribbing, bulkheads, shores or whatever means may be necessary to adequately support material carrying the facilities, or to support the facilities themselves and shall maintain the supports until they are no longer needed. Temporary pavements, facilities, utilities and installations shall also be protected until they are no longer required. When temporary supports and other protective means are no longer required, they shall be removed and disposed of as provided in Section 5-12, "Disposal of Material Outside the Right-of-Way."

19-1.03 Grade Tolerance

The grading plane shall not vary consistently above or below the design grade. Except for cuts made for roadway prisms, the tops and ends of cuts shall be rounded as directed by the Engineer.

Immediately prior to placing subsequent layers of material thereon, the grading plane shall conform to one of the following:

- A. When asphalt concrete or asphalt concrete base, or concrete, is to be placed on the grading plane, the grading plane at any point shall not vary more than 0.05-foot above or below the grade established by the Engineer.
- B. When subbase or base material (other than asphalt concrete base) to be placed on the grading plane is to be paid for by the ton, the grading plane at any point shall not vary more than 0.10-foot above or below the grade established by the Engineer.
- C. When the material to be placed on the grading plane is to be paid for by the cubic yard, the grading plane at any point shall be not more than 0.05-foot above the grade established by the Engineer.

19-1.04 Removal And Disposal Of Buried Man-Made Objects

If a buried man-made object encountered in excavation is to be removed and its removal and disposal is not included in another item of work, the removal and disposal will be paid for at the contract price per cubic yard for the type of excavation in which the object is encountered, i.e., roadway excavation, trench or structure excavation, etc. However, if the presence of the object is not indicated on the plans or in the Contract Specifications and its presence could not have been ascertained by visual inspection, the removal and disposal of the object will be paid for as extra work as provided in Section 4-11, "Extra Work," instead of at the applicable contract item price if the Contractor so requests in writing. The request shall be made prior to removal. Unless otherwise specified in the Contract Specifications, no blasting of any kind will be permitted.

Where backfill of a cavity or depression resulting from removal of a buried manmade object is required, it will be paid for in accordance with the project specifications, except that backfill for objects removed from within trench or structure excavations will not be paid for separately but included in the price paid for the pipe, conduit or structure requiring the excavation. Where the buried object is not shown on the plans and could not reasonably be ascertained from the surface, and backfill is required but not covered by any other item of work, and the cavity is not located in a trench or structure excavation, payment for backfill shall be made in accordance with said Section 4-11, "Extra Work."

19-2 Roadway Excavation

19-2.01 General

Roadway excavation shall consist of all excavation involved in the grading and construction of the roadway, except trench and structure excavation, ditch or channel excavation and any excavation

separately designated and paid for as a separate item. Unless otherwise specified in the Contract Specifications, Roadway Excavation shall include excavation, removal, and disposal of all material located within the prism of the roadway to be constructed as shown on the plans. "Roadway" shall have the meaning ascribed by Section 19-1.01, "Description."

19-2.02 Unsuitable Material

Unsuitable material encountered below the natural ground surface in embankment areas or below the grading plane in excavation areas shall be excavated and disposed of as directed by the Engineer. Unsuitable material is defined as material the Engineer determines to be:

- A. of such unstable nature as to be incapable of being compacted to specified density using ordinary methods at optimum moisture content; or
- B. too wet to be properly compacted and circumstances prevent suitable in-place drying prior to incorporation into the work; or
- C. otherwise unsuitable for the planned use.

The presence of excessive moisture in a material is not, by itself, sufficient cause for determining that the material is unsuitable.

The removal and disposal of unsuitable material will be paid for as roadway excavation for the quantities involved if the removal of the unsuitable material is shown on the plans or specified in the Contract Specifications.

If the removal of the unsuitable material is not shown on the plans or specified in the Contract Specifications, the removal and disposal of the unsuitable material will be paid for at the contract price for roadway excavation for the quantities involved unless either the Engineer, prior to removal of any unsuitable material, orders the unsuitable material to be removed and disposed of and paid for as extra work as provided in Section 4-11, "Extra Work," or the Contractor, prior to removal of the unsuitable material, requests in writing that the removal and disposal of the unsuitable material be paid for as extra work as provided in said Section 4-11. However, no payment will be made for removal and replacement or re-working of unsuitable material if such condition is deemed by the Engineer to have been caused by the Contractor's operations such as, but not limited to, over-watering.

When unsuitable material is removed and disposed of, the resulting space shall be backfilled with material suitable for the planned use. Unless otherwise specified or directed by the Engineer, the material shall be either material conforming to Section 19-2.06, "Selected Material," or conforming to Section 19-4.02, "Imported Borrow." The backfill material shall be placed and compacted in accordance with Section 19-4, "Embankment Construction."

19-2.03 Slopes

Excavation and embankment slopes shall be constructed in conformance with the lines and grades shown on the plans. When completed, the average plane of the slopes shall conform to the slopes indicated on the Plans and no point on the completed slopes shall vary from the designated slopes by more than 0.1-foot measured at right angles to the slope. The tops of excavation slopes and the ends of excavations shall be rounded as shown on the plans or as directed by the Engineer.

19-2.04 Surplus Material

Unless otherwise shown on the Plans or specified in the Contract Specifications, surplus excavated material shall be disposed of outside the right of way in accordance with Section 5-12, "Disposal of Material Outside the Right-of-Way." The Contractor shall not borrow or waste material unless authorized in writing by the Engineer.

If the quantity of surplus material is shown on the Plans or specified in the Contract Specifications, the quantity shown or specified is approximate only. The Contractor shall be satisfied that there is sufficient suitable material available for the completion of any embankments before disposing of any material outside the right of way. Any shortage of material, caused by premature disposal of any material by the Contractor, shall be replaced by the Contractor and no compensation will be allowed the Contractor for such replacement.

19-2.05 Deficiency Material

If the quantity of acceptable material from excavation is not sufficient to construct the embankments required by the work, the quantity of material needed to complete the embankments shall consist of imported borrow conforming to Section 19-4.02, "Imported Borrow," as shown on the Plans, or specified in the Contract Specifications, or as determined by the Engineer.

The Contractor shall obtain the imported borrow in conformance with the provisions in said Section 19-4.02. If the contract does not include an item for imported borrow, payment for the required imported borrow will be made by extra work as provided in Section 4-11, "Extra Work."

19-2.06 Selected Material

Selected material shall be defined as material which is excavated from a location within the right of way as specified in the Contract Specifications or shown on the plans, and the Contractor shall have no choice in the selection.

Selected material shall be used as shown on the plans or specified in the Contract Specifications. Topsoil excavated within the limits of the project shall be considered as selected material. Selected material not used for topsoil may be used as backfill for filling holes, pits or other depressions caused by removal of existing facilities in conformance with Section 19-1.04, "Removal and Disposal of Buried Man-Made Objects," or Section 19-2.02, "Unsuitable Material." Selected Material used for backfill or embankment construction shall comply with Section 19-4.02, "Imported Borrow."

When selected material is shown on the Plans or designated in the Contract Specifications as a specified layer in the roadway prism, spreading and compacting the material shall conform to the provisions in Section 25, "Aggregate Subbases," of the State Standard Specifications. When practicable, and processing is not specified, selected material shall be hauled directly from excavation to its final position in the roadway prism and compacted in place and the work will be paid for at the contract price for roadway excavation.

When practicable, selected material shall remain in place until it can be excavated and placed in final position as provided above. No additional compensation will be allowed for any delay or inconvenience in excavation operations, except that if ordered in writing by the Engineer, selected material may be excavated and stockpiled at locations designated by the Engineer and later placed in final position in the roadway prism.

Excavating selected material and stockpiling, if required, will be paid for at the contract price for roadway excavation. Removing the selected material from stockpiles for later placement in its final

position will not be paid for. Placement and compaction will be paid for at the unit price bid for the type of construction requiring the use of selected material. No payment for stockpiling of selected material will be made.

19-2.07 Subgrade Preparation, Compaction

Unless otherwise shown on the Plans or specified in the Contract Specifications, for streets divided by a concrete median island, the grading plane extends from the back of the concrete curb and gutter adjacent to the outside travel lane, parking lane, or bicycle lane (the “outside curb and gutter”), to the back of the concrete median curb. For streets not divided by concrete median island, the grading plane extends from the back of one outside curb and gutter to the back of the opposite outside curb and gutter. For alleys, trails, paths, or other places to receive an improved surface, the grading plane shall extend 12 inches beyond (right-of-way permitting) either side of the planned finish surface.

Unless specified in the project specifications, the preparation and compaction of the subgrade below the grading plane to receive subbase, aggregate base, asphalt-concrete, concrete or other paving materials shall consist of the following:

The soil material beneath the grading plane shall be bladed or disked to a depth of 6 inches and all rocks, hardpan chunks or otherwise unsuitable material over 2 inches in greatest dimension, shall be removed and disposed of off the project site in accordance with Section 5-12, “Disposal of Material Outside the Right-of-Way.”

The material thus disced or bladed shall be thoroughly mixed, watered and rolled to a smooth and even condition to a relative compaction of not less than 95 percent in compliance with Sections 6-8, “Samples and Tests,” and 6-9, “Compaction Tests,” to a depth of not less than 6 inches below the grading plane or as otherwise shown on the Plans or Standard Drawings or specified in the Contract Specifications.

Any soft, spongy or otherwise unstable areas shall be repaired by completely removing the material and replacing it with acceptable materials in accordance with these Specifications. Before subbase, aggregate base, asphalt-concrete, concrete or other paving material is placed, the Engineer may require, at the Contractor’s expense, a test roller of size and weight as approved by the Engineer to pass over the finished subgrade to ascertain that there are no such soft or spongy areas.

No subsequent layer of a structural section shall be placed until the finished subgrade is in a stable condition satisfactory to the Engineer, regardless if said subgrade passed any prior compaction test. Any trenches cut for pipelines or conduit installation after the subgrade or any other layer of the roadway prism has been stabilized, shall be compacted in compliance with Section 19-3.03(E), “Compaction,” herein. It shall be the Contractor’s responsibility to assure that others doing work within the area under his control, including subcontractors, utility and communications contractors, comply with this provision.

The relative compaction of the top 6 inches of subbase under curb returns including the landing, driveway approaches including adjacent sidewalk, valley gutters, paved trails, and alleys shall be no less than 95 percent.

No compaction test of subgrade shall be made until such time as the subgrade is finished to within 1 inch (high) of finished subgrade. The Contractor shall notify the Engineer when the subgrade is ready for compaction testing, and the TVMMWC will notify the appropriate testing laboratory designated

to perform such tests. The Engineer shall specify the locations where compaction tests are to be made.

No excavation shall be made below the plane of the bottom of curb or curb and gutter subsequent to installing curb or curb and gutter until backfill has been placed behind the curb.

19-2.08 Measurement

The following earthwork operations will be measured and paid for as roadway excavation for the quantities of material involved and no additional compensation will be allowed therefor:

Excavating the roadway prism to the grading plane including slope rounding, public and private road approaches, connections and driveways; excavating unsuitable material when shown on the plans or specified in the Contract Specifications; excavating surplus material; excavating selected material and topsoil from within the limits of the project; and excavating drainage and irrigation ditches and channels.

Quantities of roadway excavation will be computed by means of average areas and distances between these areas, except as provided in the following paragraph.

Where due to changed conditions or the nature of a particular operation or for any other reason, it is impossible or impractical to measure quantities of roadway excavation by means of average areas, the Engineer will compute the quantities of material excavated by a method which in the Engineer's opinion is best suited to obtain an accurate determination.

When quantities of roadway excavation are computed by means of average end areas and center line distances, a correction for curvature will not be applied to quantities within the roadway prism. In computing the quantity of material outside the original roadway prism, where the roadway center line is used as a base, correction will be made for curvature if the center line radius is 1,000 feet or less.

Excavation in excess of the planned or authorized cross section will not be paid for. The Contractor shall backfill and compact as directed by the Engineer unauthorized excavated areas to the original ground elevation or authorized section at the Contractor's expense.

19-2.09 Payment

Quantities of roadway excavation, measured as specified in Section 19-2.08, "Measurement," will be paid for at the contract price per cubic yard. That price shall include excavating, sloping, rounding tops and ends of excavations, loading, hauling and depositing within the work site, hauling and disposing of material outside the right of way, spreading and compacting the material complete in place, and preparing subgrade at the grading plane as specified in Sections 19-1.03, "Grade Tolerance," and 19-2.07, Subgrade Preparation, Compaction."

The above price and payment shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in performing roadway excavation work completely as shown on the Plans, specified in the Specifications, and as directed by the Engineer.

19-3 Trench And Structure Excavation, Backfill, Compaction, And Surface Restoration

19-3.01 General

This work shall consist of all excavation, backfill, and compaction necessary for the construction or installation of underground pipelines, conduits, structures and other facilities, and the replacement or restoration of surfaces disturbed by such work, all as set forth in the Plans, Standard Drawings, the Specifications, and as directed by the Engineer. As a minimum, structures shall include manholes, storm drain inlets, water valve boxes, and vaults of any kind.

Backfill, compaction, and surface restoration of potholes or other excavations performed to determine the location of underground utilities or facilities as required by Section 8-15, "Utility and Non-Street Facilities; Potholing," shall conform to the applicable portions of this Section 19-3 and to the special backfill requirements of said Section 8-15.

19-3.02 Trench And Structure Excavation

Excavations shall be made to the depths and widths required to accommodate the construction or installation of pipelines, conduits and structures to specified dimensions and to the lines and grades shown on the Plans.

The Contractor shall comply with the provisions of Sections 7-12, "Safety Provisions; First Aid; Injury/Illness Prevention Program," 7-13, "Worker Protection From Toxic Or Explosive Gases, Confined Spaces Entry," and 7-15, "Worker Protection From Caving Ground In Excavations," and all Safety Orders issued by the State Division of Industrial Safety. Material excavated from trenches or for structures shall be placed to offer minimum obstructions to traffic.

The City has made every effort to locate and show all underground utilities and facilities on the plans. However, before excavation, the Contractor shall be responsible to field verify the locations by calling for USA mark-outs, potholing, and any other means or methods to determine both the horizontal and vertical locations of underground utility and other facilities, and shall notify the Engineer immediately if conflicts occur. The Contractor shall comply with the provisions of Section 8-15, "Utility and Non-street Facilities; Potholing," relating to existing utilities, and the location and protection thereof. The location of subsurface obstructions found in the field may necessitate a variance in the depth or alignment of proposed facilities.

When a trench or structure site is to be located in an existing oiled earth or pavement area, the existing surfacing to be removed shall be cut by methods shown on the plans or as approved by the Engineer along neat lines on each side of the trench or around the structure site. Existing surfacing, when removed, shall be kept separated from the material that is to be returned to the excavation as backfill. Failure to comply with this requirement shall be grounds for rejection of the contaminated material for use as backfill.

Trenches shall be uniformly graded and prepared to provide a firm and uniform bearing for the entire length of the barrel of the pipe to be placed therein. Coupling or bell holes are required for all trenches to receive pipes or conduits with couplings or bells, and shall be excavated at each location where pipes are to be joined. Coupling or bell holes shall be of sufficient and of adequate size to permit ease in making the joint and so the coupling or bell does not rest on the bottom of the hole excavated therefor. Except for pipe bells and couplings, any portion of the trench excavated below the approved grade shall be corrected and brought up to grade with approved material thoroughly compacted.

Trenches bottoming in hardpan shall be over-excavated a minimum of 6 inches below the grade established for the bottom of the pipe and any bells or couplings and then backfilled to the design pipe grade with select material and thoroughly compacted. No additional payment will be made for such over-excavation, backfill, and compaction.

In all trenches or structure sites where a firm foundation is not encountered, such as soft, spongy, or otherwise unsuitable material, the material shall be, unless provided for within the project specifications, removed a minimum depth of 12 inches or to a depth determined by the Engineer, below the normal bottom of the trench or structure excavation. The over-excavated space shall be backfilled with suitable material containing sufficient moisture to produce maximum compaction. The backfill material shall be free from lumps or other unsuitable material, and when compacted to the satisfaction of the Engineer, shall be finish graded as provided herein or as required by the Engineer for pipelines, conduits, or structures. No additional payment will be made for such additional excavation or backfill.

The width of the trench from the bottom to the top of the pipe or conduit shall be a minimum of 6 inches but no more than 12 inches on either side of the pipe, or per the pipe manufacturer's recommendations. The Contractor shall make every effort to minimize the width of the trench at the top of the trench. Excessive trench widths, as determined by the Engineer, may require special trench and pipe backfill methods to counteract excessive pipe loads and provide a bond between backfill and trench walls. Reference is made to Sections 19-3.03(A)2, "Final Backfill, Precast Pipe," and 19-3.03(A)3, "Backfill, Cast-in-Place Pipe." No additional payment will be made for such special backfill methods for failure of the Contractor to exercise good construction practices to minimize trench widths.

Trenches for cast-in-place concrete pipe shall be graded and prepared to provide full, firm and uniform support by undisturbed earth or compacted fill throughout the bottom 220° of the pipe periphery.

The Contractor shall be responsible for drainage of trenches and other excavation areas, and such areas shall be kept as dry as practicable throughout the construction period. Pumping or other approved method shall be used to remove any accumulation of water. Trenches damaged because of failure to provide temporary drainage control shall be repaired or reconstructed at the Contractor's expense. The Contractor shall adhere to the provisions of Section 5-16, "Maintaining Drainage." No drainage water may be pumped or otherwise deposited in any sanitary sewer system, unless otherwise approved by the Engineer.

19-3.03 Trench And Structure Backfill And Compaction

Unless otherwise specified, material used for trench or structure backfill shall be granular native material, free from debris, lumps, hardpan chunks, paving material or organic matter of other deleterious or unsuitable substances. Material shall be approved by the Engineer before use in the work.

19-3.03(A) Trench Backfill

Backfill of trenches shall conform to the Standard Drawings pertaining thereto, these Standard Specifications, and the directions of the Engineer. Backfill for trenches in which precast pipe, including utility or communications conduits, has been installed shall be placed in two phases, classified as Initial Backfill and Final Backfill.

19-3.03(A)1 Initial Backfill, Precast Pipe, Conduit

After the precast pipe or conduit has been laid to line and grade, Initial Backfill shall consist of placing by hand and firmly compacting selected native material under the haunches and up to the

spring line of the pipe so as to form a firm bedding, and then filling with selected native material and compacting to a level 12 inches above the top of the pipe. The method of compacting and obtaining density requirements for initial backfill shall be such that the line and grade of the pipe is not disturbed and the pipe is not damaged. Selected native material shall be granular, free of all rocks, hardpan, paving material, organic matter or other deleterious substances. Jetting of Initial Backfill to completely fill the space under pipe haunches may be permitted by the Engineer, depending on soil conditions and type.

19-3.03(A)2 Final Backfill, Precast Pipe, Conduit

Final Backfill for trenches in which precast pipe or conduit has been placed shall consist of placing and compacting backfill material into the remaining trench cavity following completion of initial backfill. Backfill material shall be returned to the trench in lifts not to exceed 0.67 foot in depth (loose), and compacted. Each lift shall be compacted the full depth of the lift prior to placement of the next lift of backfill material. Jetting of final backfill will not be permitted. In cases of excessive trench width, soil conditions, and soil type, as determined by the Engineer, to assure proper pipe load distribution and bonding between trench backfill and trench walls, the Contractor may be required by the Engineer to bench, plow, or scarify trench walls prior to placement of backfill. The cost for such trench wall treatment, if so required, shall be included in the price paid per linear foot of pipe. No additional payment will be made therefor.

19-3.03(A)3 Backfill, Cast-in-Place Pipe

Backfill material for trenches in which cast-in-place concrete pipe has been constructed shall be returned to the trench in lifts not to exceed 0.67 foot in depth. Depending on soil condition and type, and upon satisfactory demonstration to the Engineer that the methods proposed by the Contractor achieve the required consolidation and compaction results, the thickness of lifts may be increased by the Engineer, but in no case shall lifts exceed 3 feet loose depth. In no case shall backfill material be allowed to free-fall directly onto the pipe. Initial backfill efforts may proceed no sooner than 48 hours after construction of the pipe, except that compaction efforts using equipment which imparts load on the pipe or structures, shall not proceed for a minimum of seven (7) calendar days following placement of the pipe unless this requirement is specifically waived by the Engineer, or is otherwise specified. Each lift shall be compacted prior to placement of the next lift of backfill material. In cases of excessive trench width, soil conditions, and soil type, as determined by the Engineer, to assure proper pipe load distribution and bonding between trench backfill and trench walls, the Contractor may be required by the Engineer to bench, plow, or scarify trench walls prior to placement of backfill. The cost for such trench wall treatment, if so required, shall be included in the price paid per linear foot of pipe. No additional payment will be made therefor.

19-3.03(B) Structure Backfill

Structure backfill shall consist of placing and compacting backfill material around structures to the lines designated on the Plans or directed by the Engineer. Where cast-in-place structures are constructed, no backfill shall be placed until all forms are removed, all voids in the concrete properly filled, and the exterior of the structure has been inspected by the Engineer and approved for backfilling. Backfill material shall be placed in lifts not to exceed 0.67 foot in loose depth and compacted. Depending on soil condition and type, and upon satisfactory demonstration to the Engineer that the methods proposed by the Contractor achieve the required consolidation and compaction results, the thickness of lifts may be increased by the Engineer, but in no case shall lifts exceed 3 feet loose depth. Each lift shall be compacted prior to placement of the next lift of backfill material.

19-3.03(C) Slurry Cement Backfill

Where specified in the Plans or Contract Specifications, and as specified in Section 8-15, "Utility and Non-Street Facilities; Potholing," for backfill of small diameter excavations, slurry cement backfill shall be furnished and placed in conformance with Section 19-3.03F, "Slurry Cement Backfill," of the State Standard Specifications.

19-3.03(D) Pervious Backfill Material

Where specified in the Plans or Contract Specifications, Pervious Backfill Material shall be furnished and placed in conformance with Section 19-3.03G, "Pervious Backfill Material," of the State Standard Specifications.

19-3.03(E) Compaction

Unless otherwise specified, compaction shall conform to the requirements of Section 6-9, "Compaction Tests," and the applicable Standard Drawings for Trench Backfill and Resurfacing. All trench and structure backfill, including that for utility or communications conduit whether installed under TVMMWC Contract or Encroachment Permit, shall be compacted to a relative compaction of not less than 90 percent to within 24 inches of the bottom of the planned structural section of trench resurfacing, or roadway structural section if the trench or structure is located in a roadway to be reconstructed as part of the work, or the ground surface when the trench or structure is located in an unimproved area. The upper 24 inches of trench and structure backfill shall be compacted to a relative compaction of not less than 95 percent.

For trenches or areas around structures that are to receive an improved surface, the compacted backfill shall be brought to a smooth and level condition so as to receive the full thickness of surfacing. Where the trench or area around a structure is not to be resurfaced, the surface of compacted backfill shall be brought to a smooth condition even with adjacent undisturbed soil. The surface of the finished backfill in all areas shall be made even and uniform, free from depressions or raised areas.

Excess material resulting from backfill and compaction of trenches and structures not used in the work shall be disposed of outside the right-of-way as set forth in Section 5-12, "Disposal of Material Outside the Right-of-Way."

19-3.03(F) Water

The use of water in the work shall comply with the requirements of Section 5-13, "Electric and Water Service," and Section 17, "Water Use." Where the TVMMWC's water system is utilized for construction water, the Contractor shall obtain a water meter from the TVMMWC (fire hydrant meter are required for all users). The Contractor shall obtain the permission of the Engineer as to which fire hydrants are to be utilized. Except as provided in Section 19-3.03(A)1, "Initial Backfill, Precast Pipe" jetting of trench backfill is not allowed. Flooding of trenches from the top is not permitted.

19-3.04 Progress Of Work, Trench And Structure Excavation, Backfill

All work of excavation and backfilling shall be done as quickly as possible.

Where trench or structure excavation is to occur in an area with improved surfacing, the existing surfacing at any location shall be removed no sooner than 48 hours prior to excavation at that location. No surfacing shall be removed on Friday unless excavation and follow-up work will occur the same day.

Unless authorized in writing by the Engineer, no more than 650 feet of trench shall be excavated at any location ahead of any preceding trench which has not received pipeline or other conduit and backfilled.

No excavation or trench shall be opened and left open more than 24 hours before: a) the installation of the pipeline or other conduit which is to be placed in said trench; b) the start of construction of a structure in said excavation. The backfilling of said excavation or trench shall be completed within twenty four hours after the installation of the facility for which the excavation was made, except for cast-in-place pipe installations and that portion of trenches or excavations to be used for connecting the extension of the installation, provided said portion is adequately barricaded and protected, and backfilled the following working day.

Backfill for cast-in-place concrete pipe shall be accomplished as soon as practicable but shall comply with the timing requirements of Section 19-3.03(A)3, "Backfill, Cast-in-Place Pipe." Trenches shall be adequately barricaded and access shall be provided for abutting properties and street intersections.

Unless otherwise specified in the Contract Specifications or authorized in writing by the Engineer, where an excavation or trench crosses a street intersection, the excavation, installation, and backfill or bridging shall be conducted in a manner such that the street shall remain open at all times. Alleys may be closed, but shall be reopened at the end of the work day.

All excavations located within a street or alley for the purpose of boring or jacking pits shall be properly barricaded and protected, and may be left open for a period of not more than seven (7) calendar days, unless an extension of time is approved by the Engineer in writing.

Immediately after trenches or other excavations have been backfilled and preliminarily compacted at street or alley crossings, temporary surfacing shall be placed in conformance with Section 19-3.05, "Restoration of Surfaces," and in accordance with the Plans and Standard Drawing therefor.

19-3.05 Restoration of Surfaces

For trench or structure excavations located in existing paved areas not to be reconstructed as part of the work, final pavement replacement shall be accomplished as soon as possible and practicable, but in no case less than the time limits specified in the Contract Specifications.

Restoration of surfaces shall consist of restoring the surfaces (resurfacing) of all trenches and surfaces at or around structure sites, or any other surfaces damaged or disturbed by the work. Surfaces shall include pavement of any kind including asphalt concrete, portland cement concrete, paving stones, grass, shrubbery or other landscaping, gravel, treated or untreated soil, etc. All work shall be done in accordance with the Plans, Standard Drawing, and the Specifications.

Temporary trench resurfacing shall comply with the applicable Standard Drawing for Trench Backfill and Resurfacing and placed and diligently maintained by the Contractor until permanent trench resurfacing is installed. Temporary surfacing shall be placed at all street and alley crossings, and such other locations as specified or shown on the Plans, or directed by the Engineer. Temporary surfacing shall be removed by the Contractor prior to placing final resurfacing.

Final replacement of pavement shall be performed in a manner consistent with good construction practices and methods which, when completed, shall leave all areas requiring replacement of pavement with as neat an appearance as possible. Areas to receive final pavement replacement shall be completely cleaned of all debris, rubbish, dirt, temporary paving, or any other deleterious material which might affect the quality of the work in any way. Cleaning shall be accomplished to a minimum

of 6 feet outside the edges of trenches or other areas to receive pavement replacement. This distance may be increased by the Engineer as necessary to prevent contamination of the new work.

Where sawcutting of existing pavement edges is not shown on the standard drawing or specified, all damaged existing pavement shall be removed and the edges trimmed to neat lines as directed by the Engineer and by a method approved by the Engineer.

Where sawcutting of existing pavement edges is shown on the standard drawing or is specified, the cut shall be made on a straight line along both sides of trenches, and to neat lines around structures or other locations requiring pavement replacement. The cut shall be made a minimum of 3 inches in depth, and shall encompass all pavement damaged by the work or specified to be removed or replaced.

All edges of existing pavement, whether trimmed or sawcut, shall be protected from damage. Any edges damaged from any cause prior to or during paving operations, shall be re-cut or re-trimmed as directed by the Engineer. No additional payment will be made therefor.

Where Aggregate Base is specified to be used as part of the resurfacing structural section or backfill, it shall be furnished and placed in conformance with Section 26, "Aggregate Bases," of the State Standard Specifications.

Where Portland Cement Concrete is specified to be used as part of the resurfacing structural section or backfill, unless otherwise specified on the Plans or in the Contract Specifications, it shall be Class 1, 2, 3, or 4 with 1 inch maximum aggregate, conforming to the requirements of Section 90, "Portland Cement Concrete," of the State Standard Specifications. The top surface of the concrete shall be given a rough rake finish while the mix is still workable with the corrugations parallel with the trench. Where called for on the Plans or Specifications or directed by the Engineer, calcium chloride of up to 2 percent by weight of the cement shall be added to the concrete mix.

A paint binder of asphaltic emulsion shall be furnished and applied, in conformance with Section 39-1.02B, "Tack Coat," of the State Standard Specifications, to all vertical or other surfaces of existing pavement, curbs, gutters, or other surfaces against which asphalt-concrete pavement is to be placed. Tack coat shall also be applied to the top surface of the initial layer of asphalt-concrete if the pavement is to be replaced in lifts.

Asphalt concrete shall be furnished and placed in conformance with Section 39, "Asphalt Concrete," of the State Standard Specifications. When replacing pavement in existing paved areas, the new pavement shall be placed in accordance with the Standard Drawings therefor which shall apply to replacing pavement around structures as well as within trenches. The Contractor shall not commence surface paving until the subbase and/or base have been inspected and approved. Violation of this requirement shall be cause for rejection of that portion of paving involved.

When compacted, the new pavement edge shall be flush with the existing pavement and edge of adjacent concrete improvements where applicable. The surface shall be smooth, without humps or depressions. Except where the trench is located in the crown of the road, the top of the finished surfacing shall deviate no more than $\frac{3}{4}$ inch higher, and in no case lower, than a line struck off from two points on the existing road surface, one on each side of the trench. Deviation from this tolerance shall be cause for rejection of the surfacing.

Restoration of miscellaneous surfaces shall consist of replacing or restoring in-kind any surface damaged or disturbed by the work, including but not limited to, grass, landscaping of any kind,

gravel, oiled dirt, concrete, or soil, all as directed by the Engineer. The surfaces of all trenches, excavations or other areas damaged or disturbed by the work, upon completion of miscellaneous surface restoration, shall conform to the elevations and character of the areas which existed before work commenced.

In all cases regardless of surface material or type, all existing or new facilities shall be brought to the finish grade of that surface. The interior of the existing or new facilities, including water valve barrels, shall be thoroughly cleaned of all debris or dirt, regardless of whether the debris or dirt was present before construction began.

Restoration of surfaces shall comply with Sections 4-13, "Interim Cleanup," 5-20, "Surface Restoration," and 5-21, "Final Inspection."

19-3.06 Measurement

Trench and structure excavation will not be measured as it is to be included in the work requiring such excavation and backfill. Unless otherwise provided in the Contract Specifications, measurement of Slurry Cement Backfill or Pervious Backfill Material used for trench backfill shall be by lineal foot as measured along the centerline of trench in which such backfill was placed.

Measurement for temporary or permanent trench resurfacing will be by the lineal foot as measured along the centerline of the actual trench resurfaced, unless otherwise indicated in the Plans and/or Contract Specifications. Regardless of composition or combination of materials used in trench resurfacing, measurement will be as though only one material is used. Measurement of resurfacing around structures will not be made, as no separate payment will be made therefor.

Unless otherwise specified in the Contract Specifications, restoration of miscellaneous surfaces for trenches or structures will be included in the cost of the various items of work, and no measurement will be made.

Measurement of facilities raised to grade shall be in accordance with the contract item therefor. In the absence of a contract item(s) for the measurement and payment of raising existing and/or new facilities to grade within the trench surface restoration area, no measurement will be made, and payment therefor shall be included in the various items of work.

19-3.07 Payment

Except for Slurry Cement Backfill and Pervious Backfill Material, payment for trench and structure excavation, backfill and compaction, including any benching, plowing, or scarifying required by the Engineer shall be included in the amount bid for installing the pipe, conduit, structure or other facility to be installed in such trench or other excavation. Payment shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals including water, and for doing all the work involved as shown on the Plans, as set forth in these Specifications, the Contract Specifications, and as directed by the Engineer.

The unit price paid for Slurry Cement Backfill and Pervious Backfill Material shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved as shown on the Plans, as set forth in these Specifications, the Contract Specifications, and as directed by the Engineer.

Unless otherwise provided in the Contract Specifications, the unit price bid per lineal foot for temporary or final trench resurfacing shall include full compensation for furnishing all labor,

materials, tools, equipment and incidentals and for doing all the work involved therein as shown on the Plans and Standard Drawings, as set forth in these Specifications, the Contract Specifications, and as directed by the Engineer, including maintaining temporary surfacing and removing it prior to final resurfacing, sawcutting or trimming existing pavement edges, and application of tack coat. No payment will be made for temporary or permanent resurfacing, or sawcutting existing pavement therefor, around structures; the cost thereof shall be included in the price paid for the structure involved.

When the Contract does not include a pay item for temporary or final trench resurfacing as above specified, and unless otherwise provided in the Contract Specifications, full compensation for any necessary temporary or final trench resurfacing including required sawcutting shall be considered as included in the prices bid for the other various items of work and no separate payment will be made therefor.

Unless otherwise provided in the Contract Specifications, full compensation for restoration of miscellaneous surfaces shall be considered as included in the price bid for the various items of work and no separate payment will be made therefor.

19-4 Embankment Construction

19-4.01 General

Embankment construction shall consist of constructing roadway embankments, including the preparation of the areas upon which embankment materials are to be placed; the construction of temporary surcharge embankment above the grading plane; the construction of earthen dikes within or outside the right of way; the placing and compacting of approved material within the areas to receive embankment where unsuitable material has been removed; and the placing and compacting of embankment material in holes, pits and other depressions within the area to receive embankment. Embankment material shall be either selected material conforming to Section 19-2.06, "Selected Material," or imported borrow conforming to Section 19-4.02, "Imported Borrow."

19-4.02 Imported Borrow

Unless otherwise specified, the Contractor shall, at his expense, make his own arrangements for obtaining imported borrow and pay all costs involved. Imported borrow, unless otherwise specified, shall be of a quality suitable for the purpose intended, free of vegetable matter or other unsatisfactory material, and shall have a minimum R- value of 55 as determined from tests conducted in accordance with Section 6-8, "Samples and Tests." Selected material from excavation or imported borrow material having a Sand Equivalent value less than 10 shall not be placed within 2.5 feet of finished grade and shall be placed in the lower portions of embankments. Clods or hard lumps of earth over 8 inches in greatest dimension shall be broken up before compacting the material in embankment. Large rocky material, including rocks, broken concrete or other solid materials, or hard lumps such as hardpan or cemented gravel, which cannot be broken readily shall not be used in embankments. All imported borrow shall be subject to the approval of the Engineer. The Contractor shall supply to the TVMMWC, at the Contractor's expense, test results required by the Engineer to determine the suitability of any borrow proposed for import. These tests, which are to be representative of the material delivered to the site, will be required at the original site of the proposed borrow material and also at the delivery site. The Contractor shall remove, at the Contractor's expense, any borrow placed which fails to meet the approval of the Engineer.

19-4.03 Placing

Where shown in the Plans or specified in the Contract Specifications, the Contractor shall provide excavation, grading, placement and compaction for the construction of roadway embankment from

approved surplus excavated material (selected material) or from Imported Borrow, to the line, grade and cross-section shown on the Plans, or as directed by the Engineer. Unsuitable surplus excavated material shall be disposed of by the Contractor in accordance with Section 5-12, "Disposal of Material Outside the Right-of-Way." If the quantity of selected material is not sufficient to construct the embankments required by the Plans, the quantity of material needed to complete the embankments shall consist of Imported Borrow.

Unless otherwise specified, embankments shall be constructed in layers. The loose thickness of each layer of embankment material before compaction shall not exceed 8 inches. Areas to receive embankment construction shall first be cleared of all debris, bushes, weeds, stumps, or other deleterious material. If embankment material is to be placed on existing slope areas, the existing surface shall be benched, plowed, or scarified in accordance with the plans or as directed by the Engineer to produce a bond with the material to be placed.

Attention is directed to Section 19-4.04, "Compacting." Where embankment is to be made and compacted on slopes or where new embankment is to be compacted against existing embankments or where embankment is built one-half width at a time, the original slopes and old or new embankments shall be cut into a minimum of 3 feet horizontally as the work is brought up in layers. Material thus cut out shall be re-compacted along with the new embankment material at the Contractor's expense, unless the width of excavation required by the Engineer exceeds 3 feet, in which case the excavation of material in excess of 3 feet horizontally will be measured and paid for as roadway excavation.

Where embankment is to be made and compacted on original slopes, old or new embankments, and end dumping is permitted, the slopes of the original ground or embankment shall be benched, plowed or cut into before starting end dumping.

When embankment is to be placed on an existing roadway, the existing roadbed shall be scarified, watered, graded and rolled in advance of placing new material thereon.

The construction of earthen dikes, the placing and compacting of approved material within the right of way where unsuitable material has been removed, and the filling of holes, pits and other depressions within the right of way, shall conform to the provisions herein and in conformance with the provisions in said Section 19-4.04. Trenches, holes, depressions and pits outside of areas where embankments are to be constructed shall be graded to provide a presentable and well-drained area.

Where embankments are shown on the plans to be constructed across low, swampy ground which will not support the weight of hauling equipment, the lower part of the embankment may be constructed by dumping successive loads in a uniformly distributed layer of a thickness not greater than that necessary to support the equipment while placing subsequent layers, after which the remainder of the embankment shall be constructed in layers and compacted as specified.

Embankments shall be maintained to the grade and cross section shown on the plans until the acceptance of the contract.

19-4.04 Compacting

Embankments shall be constructed in layers of uniform thickness as specified in Section 19-4.03, "Placing." Each layer shall be compacted to a relative compaction of not less than 90%, except that any layer within 2.5 feet of finish grade shall be compacted to a relative compaction of not less than 95%, unless otherwise specified.

Sidehill embankments, where the width including bench cuts for bonding existing and new embankments is too narrow to accommodate compacting equipment, may be constructed by end dumping if permitted by the Engineer, until the embankment, including benching, is wide enough to permit the use of compacting equipment, after which the remainder of the embankment shall be placed in layers and compacted as specified.

At the time of compaction, the moisture content of embankment material shall be such that the specified relative compaction will be obtained and the embankment will be in a firm and stable condition. Embankment material which contains excessive moisture shall not be compacted until the material is dry enough to obtain the required compaction. 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 or furnishing the material and no additional compensation will be allowed therefor.

Any subsequent trenching through completed embankments, including trenching for utility or communications conduits, shall comply with Section 19-3, "Trench and Structure Excavation, Backfill, Compaction, and Surface Restoration." The Contractor shall assure that others doing work within the area under the control of the Contractor comply with this requirement.

19-4.05 Measurement

Where embankment construction is shown on the Plans, measurement shall be by the cubic yard. Where embankment construction is included as backfill for other contract items of work, no measurement will be made.

19-4.06 Payment

The unit price paid for Embankment Construction shall include full compensation for furnishing all equipment and performing all work required for clearing, subgrade preparation for placing embankment, including placing and compacting approved material where unsuitable and unstable embankment foundation material has been removed, benching, plowing, or scarifying as required, excavation, hauling, placing and compacting local or imported borrow, and finish grading to the lines and grades shown on the plans.

Filling and compacting holes, pits and other depressions, backfilling excavations resulting from the removal of structures and other facilities, or replacement of unsuitable material will be paid for in accordance with Section 19-2.07, "Subgrade Preparation, Compaction."

SECTION 21 - LANDSCAPE IRRIGATION SYSTEMS

21-1 General

The work shall consist of furnishing and installing landscape irrigation systems, complete and fully functional, all as shown on the Plans, Standard Drawings, as specified in the Specifications, and as directed by the Engineer. The work shall include furnishing all labor, materials, equipment, and supplies necessary for the installation of irrigation pipelines of varying sizes, all forms of sprinklers or other water delivery and control devices and systems, backflow prevention devices, booster pumps, protective cages, electrical service panels and all related wiring, controllers, valves, valve boxes, water service connections, water meter boxes, water consumed in system testing, and security lighting systems related to irrigation improvements where required.

In compliance with Section 2-2, "Examination of Site of Work, Plans, Specifications and Contract Documents," the Contractor shall examine carefully the site of work. Submission of a bid shall mean that the Contractor has investigated and is satisfied as to the conditions to be encountered, the character, quality, and quantity of work to be performed and materials to be furnished, and the requirements of the Plans, the Contract Specifications, and these Standard Specifications.

All work called for on the Plans, the Standard Drawings, or set forth in the Specifications shall be executed in accordance with all governing ordinances, laws, codes and regulations including, but not limited to, the current edition of the California Plumbing Code and the California Electrical Code, and shall meet all local conditions. Any changes and/or additions in work necessary to comply with ordinances, laws, codes and regulations and/or conditions will be made without additional expense to the TVMMWC, but such changes shall have the prior written approval of the Engineer.

21-2 Design

The objective of the Plans and Specifications (design) is to provide an assembled and installed landscape irrigation system which will operate in an efficient and satisfactory manner. The finished system shall adequately and efficiently irrigate all areas to be covered and shall perform in all respects in conformance with the plans and specifications and to the satisfaction of the TVMMWC.

Due to the scale of the drawings, it is not always possible to indicate all offsets, pipe or conduit fittings, etc., which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting the work, and plan the work accordingly, furnishing such fittings, couplings, pipes, conduits, etc., as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed in the most direct and professional manner, so that conflicts between irrigation systems, lighting systems, planting, and architectural features will be avoided. The Contractor shall verify the correctness of all finish grades within the work area in order to ensure the proper soil coverage as specified for the irrigation system pipes.

The Contractor shall not willfully install the irrigation facilities as indicated on the Plans when it is obvious in the field that obstructions or grade differences exist that might not have been considered in the design. Such obstructions or differences should be brought to the attention of the Engineer, in writing, by the Contractor for consideration of adjustment in proposed facility locations, prior to installation of facilities.

The Contractor shall verify and be familiar with the location and size of the existing water supply and shall make connections in accordance with the Plans, Standard Drawings, and the Specifications. The water meter required for the project will be provided at no cost by the TVMMWC. The Contractor shall furnish the meter box, all fittings, valves, pipeline, and all appurtenances required for a complete water service. The Contractor shall comply with the provisions in Section 5-13, "Electrical and Water Service," and Section 17, "Water Use." Unless otherwise specified in the Contract

Specifications, the Contractor will be charged for all water consumed in the installation of landscape irrigation systems, including testing of irrigation systems.

Unless otherwise noted on the Plans or Contract Specifications, the irrigation system has been designed in such a manner so that:

- (a) All irrigation will occur between the hours of 10:00 p.m. and 6:00 a.m.;
- (b) Each individual valve station is capable of operating effectively at line pressure;
- (c) Booster pumps have been added only to allow the operation of multiple valve stations concurrently.

The Contractor shall not vary the installation of the irrigation system from these design parameters without the express approval of the Engineer.

21-3 Permits

Prior to beginning any work, the Contractor shall obtain a Tesoro Viejo Master Mutual Water Company Encroachment Permit from the TVMMWC (and County of Madera if applicable) an Electrical Permit and a Plumbing Permit from the TVMMWC (and County of Madera if applicable), and pay all fees associated therewith, all in compliance with Section 7-10, "Permits and Licenses."

21-4 Specialized Inspection

All of the work described herein will be subject to inspections by TVMMWC personnel, as ordered by the Engineer. Additional inspections will be conducted by the TVMMWC for work covered by the California Electrical and Plumbing Codes. Reference is made to Section 21-11, "Inspection." Specialized inspections will be made of items including the following:

- (a) Grading.
- (b) Alternative materials where allowed.
- (c) Locations of above and below-ground facilities if different from the plans.
- (d) Performance inspection prior to planting.
- (e) Pre-final performance inspection prior to beginning plant maintenance period.
- (f) Performance inspection during plant maintenance period.
- (g) Final inspection after completion of the plant maintenance period.

All overtime inspection charges incurred by specialized TVMMWC personnel shall be paid by the Contractor when inspection services are required outside of normal working hours. Work requiring inspection before or after the normal 8 hours of a normal working day or taking place on holidays Saturdays and Sundays will be considered overtime inspection. The Contractor will be billed at the standard TVMMWC hourly overtime rate. Failure to pay the bill will be cause to deduct the amount from monies due the Contractor.

A pre-final inspection of the work shall be made by TVMMWC in the presence of the Contractor, at the time when all landscaping and irrigation work is completed and inspection is requested by the Contractor to commence the plant maintenance period. The Contractor shall make the inspection request to the Engineer two working days prior to the requested time of such inspection. After the system has been completed in all respects, the Contractor shall instruct an authorized representative of the TVMMWC in the operation and maintenance of the system and shall furnish a complete set of written operating instructions.

At the time of the pre-final inspection, the Contractor shall have prepared and transmit to the TVMMWC a set of record or "as-built" drawings of the landscaping and irrigation work.

At the conclusion of the maintenance period, a final inspection shall be scheduled by the Contractor

two working days in advance of the requested inspection.

In the event the Contractor schedules an inspection and has not completed the work that is to be inspected or made an effort to do so, the Contractor will be billed at the standard TVMMWC hourly rate for the cost of time expended by TVMMWC inspectors in preparing for and making the determination that the work has not been satisfactorily completed to warrant an inspection. If the inspection was scheduled to occur on overtime, a weekend, or holiday, said charge will be calculated at the standard TVMMWC overtime/double time rate as applicable. Failure to pay the bill will be cause to deduct the amount from monies due the Contractor.

21-5 Materials

In accordance with Section 6, "Control Of Materials," any material specified by name and/or model number in the Plans, Standard Drawings, Contract Specifications, or these Standard Specifications shall be deemed to be used for the purpose of identifying the standard of quality and type of materials and insuring the specific use of that material in the construction of the system. If substitution of a material is desired by the Contractor, sufficient descriptive literature and material samples must be furnished to establish the material as an equal substitute. In addition, the Contractor must state his reasons for desiring substitute materials.

Material used in landscape irrigation systems shall conform to the following requirements:

1. **Mainline Irrigation Pipe:** All mainline or pressure supply line plastic pipe shall be standard weight class 315 polyvinyl chloride (PVC) 1120 high impact solvent weld pipe. Pipe 2 inches in diameter or less shall be Schedule 40 PVC, solvent weld. The Contractor shall provide adequate thrust-blocks at all changes in direction of the mainline pipe.
2. **Lateral-line Irrigation Pipe:** All lateral-line or non-pressure line plastic pipe shall be standard weight class 200 polyvinyl chloride (PVC) 1120 normal impact.

All plastic pipe shall conform to current National Sanitation Foundation (NSF), Iron Pipe Size (IPS) standards and American Society for Testing & Materials (ASTM) requirements. Pipe shall be of improved white rigid PVC compound as manufactured by Lasco Industries or approved equal.

3. **Pipe Identification:** All pipe shall be continuously and permanently marked with the following information:
 - (a) Manufacturer's name or trademark;
 - (b) Nominal pipe size;
 - (c) Schedule and type of pipe;
 - (d) Pressure rating in PSI; and
 - (e) NSF seal of approval.
4. **Plastic Pipe Fittings and Connections:** All plastic fittings shall be white rigid PVC combination Type I and II, grade I standard weight schedule 40 and/or have a working pressure rating no lower than that of the pipe. The sockets must conform to the outside diameter of the pipe as recommended by the pipe manufacturer.

All plastic fittings and connectors shall be injection molded of an improved PVC compound featuring high tensile strength, high chemical resistance and high impact strength in terms of current ASTM standards for such fittings and as manufactured by Lasco Industries or approved equal. Where threads are required in plastic fittings, these shall be injection molded also.

5. Fittings Identification: All fittings shall bear the manufacturer's name or trademark, material designation, size applicable (IPS) schedule, and (NSF) seal of approval.
6. Plastic-to-steel Connections: At all PVC pipe to steel pipe connections, the Contractor shall complete the steel connection first. Teflon tape shall be used on all threaded PVC to steel pipe joints applied to the male threads only, and light wrench pressure is to be applied. A minimum of three (3) wraps of Teflon tape shall be used.
7. Plastic Pipe Cement: Solvent cement joints for plastic pipe and fittings shall be made as prescribed by the manufacturer. The high chemical resistance of the pipe and fitting compounds specified in the foregoing sections makes it mandatory that an aggressive colored primer, which is a true solvent for PVC, be used in conjunction with a solvent cement designed for the fit of pipe and fittings of each size range specified.
8. Galvanized Pipe: Pipe shall be hot dip galvanized continuous welded, seamless, schedule 40 steel pipe conforming to applicable current (ASTM) standards.
9. Galvanized Fittings: All fittings shall be galvanized malleable iron ground joint Schedule 40 conforming to applicable current ASTM standards.
10. Sprinkler Heads: Sprinkler spray heads shall be Rain Bird 1800 or Hunter Pro Spray.
11. Spray nozzles:
 - (a) nozzles for shrubs shall be Rain Bird MPR;
 - (b) nozzles for turf shall be Buckner Brass, or approved equal.
 - (c) Walla Walla MP Rotator for shrub or turf.
12. Rotors shall be: Hunter I- Series Stainless Steel; or Rain Bird 5500-Series Stainless Steel; or Rain Bird 7005-Series Stainless Steel.
13. Drip Emitters: Drip emitters shall be of the type and performance as listed on the Plans.
14. Drip Filters: Filters shall be capable of efficiently removing foreign particles that would clog emitters. Filter shall be a flushable type and contain a replaceable stainless steel element. Filters shall contain a 200 mesh screen or as prescribed by the emitter manufacturer. The filter shall be of the type and performance as listed on the Plans.
15. Remote Control Valves: Electric remote control valves shall be Irritrol Series 100 or 102.
16. Valve Boxes: Valve boxes shall Christy Fibrelyte or approved equal. Standard size shall be 11¼ inches x 17 inches.
17. Control Wiring: Connections between the controller and remote control valves shall be continuous, made with direct burial wire AWG-UF Type, single conductor, installed in accordance with valve manufacturer's wire chart and specifications. Valve "hot" wire to be no smaller than AWG No. 14. Valve "common" wire to be no smaller than AWG No. 12.

Where more than one wire is placed in a trench, the wiring shall be taped together at intervals of not more than 10 feet.

All splices shall be made using 3M-DBY waterproof sealing packets or approved equal. An expansion loop of 20 inches minimum shall be provided at each wire connection and/or directional turn, unless otherwise specified.

Wiring shall occupy the same trench and shall be installed along the same route as, and underneath, the pressure supply lines whenever possible.

All wire splices in field runs shall be located in valve boxes, and indicated on the "as-built" plans.

Control wires shall be identified at the controller. A separate common wire shall be installed for each controller.

18. Automatic Controller (Electrical and Solar): Controllers shall be fully automatic in operation, and shall be of the type and performance as specified on the Plans or in the Contract Specifications. Each controller shall have the capacity to operate the number of valve stations indicated on the Plans. Controllers shall be certified by Underwriters' Laboratories and bear their stamp of approval.

Controllers shall be programmable for the various operations as indicated on the Plans or as specified in the Contract Specifications, including programmable master valve and pump on/off functions when such equipment is specified.

19. Gate Valves: Gate valves shall be of the type and performance as specified on the Plans.
20. Backflow Prevention Unit: The backflow prevention unit shall be a reduced pressure principle device. The backflow prevention unit shall also be approved by the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research. The backflow prevention unit shall be installed downstream to water meters, in a location approved by the Engineer. The concrete pad therefor shall be Class 2, 3-1/2 in. thick.
21. After being installed at the project site, the backflow prevention unit must be tested and approved as functioning properly by an approved AWWA certified tester within 5 days of installation with the results sent to the Tesoro Viejo Master Mutual Water Company. Approval of the backflow prevention unit must precede any shrub, tree, or turf planting. Plumbing from the water meter to the backflow preventer shall consist of galvanized pipe and fittings.
22. Pressure Regulating and Pressure Sustaining Valve: The pressure regulating and pressure sustaining valve shall be of the type and performance as specified on the Plans.
23. Booster Pump: Pump shall be Flow Tronics or Water Tronics, and provide high efficiency, reliability and stable operating pressures. Pump submittals are required and shall be approved by the Engineer, in writing.

The pump unit shall be pre-fabricated and self-contained, with the following features:

- (a) Variable frequency drive
- (b) High and low pressure system shutdown.
- (c) Motor overload shutdown.
- (d) Full flow bypass.
- (e) Weather-resistant rust-proof enclosure, either powder coated or stainless steel.
- (f) Exhaust fan.

The concrete pump pad shall Class 2, min. 3-1/2 in. thick, and surround the entire mechanical package (all piping and appurtenances) by a minimum of 12 inches in both length and width.

24. Operations and Maintenance Manuals: Within ten calendar days prior to completion of the construction, the Contractor shall prepare and deliver to the TVMMWC all required and necessary descriptive material in complete detail and sufficient quantity, properly prepared in two individually bound sets of Operating and Maintenance Manuals. These manuals shall describe the material installed and shall be in sufficient detail to permit operating personnel to understand, operate and maintain all equipment. Spare part(s) lists and related manufacturer identification shall be included for each installed equipment item. Each complete, bound manual shall also contain the following information:
 - (a) Index sheet, stating Contractor's address and telephone number, duration of guarantee period, and list of equipment, with names and addresses of local manufacturer representatives.
 - (b) Complete operating and maintenance instructions on all major equipment.
25. The Contractor shall be responsible for correct procedures in loading, unloading, stacking, transporting, and handling all materials to be used in the system. The Contractor shall avoid rough handling which could affect the useful life of equipment. Pipe shall be handled in accordance with the manufacturer's recommendations on loading, unloading and storage.
26. Water Meter: Prior to beginning of planting, the Contractor shall contact the TVMMWC and request the installation of the water meter.

21-6 Trenching And Excavation

Trenching and Excavation shall conform to the requirements of Section 19-3, "Trench and Structure Excavation, Backfill, Compaction, and Surface Restoration," be of open vertical construction, and sufficiently wide to provide free working space around the work installed and to provide ample space for backfilling and tamping.

The use of a vibratory plow or methods other than open vertical trenching will not be allowed without the written approval of the Engineer. To obtain such approval, a field test must be performed, at the proposed site, with the equipment to be used in the presence of the Engineer. The field test is to indicate if the proposed site is favorable to the plowing method. Approval for plowing at one location does not allow the use of plowing at another location. Approval for plowing must be obtained for each location where the use of plowing is proposed. If, at previously approved plowing locations, conditions for plowing become unfavorable as determined by the Engineer, plowing shall be terminated.

Trenches for pipe and equipment shall be cut to required grade lines, and compacted to provide an accurate grade and uniform bearing for the full length of the pipe. When two pipes are to be placed in the same trench, a minimum 4 inch space between pipes must be maintained.

The depth of the trenches shall be sufficient to provide a minimum cover above the top of the pipe as follows:

- (a) 24 inches minimum over main lines;
- (b) 18 inches minimum over non-pressure (rotary pop-up) lateral lines;
- (c) 12 inches minimum over non-pressure (pop-up spray head) lateral lines;
- (d) 24 inches minimum over lines located in paved areas.

21-7 Installation

Installation of all irrigation facilities shall comply with the applicable Standard Drawings and the following specifications.

1. **Water Supply:** The Contractor shall connect to the water supply line at the location and as indicated on the Plans. Minor changes in location caused by actual site conditions may be required, and shall be approved by the Engineer. The actual location shall be shown by the Contractor on the “as-built” drawings to be furnished to the TVMMWC upon completion of the work. The Contractor shall comply with the provisions in Section 5-13, “Electrical and Water Service,” Section 17, “Water Use,” and Section 21-13, “Completion.”
2. **Layout:** The Contractor shall be responsible for layout of proposed facilities at the site and any minor adjustments required due to differences between the site and drawings. Any such deviations in layout shall be within the intent of the original drawings and shall be approved by the Engineer. The TVMMWC will indicate the proposed precise location of the control panels.
3. **Grades:** Before starting work on the system, the Contractor shall carefully check all grades to ensure the work may safely proceed and keep within the specified material depths. If the slope of the landscaped area exceeds 10:1, inline check valves shall be installed at each sprinkler subject to low head drainage.
4. **Standard of Installation:** Material and workmanship shall be in accordance with local codes and ordinances of legally constituted authorities; except where provisions of these specifications exceed such requirements, these specifications shall govern.
5. **General Installation:** Any equipment installed by the Contractor and deemed to be for the use of the TVMMWC in various situations (i.e., control valves, control panels, etc.) shall be so installed to be readily accessible and quickly operable. Two keys for lockable equipment shall be supplied to the TVMMWC upon installation. Equipment deemed by the TVMMWC to be inoperable for its intended purpose shall be reinstalled by the Contractor in an operable position before approval will be given. Routing of pressure supply lines as indicated on the drawings is diagrammatic. Install lines (and various assemblies) in such a manner as to conform to details on plans.
6. **Assemblies:** Install all assemblies specified herein according to the respective detail drawings or specifications pertaining to specific items required to complete the work. Perform work according to best standard practice, with prior approval.

All plastic and galvanized steel threaded pipe and fittings shall be assembled using Teflon tape applied to the male threads only. A minimum of three (3) wraps of Teflon tape will be required.

7. **Pipe Clearance:** All pipes shall have a minimum clearance of 4 inches from each other and 6 inches from pipes of other trades. Parallel pipes shall not be installed directly over one another.
8. **Plastic to Steel Connections:** At all PVC-to-steel pipe connections, the Contractor shall complete the steel connections first. Connections shall always be plastic into steel, never steel into plastic. Teflon tape shall be used on all threaded PVC to steel pipe joints, applied to male threads only, and light wrench pressure is to be applied.
9. **Pipe and Fittings, Galvanized Steel Pipe:** All pipe shall be reamed and rough edges or burrs removed so that a smooth and unobstructed flow can be obtained.

Teflon tape shall be carefully and smoothly placed on the male threads only. All threaded joints must be tightened with wrenches. No caulking or joint compound of any kind will be permitted.

Immediately upon installation of lines, all openings shall be capped or plugged to prevent the entrance of materials that would obstruct the pipe. Caps shall remain in place until removal is necessary for completion of installation.

Thrust blocks shall be installed as recommended by the pipe manufacturer, or as shown on the detail drawings.

All mainline and lateral PVC pipe traversing paved concrete or hardscape areas is to be installed in galvanized iron pipe sleeves that are at least 2 inches in diameter larger than the pipe within the sleeve. Galvanized iron pipe for electrical wires traversing such areas shall allow a generous amount of room for the wires present or to be installed and for pulling additional wire in the future.

10. Joining of Pipe: It is the responsibility of the Contractor to be familiar with any and all methods of assembling, joining, and installation of the various types of pipe to be used. The Contractor shall strictly adhere to recommendations in the manufacturer's guide. If during any phase of the work, the Contractor or any of the workers are not familiar with the recommended procedures, the Contractor shall arrange with the manufacturer of the particular product for the services of a qualified manufacturer's representative to instruct the workers in the proper recommended procedures.
11. Plastic Pipe: The Contractor shall exercise care in handling, loading, unloading, and storing plastic pipe and fittings. All plastic pipe and fittings shall be stored under a weatherproof roofed structure before using and shall be transported in a vehicle with a bed long enough to allow the length of pipe to lie flat so as to avoid undue bending or concentrated external load at any point.

All lumber, rubbish, and rocks shall be removed from the trenches by the Contractor. Pipe shall have a firm uniform bearing for the entire length of each pipe line to prevent uneven settlement. Wedging or blocking under riser tees shall be done only if specified on the plans. Pad trenches with soil as necessary to provide uniform bearing surfaces.

Where extensive lengths of pipe are installed, snake pipe in trench from side to side to allow for expansion and contraction. 1 foot per 100 feet (1:100) of pipe is the minimum allowance for snaking. Pipe shall not be placed when there is water in the trench or when the temperature is 32°F or below.

All changes in the direction of the pipe shall be made with fittings, not by bending.

Make solvent joints in the following sequence:

- (a) Make sure pipe is cut square and all connecting surfaces are properly cleaned and dry.
- (b) Apply an even coat of colored primer to pipe and fitting prior to application of solvent.
- (c) Apply an even coat of solvent to the inside of the fitting.
- (d) Apply a liberal, even coat of solvent to the outside of the pipe, making sure that the coat area is equal to the depth of the fitting socket.
- (e) Insert the pipe quickly into the fitting and turn the pipe approximately one-quarter turn to distribute the solvent and remove air bubbles. Hold the joint for approximately fifteen seconds so the fittings do not push off the pipe.

- (f) Using a clean rag, wipe off all excess solvent to prevent weakening at the joint.
 - (g) exercise care in going to the next joint so that the pipe is not twisted, thereby disturbing the last completed joint.
 - (h) Allow at least fifteen minutes setup time for each welded joint before moving.
 - (i) Repair damaged plastic pipe by replacing the damaged segment.
12. Backflow Prevention Devices: Backflow prevention devices will be installed in a protective cage. The cage will be constructed of a 3/16 inch angle steel frame, with No. 9 expanded steel fabric welded to the frame at each point of contact between the fabric and the frame. The enclosure will include provisions for padlocking, and handles for lifting.

For devices up to 2 inches, a single hinged cage shall be furnished and installed.

For devices 2 inches and greater, a double hinged cage that opens from the center shall be furnished and installed.

The dimensions of the cage will vary depending on the size and type of device required. Consult the enclosure manufacturer's specifications to determine the appropriate model number. A minimum of 6 inches clearance is required between the device and the cage.

13. Control Wiring: Lay the wiring from the remote control valves to the controller. Lay alongside the supply mains where practical. Tape wires together at 10 foot intervals. All wiring passing under existing or future paved walks and roads shall be installed inside PVC Schedule 40 Type II pipe sleeve, of adequate sizes to permit convenient threading of all bundles, as shown on the plans. Wires shall not be taped together inside conduits. The conduit shall extend at least 12 inches beyond the edges of the paved walks or road.

Wire sizes shall be determined by the number of valves operating on a given wire and the distance from the controller to the farthest valve, as specified by the charts furnished by the remote control valve manufacturer. Valve wire may be any color other than white. No splices are permitted. Common ground wire must be white and splices are permitted only at remote control valves. Use "3M DBY" wire splices or approved equal when splices are made.

Each remote control valve is to have a dedicated individual 14 GA direct burial wire that is continuous in length to the automatic controller. The common wire is to be 12 GA direct burial and is to be dedicated to the controller it serves. No cross connection of common wires between different controllers will be allowed.

14. Valves Boxes: Valve boxes shall be set to finished grade. Only one remote control valve may be installed in each box.

Furnish purple valve boxes where reclaimed water is or may be used in accordance with Section 67, "Recycled Water Distribution Systems."

Remote control valves shall be connected and aligned to provide the most efficient flow of water to the irrigation heads. Each valve is to be enclosed in the specified valve box. The valve box shall be secured on firm soil clear of valves and wiring connections.

Backfill carefully to prevent settlement and subsequent damage. Each valve box corner is to be set on a brick to prevent settling, with a minimum of one cubic foot of pea gravel installed below the valve.

15. Remote Control Valves: Remote control valves shall be adjusted so that all heads operate

within the pressure range recommended by the head manufacturer. Remote control valves shall be adjusted so a uniform distribution of water is applied by the heads to the planting areas for each individual valve system. Make all connections for operation.

16. Flushing of Lines: After all new piping is in place and connected, and all necessary diversion work has been completed, the control valves shall be opened and a full head of water used to flush out the system.
17. Automatic Controllers: Locate controllers in general locations shown, with exact placement to be determined at the job site by the TVMMWC's representative.

Connect to 120 volt source(s) provided at the site. Install electrical service pedestal at the connection.

Use rigid metal conduit above grade, slab, or floor.

Where specified, provide and install rechargeable battery backup in controllers per the manufacturer's recommendations.

Connect control wires to controllers in sequential arrangement according to assigned identification numbers on drawings.

Controllers shall be properly grounded per Article 250 of the National Electric Code and conform to local regulations.

Reference is made to Section 21-2, "Design," for operating hours. Controllers shall be programmed so as not to apply excess water. Care shall be taken to prevent run-off and slope/soil erosion caused by prolonged applications of water. **Note: Contractor will be cited and fined for water waste in accordance with Madera County Municipal Code.**

Solar powered controllers shall be installed per manufacturer's recommendation and as directed by the TVMMWC Inspector.

18. Automatic Controller Schedule: Install automatic controller schedule in laminated plastic or a watertight plastic envelope inside controller cover showing which valves are connected to which stations on controller.
19. Controller Charts: The Contractor shall provide one controller chart for each controller supplied.
20. The chart shall show the area controlled by automatic controller and shall be the maximum size controller door will allow.
21. The chart may be a reduced drawing of the actual "as-built" system. However, in the event the controller sequence is not legible when the drawing is reduced, it shall be enlarged to a size that will be readable when reduced.
22. Sprinkler Heads: Sprinkler heads located in areas where ground cover planting is indicated shall be set on permanent risers with top of head located above finished grade per plan detail; rotary pop-up sprinkler heads adjacent to walks or roads shall be set 6 inches from edge of walk or road, and pop-up spray heads adjacent to walks or roads shall be set 2 inches from edge of walk or roads.

Upon completion of the installation, the Contractor shall adjust sprinkler heads to properly

distribute water flow and shall place entire irrigation system in correct operating condition.

Adjust sprinklers so that water spray does not contact structures such as fences, walls, or buildings.

Adjust sprinkler heads to avoid applying water on roadways, walkways, sidewalks, and other areas that are not landscaped.

Where reclaimed water is to be used, purple caps shall be provided on sprinklers.

23. Drip Emitters: Upon completion of the installation, the Contractor shall adjust the drip emitters to properly distribute water flow and shall place the entire irrigation system in correct operating condition.

24. Cathodic (Insulation) Protection: Protection shall be installed as follows:

- (a) Between wrapped galvanized steel pipe and unwrapped galvanized steel or cast iron pipe in ground using couplings or flanges.
- (b) Between pipes and equipment, except at sprinkler heads and backflow preventer.
- (c) Between old and new steel piping.
- (d) Wherever brass, copper, or bronze is installed in contact with or adjacent to steel buried in the ground, and also at insulated fittings, junction shall be wrapped with a minimum of two overlapping layers of specified tape. Tape shall follow the contours of the junction and extend 6 inches or more over the steel and over the brass fittings or valve as far as practical.
- (e) Galvanized steel pipe under a concrete slab.

25. Concrete Equipment Pads: Concrete pads shall be provided for all irrigation and electrical equipment in locations approved by the TVMMWC Inspector.

All pads shall be installed at finished grade and will be a minimum of 3½ inches thick. All pads shall be installed with the slab extending ½ inch above finish grade. All pads shall be sloped to drain to matching drainage patterns at ¼ inch per foot.

Unless otherwise directed by the TVMMWC Inspector, the installer will locate the irrigation controller, backflow preventer, and electrical service panel on a common pad.

21-8 Pressure Test

The Contractor shall notify all necessary parties 48 hours prior to pressure testing. The Contractor is to center load pipe with small amounts of backfill to prevent arching or slipping of pipe under pressure.

All solvent welded pipe joints shall be allowed to set at least 24 hours before any pressure testing can be performed.

All pressure lines shall be tested under hydrostatic pressure of 125 psi after installation. The Contractor shall provide all equipment for such tests. Pressure tests will not be required for non- pressure lateral lines with swing joints.

Pressure shall be sustained in the lines for not less than four (4) hours. If leaks develop, the joints shall be replaced and the tests repeated until the entire system is proven watertight.

Tests shall be observed and approved by the TVMMWC Inspector prior to backfill. If irrigation lines are plowed into place, all pipe joints are to be exposed for the pressure test.

Upon completion of each phase of the work, the Contractor shall check and adjust each sprinkler head to meet the site requirements and plan.

Water consumed for pressure testing will be charged to the Contractor in accordance with Section 5-13, "Electrical and Water Service," and Section 17, "Water Use."

21-9 Backfill And Compaction

Backfill and Compaction shall conform to the applicable requirements of Section 19-3.03, "Trench and Structure Backfill and Compaction."

Backfill shall not be placed until the installed system has been tested, inspected and approved by the TVMMWC.

Material shall be approved soil. Unsuitable material, such as pipe remnants, wire, clods and rocks over 2 inches in size, shall be removed from the premises and disposed of legally. Backfill for the first 6 inches around the mainline pipe and control wires shall be sand or native soil approved by the Engineer.

All backfilling shall be done carefully and shall be properly tamped. All soil shall be tamped and jetted to eliminate any voids.

Surplus earth remaining after backfilling shall be disposed of as directed by the TVMMWC Inspector.

Backfilling for all pipe shall be carried out in two basic stages:

A. Stage One Backfilling:

This shall be accomplished as soon as possible after the pipe is placed. A bedding of uniform depth with no voids must be provided along the entire length of the pipe. The bedding dirt should be placed in the trench and tamped into the areas under the pipe, using a suitable tool. Joints should be left exposed until hydrostatic tests are completed. Cover only those portions of the pipe necessary to prevent movement or damage.

B. Stage Two Backfilling:

This shall be completed after all hydrostatic tests are completed and the piping system has been thoroughly checked for leaks or other defects. Continue to add backfill soil in 4 inch layers and hand tamp to achieve a density similar to adjacent soil. After 12 inches in main line trenches of hand-tamped soil is in place over the pipe and fittings, backfilling can be continued, using light machinery to place dirt in the trenches in 6 inch layers and to compact the dirt to conform to adjacent soil. Extreme care should be taken to avoid damage to the pipe from machinery that is too heavy. All trenches shall then be water jetted to assure uniform settling and compaction. Backfilling operations will not be considered complete until the top surface has been graded to conform to the adjacent soil. All rocks must be collected and removed from the site.

PVC piping and fittings shall not be backfilled during periods of extreme heat or when a sudden lowering of the temperature of the pipe may cause separation of joints or fittings.

21-10 System Testing And Adjustment

After the installation of automatic controller, valves, sprinkler heads, drip emitters and other equipment, the complete system shall be operated in the presence of the Engineer. Any defective or inoperative material shall be repaired or replaced to the satisfaction of the Engineer. The Contractor shall balance

and adjust the various components of the system so the overall operation of the system is most efficient. This includes a synchronization of the controllers, adjustments to heads and emitters, and individual station adjustments on the controllers.

When the irrigation system is completed, the Contractor, in the presence of the TVMMWC Inspector, shall perform a test to check the coverage of the system. The Contractor shall inform the TVMMWC of any deviation from the plan required due to wind, planting, soil, or site conditions that bear on proper coverage.

The Contractor shall furnish all materials and labor required to correct any inadequacies of coverage due to site conditions or unauthorized deviations from the Plans. If such corrections or additions are required in the sprinkler system, the Contractor shall make all adjustments and corrections without any extra cost to the TVMMWC.

21-11 Inspection

Reference is made to Section 21-4, "Specialized Inspection." In addition to the specialized inspection specified in said Section 21-4, periodic inspections shall be required for basic operations and installations during progression of the work. It shall be the Contractor's obligation to call and schedule inspections, including the TVMMWC and County of Madera for work covered under the California Electrical and Plumbing Codes. Inspections will include but not necessarily be limited to the following items:

- (a) Grading
- (b) Layout and flagging of sprinkler heads and system
- (c) Trenching
- (d) Pipe and Wire placement
- (e) Partial fill compaction of trenches
- (f) Control valve installation
- (g) Electrical Service installation
- (h) Electrical panel installation
- (i) Irrigation controller installation and operation
- (j) Mainline sustained pressure check
- (k) Booster pump installation
- (l) Backflow preventer installation
- (m) Water Service installation and meter connection

All overtime inspection charges incurred by TVMMWC personnel shall be paid by the Contractor when inspection services are required outside of normal working hours. Work requiring inspection before or after the normal 8 hours of a normal working day or taking place on holidays, Saturdays and Sundays will be considered overtime inspection.

A pre-final inspection of the work shall be made by the TVMMWC personnel in the presence of the Contractor, at the time when all landscaping and irrigation work is completed and inspection is requested by the Contractor to commence the plant maintenance period. The Contractor shall make the inspection requests to the Engineer two working days prior to the requested time of such inspection. After the system has been completed in all respects, the Contractor shall instruct an authorized representative of the TVMMWC in the operation and maintenance of the system and shall furnish a complete set of written operating instructions.

A final inspection of the work shall be made by the inspectors of the TVMMWC and County of Madera in the presence of the Contractor, at the end of the required maintenance period when all landscaping and irrigation work is completed. The Contractor shall provide 48 hours notification in advance of such inspection. Prior to the final inspection, the Contractor shall have prepared and

transmitted to the TVMMWC a set of Record Drawings ("as-builts") of the landscaping and irrigation work. No final inspection will commence without the Record Drawings.

In the event that the Contractor schedules an inspection and has not completed the work that is to be inspected or made an effort to do so, the Contractor will be billed for the cost of the inspection and must remit the cost prior to final approval and inspection of the work.

21-12 Maintenance Period

A ninety (90) day maintenance period will be required for all irrigation systems. This maintenance period will run concurrently with the landscape planting maintenance period. The maintenance period for landscape irrigation systems shall begin after all landscape construction activities have been completed, all approved equipment and improvements have been installed, and upon receiving written approval by the Engineer to commence the maintenance period.

The Contractor shall continuously maintain and provide all necessary repairs until a written notice of final acceptance for maintenance is received from the TVMMWC. The Contractor shall have the charge and care thereof and shall bear the risk of injury or damage to any part thereof by the action of the elements or from any other cause not the fault of the TVMMWC. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work before final acceptance for maintenance.

21-13 Completion

Upon completion of work, including the 90 day maintenance period, the Contractor shall provide to the TVMMWC:

- (a) Two additional keys to each enclosure and controller box;
- (b) Two each of any specialized tools required for the operation and/or maintenance of each type of component installed in the system;
- (c) Other items as specified in the Plans and Specifications, including a set of Record Drawings ("as-builts") as provided in Section 21-11, "Inspection."

21-14 System Guarantee

In compliance with Section 7-23, "Guarantee," the entire irrigation system shall be guaranteed by the Contractor to give satisfactory service, and the Contractor shall guarantee the quality of materials, equipment and workmanship, including settling of fill areas or backfilled trenches below finish grade, for a period of one year following the date of the filing of the Notice of Acceptance for all of the work by the TVMMWC.

If, within one year from the date of the filing of the Notice of Acceptance for all of the work, problems develop resulting from inferior or faulty materials or workmanship, or settlement of fill areas or trench backfill occurs requiring adjustments in pipes, valves, emitters, heads, sod, or paving to the proper level of the permanent grades, the Contractor, as part of the work under his Contract, shall make all adjustments and corrections without extra cost to the TVMMWC, including the complete restoration of all damaged planting, paving, or other improvements of any kind.

21-15 Measurement And Payment

Unless otherwise specified in the Contract Specifications, landscape irrigation systems will be measured and paid for on a lump sum basis for the entire system, complete in every detail. The lump sum price bid for landscape irrigation system shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved therein as shown on the Plans, as specified in the Specifications, and as directed by the Engineer. This shall include, but not be limited to clearing and grubbing, furnishing and installing all equipment such as pipe, fittings, heads, emitters, valves and valve boxes, controllers, wiring, electric service, water service, backflow

preventers, filters, providing excavation, backfill and compaction, testing, adjusting, guaranteeing, and all incidentals.

SECTION 63 - DRAINAGE FACILITIES

63-1 General

Drainage improvements are to include: culverts, drop inlets, lined channels, turf reinforcement matting, manholes, outlet and inlet structures and storm drain pipe. These improvements shall be installed in accordance with the approved improvement plans, these Construction Standards, and the latest edition of the State of California Department of Transportation Standard Specifications hereinafter referred to as the Caltrans Standard Specifications. These Standards shall apply to the public right-of-way and easements and private on-site drainage improvements. Several items within this section shall apply to on-site improvements and in conformance to stormwater quality requirements.

63-2 Drop Inlet Installation

Drop inlet installations shall conform to Construction Standard Details DR-1 through DR-5A & B and to provisions in Sections 51 and 52 of the Caltrans Standard Specifications. The interior of the drop inlet shall have a troweled finish; rock pockets shall be grouted and brushed; exposed top surfaces shall have a Class I Surface Finish. If the storm drain system is active and open to discharges, then immediately following installation, all storm drain inlets shall be protected with sediment control protection until construction no longer poses a risk of sediment discharges.

63-3 Manhole Installation

A. Bases -

1 **Precast-**Precast bases shall be placed on a foundation of ½ inch minus crushed rock, a minimum of 4 inches thick, compacted to 90 percent relative compaction. Elevation differentials of inlets and outlets shall conform to the approved improvement plans. Openings in the base shall align true with all inlet and outlet pipes. Stub-out or couplings provided in precast bases shall be of the same material as the pipe to which they connect, unless otherwise approved by the TVMMWC.

2 **Cast-in-Place Base -** The cast-in-place base portion shall not be placed higher than 6 inches above the outside tops of the main incoming and outgoing pipes, whichever is higher.

The wall thicknesses for the top of the cast-in-place base sections shall conform to the following table:

Diameter Thickness	Manhole Minimum Wall
48"	5"
60"	6"
72"	7"
84"	8"
96"	9"

Inside diameters of cast-in-place base portions shall equal the inside diameter of the manhole specified. Standard precast manhole riser sections and/or cones shall be placed above the cast-in-place section to bring the manhole rim to finish grade. Upon pouring the concrete base, the top surface of the cast in place base barrel shall be stamped with a rigid impression ring in order to match it up with the above, precast barrel section. As an alternate, a maximum one-foot barrel section may be stacked when it is determined that the concrete for the base is adequately stiff.

A 24-hour minimum curing time is required before manhole stacking is allowed.

Concrete in the cast-in-place portion shall be placed against undisturbed earth or upon a base of crushed rock or sand. All loose material shall be removed from the excavation prior to installation.

B. Cones - Cone tops shall be placed within 6 to 18 inches of final street grade. Where depth is insufficient for cones, flat slab tops shall be used. Lifting rings in precast cones shall be plugged with dry packed mortar.

C. Joints - Joints in precast manhole sections shall be made with either mortar or plastic sealing compound.

1 **Mortar Application** -All joint surfaces and the face of the manhole base shall be thoroughly cleaned and wetted before applying mortar. Both the inside and outside of mortared joints shall be plastered with mortar, and the inside surfaces brushed to a smooth finish with a wet brush. Special precautions shall be taken to ensure that the entire joint space is filled with mortar and is water tight.

2 **Plastic Sealing Compound Application** -All joint surfaces and the face of the manhole base shall be thoroughly cleaned before applying plastic sealing compound. The sealing compound shall be protected from dirt during application. Ends of the compound shall be joined end-to-end and not joined by overlapping. Sufficient compound shall be used to cause a visual “squeeze-out” of the compound material when adjacent sections are seated.

Squeeze-out material on the inside of the manhole shall be neatly trimmed flush with the inside surface.

D. Connections - Pipe connections to drainage manholes shall be made so that the pipe is flush with the inside face of the manhole. These connections shall be finished so that entrances are smooth. Unless the manhole is cast around the pipe, connections shall be made with dry packed cement mortar. Pipe connections shall not be made into the cone section of the manhole unless shown on the approved plans, or approved by the Engineer.

E. Grade Rings - Grade adjustments shall be made using precast grade rings. Precast rings shall be a minimum of 0 inches in height. The total height of the grade rings, frame, and cover casting shall not exceed 18 inches.

F. Frames and Covers - The tops of frames and covers shall be set 1/8 inch below finish grade pavement in the street and six inches above finish grade in landscape areas and 12 inches in unimproved, isolated areas unless otherwise shown on the approved plans. Per the Construction Standard Details, a 12-inch deep by 12-inch wide concrete collar shall be placed around the casting, covered by two inches of asphalt concrete paving in a street area. The concrete collar shall be in conformance to Section 90-2, “Minor Concrete” of the State Standard Specifications. All joints between the frame, grade rings, dome, barrels and base shall be sealed with non-shrink mortar, or an approved plastic sealing material. Inside the manhole, all joints where the sealing material is not flush with the inside wall shall be grouted with non-shrink mortar and finished/wetbrushed.

G. Adjusting Existing Manhole Frames -The frame shall be supported above the grade ring or dome by spacers, or by suspending with timber and wires. After the concrete collar is poured, any space between the frame and grade ring and dome shall be filled with non-shrink mortar, and the inside wall of the riser finished/wet-brushed.

H. Compaction -Compaction around storm drain manholes shall conform to Section 19, “Earthwork”.

63-4 JUNCTION BOXES/VAULTS

Manholes shall not exceed 96 inches in diameter unless approved by the Engineer. Where the number of pipes and/or pipe diameters requires a larger structure than a 96-inch diameter manhole, junction boxes or vaults are required. A registered civil engineer shall design vaults. Shops drawings shall be submitted and approved by the TVMMWC Engineer.

63-5 PIPE INSTALLATION

All drainage improvements shall conform the following requirements:

A. Excavation -Pipeline excavation shall be open-cut trenches, unless otherwise specified on the approved improvement plans. All excavations shall adhere to all applicable Federal and State safety requirements. All work shall be conducted in such a manner as to prevent damage to new and existing facilities or adjoining property.

Wherever the trench bottom is unstable, the area shall be excavated and an adequate amount of ½ inch crushed rock shall be compacted in place to provide a stable base for the pipe. Pipe bedding material, per approved plans, will be placed on top of stabilized trench bottom.

B. Trench Width -A minimum clearance of six inches shall be maintained between the pipe and the trench wall for reinforced concrete pipe and ductile iron pipe.

C. Pipe Bedding -Pipes shall be placed on a firm bed of imported granular material. Unless unstable pipe bedding subgrade needs to be removed, pipe bedding shall only be placed on native, undisturbed soil. Prior to placing pipe bedding, the trench bottom shall be free of any loose material.

D. Laying Pipe - The pipe shall be laid up-stream with the bell end of the pipe placed up-stream. The interior of the pipe shall be kept clean as the work progresses. There shall not be a change in pipe material between storm drain structures.

1. Handling, Laying and Backfill of Polyvinyl Chloride (PVC), and High Density Polyethylene Pipe (HDPE) and Steel Reinforced High Density Polyethylene Pipe (SRHDPE) – The pipe shall be handled in accordance with the manufacturer’s published recommendations. Laying and backfill shall conform to Caltrans Standard Specifications, the manufacturer’s recommendations, ASTM D-2321 and Construction Standard Details:

a. Due to the lightweight characteristic of the pipe, extreme care shall be taken to

avoid displacing the pipe during the backfilling operation. Following placement of the pipe on the required bedding and to the required grade, the pipe shall be stabilized in place with ballast. At a minimum, this shall be accomplished by loading the pipe down slowly and carefully with small piles of embedment material to a minimum of one foot above the pipe on each joint and midway on each length. The pipe shall be kept centered in the trench during this operation. Every precaution shall be taken to avoid flooding the trench prior to placing backfill. The City's Construction Inspector may require dewatering the trench to confirm pipe grade, and to retest the integrity of the pipe following trench flooding.

- b. The trench shall be backfilled with embedment material 6 to 12 inches above the pipe, prior to continuing with the trench backfill.
- c. Pipe material shall not change between manhole structures or between the last structure and the discharge/inlet opening.
- d. The pipe run between the last structure and the discharge/inlet opening shall be reinforced concrete. Pipe stub runs from storm drain mains into commercial sites shall also be reinforced concrete. (Unless otherwise indicated on the plans)
- e. No pipe, conduit or any other appurtenance shall be located within any existing or newly constructed storm drainpipe or culvert. Each run of storm drainpipe and culvert shall also be 100% clear and unobstructed the total length.

E. Non Rigid (PVC/HDPE/SRHDPE) Pipe Testing - A mandrel test shall be conducted following completion of subgrade processing and compaction for curb gutter and sidewalk and asphalt concrete pavement. Placement of curb, gutter and sidewalk and asphalt concrete pavement (and related aggregate base) shall not occur until the TVMMWC Inspector has approved the mandrel test. The TVMMWC Inspector shall be present through the duration of the mandrel testing.

The allowable deflection (reduction in vertical inside diameter) for all non-rigid pipes shall be 7.5% maximum. The deflection shall be tested by pulling a mandrel which is 92.5% of the inside pipe diameter through all installed pipe. The mandrel shall be the "go/no-go:" type and shall be pulled per the manufacturer's recommendations without mechanical assistance. Prior to the mandrel test, the pipe shall be thoroughly flushed and cleaned, (See Subsection "J" below). Obstacles in the pipe shall be removed. At each location in which the mandrel cannot pass, the cause shall be ascertained. If it is found the deflection exceeds 7.5 % or that a gasket has been mis-installed, or that the pipe has been damaged due to construction activities, then the respective section of pipe shall be repaired and retested. Pipe section repair operations may require rebedding pipe, replacing pipe, or both as needed to properly repair pipe section. Watertight repair couplings shall be used in repair. A passing mandrel retest is required.

At the contractor's discretion, any sections of non-rigid pipe not passing the mandrel test may be televised to evaluate the problem.

F. Pipe Laying Tolerances - The pipes shall be laid true to line and grade with allowed tolerances

of 0.03 foot above or below the design grade and 0.10 foot left or right of the design alignment.

G. Trench Backfill- Initial backfill material shall be placed immediately after pipe joints have been completed inspected and passed by the TVMMWC Inspector.

The material shall be carefully placed so as not to disturb or damage the pipe, and shall be brought up evenly on both sides. Trench backfill shall be placed in accordance with Section 19-3.03(A), "Trench Backfill" of these Specifications.

H. Cast-in-Place Concrete Pipe -Cast-in-place concrete pipe shall conform to provisions in Section 63 of the Caltrans Standard Specifications and per ACI-346. Where excavations for other utilities undermine installed cast-in-place pipe, that excavation shall be backfilled to the spring line of the cast-in-place pipe with two-sack slurry per these Standards.

I. Pavement Cutting and Repaving -When the trench line is in an existing pavement area, the pavement shall be sawed or scored and broken ahead of trenching operations.

The proper tools and equipment shall be used in marking and removal of the pavement such that it is cut accurately to a neat and parallel line on either side of the trench width required. All cuts in Portland cement concrete pavements shall be sawcut with equipment approved by the City's Construction Inspector. See Section 19-3.03(A), "Trench Backfill", of these Standards.

J. Cleaning of Storm Drain System -The storm drain system shall be cleaned to the satisfaction of the TVMMWC's Inspector upon completion. If flushing is utilized, then the discharge shall not be routed into the existing system. The downstream manhole shall be plugged and the discharge fluid shall be disposed of in a manner satisfactory to the TVMMWC's Inspector.

63-6 CHANNEL LINING INSTALLATIONS -Channel lining installations shall conform to the following specifications:

A. Surface Preparation - The surfaces of the areas to be lined shall be evenly graded to the lines and grade and sections as indicated on the approved plans. The surfaces shall be moistened thoroughly to prevent moisture from being drawn from the freshly placed lining.

All surfaces on which lining is to be placed shall be free from water, mud and debris and shall be firm enough to prevent contamination of the fresh lining by earth or other foreign material. Prior to placing any lining, the Contractor shall verify line and grade of the excavated channel.

B. Reinforcement -Welded wire fabric shall be embedded in the concrete so that it will be a minimum of 1 inch clear from either face of the concrete, unless otherwise noted.

C. Joints

- 1 **Construction Joints** -Shall be square and edged with a 1/4-inch radius-edging tool. The edge shall be thoroughly wetted before the next section of lining is placed. Construction joints shall be constructed whenever the operation is halted for a period exceeding 30 minutes. Welded wire fabric reinforcing shall extend through the construction joint.
- 2 **Deep Tool Joints** -Transverse deep tool joints shall be constructed at 10-foot intervals. The aggregate shall be separated with the joint tool a minimum of two inches deep.

Immediately following application of the deep tool, a ¼-inch grooving tool shall be applied to the surface to seal the joint.

D. Weep Holes - On channels with side lining extending more than 18 inches vertically above the channel toe, weep holes shall be constructed at intervals of 10 feet, midway between contraction joints on each side of the channel. The weep hole elevation shall be 12 inches above the adjacent toe of slope.

The holes shall be backed by a minimum of 1 cubic foot of aggregate material tied in a burlap bag.

The aggregate shall extend at least 6 inches above and below and to each side of the weep hole, and at least 10 inches into the side slope. The side and back of the burlap sack shall be protected from being coated by mortar or concrete during the lining placing operation.

On the day following the lining placement, each weep hole shall be rodded to assure it has not been blocked. The weep hole shall then be cut to fit the channel slope.

E. Cutoff Walls -Cutoff walls shall be constructed around the perimeter at each end of the channel lining and at all locations where the new lining meets structures or existing lining, and at all other locations shown on the approved plans. The cutoff walls shall be a minimum of 6 inches thick and 18 inches in depth, as measured from the surface of the lining. The welded wire fabric shall be bent down into the cutoff walls.

F. Geotextile Linings -shall follow the manufacture's recommendations for preparation of soil, seed bedding, blanket orientation, anchoring details, and appropriate seed blend and application rates.

63-7 MATERIALS

A. Backfill Material -All Drainpipe backfill material shall conform to the project specifications.

B. Drop Inlets -All drop inlets shall conform to Construction Standard Details DR-1 through DR-5. Concrete shall conform to these standards.

C. Manholes -All precast manhole barrels, risers, cones, flat tops and grade rings shall conform to ASTM Designation C478 and shall conform to dimensions shown on Construction Standard Details DR-6 through DR-10.

1. Bases - Bases shall be either precast or cast-in-place. Precast bases shall conform to ASTM Designation. Cast-in-place bases shall be of Type II – Modified Portland Cement content of the minor concrete shall be not less than 550 pounds per cubic yard, with a maximum size aggregate not greater than one-inch or small than 3/8-inch. Slump shall not exceed 4 inches as determined by the slump cone method of ASTM Designation C143 or an equivalent slump as determined by Test method No. California 533.

2. Barrels - Manhole barrels shall conform to dimensions of Jensen Precast or approved equal, and shall conform to ASTM Designation C478.

3. Cones -All cones shall be concentric (unless otherwise shown on the approved

improvement plans), Jensen Precast or equal and conform to ASTM Designation C478.

4. **Joints/Mortar** - Joints shall be made with either non-shrinking mortar or with a plastic sealing compound conforming to Federal Specification SS-S-002-10. Mortar shall consist of one cubic foot of Portland cement to two cubic feet of concrete sand.
5. **Manhole Frames and Covers** - All manhole frames and covers shall be of cast iron or ductile iron and conform to ASTM Designation A48, C478 or ASTM A536 for Ductile Iron or, Class 30 and shall be the following or approved equal per the Standard Drawings.

D. Storm Drain Pipe -Storm drain pipe; shall conform to the following:

1. **Cast-in-Place Concrete Pipe** -Concrete shall be Type II Modified Portland Cement content of the minor concrete shall not be less than 550 pounds per cubic yard, with a maximum size aggregate not greater than one-inch or smaller than 3/8-inch, and shall conform to the requirements of Sections 63 and 90 of the Caltrans State Specifications.
2. **High Density Polyethylene Pipe (HDPE)** - HDPE shall be type “S”, conforming to Section 64 of the Caltrans Standard Specifications. Joint connections shall be water tight, rubber ring gasketed. HDPE shall be Hancor (Sure Lok F477), ADS, Inc. (N-12 Pro Link Ultra) or approved equal.
3. **Polyvinyl Chloride Pipe (PVC)** - PVC shall conform to the following standards based on pipe diameter:

Pipe Diameter ASTM Designation 12” through 15”
D3034, SDR 35 18” through 27” F794, F2241, SDR 51
30” through 48” F794

All PVC pipe joints shall be integral wall bell and spigot configuration, factory formed. All rubber rings shall conform to ASTM Designation F477.

4. **Precast Reinforced Concrete Pipe (RCP)** - RCP shall conform to ASTM Designation C76 for Class I, II, III, IV or V. The class of pipe shall be based on the designation conforming to the approved plans. Joints for RCP shall be bell and spigot with rubber gasket. The gasket shall conform to Section 65 of the Caltrans Standard Specifications.
5. **Steel Reinforced High Density Polyethylene Pipe (SRHDPE)** – SRHDPE shall be manufactured in accordance with ASTM F2562 “Standard Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage”. SRHDPE shall be manufactured from high density polyethylene stress rated resins conforming to the minimum requirements of cell classification 345464 C per ASTM D3350 “Standard Specification for Polyethylene Plastic Pipes and Fittings Material”. Joints shall be watertight to an internal water pressure of 15 psi when tested in accordance with ASTM D3212 “Standard

Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals”. SRHDPE shall be CONTECH (DuroMaxx) or approved equal.

E. Outlet and Inlet Structures - All outlet structures shall conform to Construction Standard Details or as shown on the plans.

F. Slurry Cement Backfill -Slurry cement backfill shall conform to the requirements of Section 19 of the Caltrans Standard Specifications.

G. Lined Channels - All lined channels shall conform to the details shown on the plans and the following materials:

- 1 Air Blown Mortar** - Air blown mortar shall conform to provisions in Section 53 of the Caltrans Standard Specifications.
- 2 Concrete** - Concrete shall be either “Minor Concrete” with Type II cement, sacked concrete, or doweled and sacked concrete. The minimum weight of sacked concrete shall be 60 pounds per sack.
- 3 Curing Compound** -Curing Compound shall conform to provisions in Section 90-1.02J of the CalTrans Standard Specifications.
- 4 Grouted Cobbles** - Ground cobbles shall be set in six inches of “Minor Concrete” with pea gravel concrete. The top surface of the concrete shall be flush with adjacent finish grade. Cobbles shall be four to ten inches in size, with 1/3 exposed above the concrete surface, per Caltrans Specifications. Base for concrete shall be undisturbed native soil. If the soil is disturbed or undercut, it shall be processed to 90% relative compaction.
- 5 Weep Holes** - All weep holes shall be 2 inches in diameter and made of: galvanized steel pipe, schedule 40 or better; PVC pipe, schedule 40 or better; or ABS pipe, schedule 40 or greater.
- 6 Welded Wire Fabric** - Welded wire fabric to conform to ASTM Designation A 185.

63-8 ABANDONING STORM DRAINS

In newer construction, storm drain stubs and services to be abandoned shall be either removed to the main or manhole of origin or filled solid with concrete slurry, at the discretion of the TVMMWC. Abandonment of existing storm drain stubs shall be removed or left in place as directed by the TVMMWC Engineer and or as shown on the approved plans.

SECTION 64 - SANITARY SEWER FACILITIES

64-1 General

This work shall consist of furnishing all sewer main pipelines, branch fittings, building or house branches (services), manholes, stub-outs, lampholes, and other sewer facilities as shown on the Plans and in conformance with the Standard Drawings, as specified in the Specifications, and as directed by the Engineer, including testing and internal inspection of all sewer main pipe after installation.

64-2 Materials

64-2.1 PVC Pipe And Fittings

Unless otherwise specified in the Contract Specifications, pipes for sanitary sewer mains, fittings, and building and house branches (services) shall be polyvinyl chloride (PVC), as specified herein.

PVC pipe shall conform to the provisions in the ASTM Standard Specifications tabulated below, for the standard dimension ratio (SDR) or pipe stiffness (PS) designation given, and these specifications.

Pipe Size (Inches)	ASTM	SDR or PS
4-15	D3034	SDR 35
18-30	F679	PS 115

PVC pipe and fittings shall be manufactured of PVC compound containing not more than 10 parts per 100, by weight, of additives and fillers, including but not limited to, stabilizers, antioxidants, lubricants, and colorants.

PVC pipe and fittings for sanitary sewers and sewer services shall be green in color.

Chemical Resistance: PVC pipe shall have the properties in the following table, when tested before and after exposure to certain chemical solutions as specified in the American Public Works Association Standard Specifications for Public Works Construction "Greenbook," Section 207-15.3, as amended.

Property	ASTM Test Method	Allowable Change (After 112-Days Exposure)		
Minimum Yield Strength (psi)	D 638	- 0% (No Reduction)		
Impact Strength (Ft. - lbs/in.) Notch Min.	D 256 Method A (Size ½" x ¾" x 2½")	- 0% (No Reduction)		
Weight Change %	D 543			
Unconditioned		±1.5 max	±1.5 max	±1.5 max
Conditioned		±1.0 min	±1.0 min	±1.0 min

PVC Pipe shall be clearly marked as follows at intervals of five feet or less:

Manufacturer's name or trademark
 Pipe" Nominal pipe size
 PVC cell classification

Legend "Type PSM SDR-35 PVC Sewer
 ASTM D3034
 (12454-B or 12454-C or 13364-B)

PVC pipe fittings shall conform to the provisions in ASTM F1336 and these specifications. PVC fittings and accessories shall be as manufactured and furnished by the pipe supplier, or approved equal, and have bell and/or spigot configurations identical to that of the pipe. Where shown on the Plans, injection molded PVC wye fittings shall be used for future building or house branch connections at the time of installation of the sanitary sewer main. Where indicated on the Plans or specified in the Contract Specifications, each wye branch for future sewer service connections shall be provided with an end cap or plug approved by the pipe manufacturer for use with its product.

PVC Fittings shall be clearly marked as follows:

Manufacturer's name or trademark	"PSM"
Nominal size	"ASTM D3034"
Material Designation	"PVC"

64-2.2 Joints And Gaskets

Joints shall be integral bell and spigot push-on joints conforming to the provisions in ASTM D3212 and these Special Provisions, with factory installed elastomeric gaskets. Joints shall be configured so as to prevent improper installation of the gasket and ensure that the gasket remains in place during the joining operation. Bell and spigot configurations for fittings and couplings shall be compatible with those used for pipe joints.

Spigots shall have a home mark to indicate proper penetration when the joint is made.

Elastomeric gaskets shall conform to the provisions in ASTM F477 for thermoset elastomeric gaskets, and these specifications. Gaskets shall be factory installed by the pipe manufacturer, and shall be specifically intended for use with the pipe.

Gaskets shall be manufactured from a synthetic elastomer, containing not less than 50% by volume of first-grade synthetic rubber. The remainder of the compound shall consist of pulverized fillers free of rubber substitutes, reclaimed rubber, and deleterious substances.

A gasket shall contain no more than one splice. A splice shall be made by applying a suitable cement to the ends and vulcanizing the splice in a full mold.

64-2.3 Test Requirements

During production of the pipe, the pipe manufacturer shall perform the tests specified in ASTM D3034. A certificate of compliance with specification requirements shall be provided by the manufacturer, for each lot of pipe from which pipe is delivered, and shall be delivered with the pipe. The certificates of compliance shall include the test results. The Contractor shall submit the certificates of compliance to the Engineer prior to commencing excavation for installation of the pipe.

In addition, when so directed by the Engineer, the Contractor shall obtain PVC compound samples and shall provide test specimens in accordance with ASTM D1987. The Contractor shall also provide one test pipe selected at random by the Engineer from each 1200 feet or fraction thereof, or from each pipe lot or fraction thereof. A lot shall be defined as all pipe having identical identification marking. The length of test pipe for each selected pipe shall be a minimum of 8 feet. The Engineer may test the specimens for compliance with specification requirements.

When so directed by the Engineer, the Contractor shall furnish test specimens of gaskets from each batch used in the work.

When the pipe is delivered to the work site, the Engineer may require additional testing to determine conformance with specification requirements for pipe flattening, impact resistance, pipe stiffness, and extrusion quality.

The basis for acceptance will be compliance with specification requirements, as determined by the inspection of pipe, fittings, and couplings, the certificates of compliance, and the results of any tests conducted by the Engineer.

64-2.4 Time Limit For Installation

If the Contractor proposes to install any PVC pipe and fittings that are more than 180 days old from the date of manufacture, the Contractor shall retest the materials within 60 days prior to installation, at the Contractor's expense, to demonstrate compliance with specification requirements, unless otherwise directed by the Engineer. The Contractor shall not install any PVC pipe and fittings more than 2 years old from the date of manufacture. PVC pipe that is stored for more than 3 weeks under conditions that may subject the pipe to sunlight or other sources of ultraviolet light shall be covered or otherwise protected from such exposure to prevent pipe material degradation ultraviolet radiation. The foregoing shall also apply to elastomeric gaskets.

64-2.5 Vitrified Clay Pipe

Vitrified clay pipe and fittings shall only be used if required by the Plans or Contract Specifications. In such case, vitrified clay pipe, shall be extra strength, bell and spigot, and shall conform to ASTM Specification Designation C-700 with preformed factory fabricated plastisol joints complying with ASTM Specification Designation C-425-04. Vitrified clay sewer pipe shall also conform to standards of the Clay Products Institute.

64-2.6 Manhole Materials

Cast-in-Place Concrete:

Concrete for cast-in-place manholes shall be Class 2 concrete conforming to the provisions in Section 90 of the State Standard Specifications, unless otherwise shown on the Plans or specified in the Contract Specifications. Portland cement shall be Type II low alkali sulfate resistant conforming to the provisions in ASTM C150. Slump shall not exceed 3 inches. Before using concrete, the Contractor shall submit in writing to the Engineer a copy of all mix designs.

Precast Reinforced Concrete Manhole Sections:

Precast reinforced concrete manhole sections for manholes shall conform to the provisions in ASTM C478. Elliptical single line reinforcement is not allowed. The ends of manhole sections shall be in planes at right angles to the longitudinal axis of the section. The ends of manhole sections shall be finished to regular smooth surfaces, and no point on any surface of either the spigot end or bell end shall project beyond, or be more than 1/4 inch short of, the specified plane.

In addition to the tongue and groove joints shown on the Standard Drawings, joints for manhole sections may be rubber gasket joints of flush bell and spigot design with a contained rubber gasket. Joints and gaskets shall conform to the provisions in ASTM C443 for standard gaskets, except as modified or required otherwise in these Special Provisions. The gasket shall be confined in a groove or by a shoulder on the spigot end of the manhole section so that neither movement of the section nor hydrostatic pressure can displace the gasket. When the joint is assembled, the gasket shall be compressed to effect a watertight seal.

Rubber gasket joint assemblies shall be formed and accurately manufactured so that installed manhole sections will form a continuous watertight manhole with a smooth and uniform interior surface, and shall provide for slight movements of the sections due to expansion, contraction, settlement, or lateral

displacement. The shape and dimensions of the joint shall be such that it shall be self-centering upon closure, and so designed that the gasket will not be required to support the weight of the manhole sections. The rubber gasket shall be the sole element of the joint depended upon to provide watertightness.

Manhole adjustment rings shall be precast concrete manhole adjustment rings conforming to the details shown on the Standard Drawings.

Mortar used in manholes shall be composed of one part, by weight, Portland cement (Type II low alkali conforming to ASTM C150) and 2 parts, by weight, sand.

Steel reinforcement bars shall be deformed billet-steel bars of the size called for in the Plans and Specifications, conforming to the provisions in ASTM A615 for Grade 60.

Metal frames and covers for manholes shall be cast iron meeting the provisions in ASTM A48 for Class 25, and shall conform to the details shown on the Plans and Standard Drawings. Covers shall be marked "Sanitary Sewer," molded into the cover by the manufacturer.

64-3 Trenching And Excavation

Trenching for sanitary sewer pipes and service laterals, and excavating for sewer manholes shall conform to the requirements of Section 8-15, Utilities and Non-Street Facilities; Potholing," and Section 19-3, "Trench and Structure Excavation, Backfill, Compaction, and Surface Restoration."

64-4 Sewer Pipeline Installation

Construction of sewer pipelines connecting to existing sewers shall begin at the existing sewer location and proceed upstream with the spigot end of the pipe in the direction of flow, unless otherwise approved in writing by the Engineer. Existing sewer lines shall remain operational at all times. The Contractor shall furnish and install a gasketed stainless steel band-type repair coupling specifically designed for such use and approved by the Engineer where PVC sewer pipe is to be connected to an existing pipe.

Sewer pipe and fittings shall be laid to true line and grade, and jointed in compliance with the manufacturer's recommendation and shall be carefully adjusted to grade by scraping away or filling and tamping the trench bottom to eliminate any possible sag or high point in the pipe. Occasional variations as follows will be permitted: above grade, 3/16 inch; below grade, not to exceed 3/8 inch; alignment not to exceed 2 inches if gradual over a distance of 20 feet. Use of blocks to support the pipe is prohibited. Each joint of pipe must be fully pressed into place so that there will be no unevenness or settlement of one length of pipe with the other at the joint.

The Contractor shall furnish and use a laser device for control of alignment and grade of the sewer pipe. When conditions are such that this method is impracticable, such as on short pipe runs, the Contractor shall have an Engineer on the ground to set grade of each joint of pipe by means of an Engineer's level. The grade line shown on the Plans indicates the flow line or invert of the pipe; all cuts, unless otherwise indicated, refer to this line.

The interior of the pipe shall be kept free from dirt and other foreign material as the laying progresses. Any pipe that shows undue settlement or is damaged shall be taken up and replaced or re-laid at the Contractor's expense. The open ends of all sewer pipes being installed must be covered to keep out animal life, etc., whenever the pipe is left unattended for any length of time, such as overnight. The end of any sewer that does not terminate at a manhole shall be closed at the bell end with a plug, or at the spigot end with a cap, manufactured for that purpose.

PVC pipe exposed to the sun during the summer months must be allowed to cool before connection is made to manholes and other facilities, and prior to backfill.

64-5 Service Lateral Installation

Service laterals shall be furnished and installed by the Contractor at the locations shown on the Plans, in conformance with the Standard Drawing pertaining thereto, the Contract Specifications, and the directions of the Engineer.

Pipe for sewer service laterals shall conform to the requirements of Section 64-2.1, "PVC Pipe and Fittings," and shall be installed in accordance with the requirements of Section 64-4, "Sewer Pipeline Installation."

Sewer service laterals 4 inches or 6 inches in diameter shall be connected to all sewer mains less than 18 inches in diameter at prefabricated wye fittings conforming to Section 64-2.1, "PVC Pipe and Fittings," or shall be connected to similar pipe stub-outs from manholes. Sewer service laterals 4 inches or 6 inches in diameter may be connected directly to existing sewer mains 18 inches in diameter or greater, providing that a machine core is used in connecting to the main sewer. Sewer service laterals 8 inches in diameter or greater connecting to sewer mains shall require the construction of a manhole at the point of connection. All connections shall be of materials and methods as approved by the Engineer.

Sewer wye fittings, unless otherwise specified or directed, shall be inclined at an angle of not greater than 45° from the horizontal. Service laterals shall extend from the sewer main to the right-of-way line of the street or alley, where the service lateral shall be promptly closed at the bell end with a plug, or at the spigot end with a cap, manufactured for that purpose.

The Contractor shall mark the location of the end of the service lateral by putting an "S" mark on the curb face. Said mark is to be chiseled into existing concrete or stamped if the concrete is freshly poured. In cases where a concrete curb does not exist, the Contractor shall mark the location of the terminus of the building or house branch for future location 4x4 wooden post at the end of the pipe or other means approved by the Engineer.

Excavations for laying service laterals shall be made in accordance with the Plans or Contract Specifications. Where no direction is given, service laterals shall be installed in such a manner that: 1) at no time will an existing street be closed to traffic; 2) Whenever service laterals are to be installed in existing major streets that have been resurfaced within the last five years, or in pavement that is in good condition and free of cracking, they shall be installed by boring methods rather than open cut trenches. Laterals crossing over water mains shall comply with Section 64-11 "Alignment Changes (Separation Criteria)."

64-6 Manhole Construction

Manhole structures shall be constructed at the locations shown on the Plans and as specified in the Contract Specifications, and as indicated on the standard drawings pertaining thereto. Construction of Manholes shall comply with Section 19-3, "Trench and Structure Excavation, Backfill, Compaction, and Surface Restoration," and Section 64-2.6, "Manhole Materials."

Manholes shall be complete structures in place and backfilled including the furnishing and placing of all materials involved. Cast-in-Place Concrete manholes shall consist of a poured-in-place base and riser section, reinforced concrete reducing cone sections. Pre-cast concrete pipe manholes shall consist of a poured in place concrete base section, reinforced concrete pipe riser and reducing cone sections. Both types shall have a cast iron frame and cover and a poured in place concrete collar with paving patch. Invert channels shall be smooth and semicircular in shape conforming to the inside of

the adjacent pipe invert, or flow channels may be provided by use of the bottom half of the specified main pipe. The floor and wall of the manhole outside the channels shall be smooth and shall slope toward the channels.

The top of the manhole base section shall be keyed to receive the tongue end of the riser section. The key shall be formed in the freshly poured concrete by using a template manufactured to the dimensions of the riser section. If the riser is cast-in-place monolithically with the base section by using a slip form or other means, the key may be omitted between the base and riser. If the base and riser sections are not poured monolithically, but separately, a key shall be provided in the base section. In either case, a key will be required in the top of the riser section to receive the tongue end of the tapered cone.

The joints between the base and all precast elements of the manhole, including adjustment rings and manhole frame, shall be filled with cement mortar, or approved equal, prior to joining the elements.

The interior of the manhole shall be troweled smooth with a wooden trowel, removing excess mortar extruded out of joints for the entire height of the manhole, from the manhole frame to the floor. All excess mortar and any other debris shall be removed from the manhole.

Changes in direction of flow shall be made with a smooth curve of as large a radius as the size of the manhole will permit. Changes in size and grade of the channels shall be made gradually and evenly.

Stub-outs shall be installed in manholes at the locations and sizes shown on the Plans. All stub-outs shall be sealed with a plug or cap of a type approved by the manufacturer of the pipe.

All manholes shall be completed to finish grade with concrete collar and paving patches (where indicated) as shown on the Standard Drawings and as herein specified. In undeveloped areas where no street or alley surfacing is to be done in conjunction with or immediately after utility installation, the manhole cover shall be finished off to a level 1 foot above ground elevation and shall be provided with 12 inches of grade rings. In existing street areas where surfacing exists and no new street re-grading is contemplated in conjunction with or immediately after utility installation, the manhole cover shall be brought to existing street grade and finished off. In areas where street or alley surfacing is to be done in conjunction with or immediately after utility installation, such as new subdivisions, manholes shall initially terminate with the top of the cone 6 inches below subgrade and shall be brought to street or alley surface with grade adjustment rings and completed after street paving is accomplished. Unless specifically otherwise indicated in the Contract Specifications, it will be the responsibility of the sewer Contractor to return and install the manhole covers to finish grade as specified and as shown on the Standard Drawings.

The Contractor should be aware that connections to existing sewers will be "wet" and the Contractor shall make whatever arrangements are necessary to complete the manhole connections under the "wet" conditions.

Where necessary, mounds or dikes shall be placed around the perimeter of manhole covers to prevent rainwater or other inflow of water from entering the manholes. No steps shall be installed in manholes unless otherwise noted on the plans.

64-7 Backfill, Compaction, And Surface Restoration

Backfilling, compacting and restoration of surfaces of trenches and excavations for sewer facilities shall conform to the requirements of Section 19-3, "Trench and Structure Excavation Backfill, Compaction, and Surface Restoration."

64-8 Leakage Test, Sewer Mains And Service Laterals

After completing the installation, backfill and compaction of a section of sewer main pipeline with service laterals, and after all other underground utilities including TVMMWC, other agency, and privately owned utilities are in and compacted, but prior to the placement of aggregate base or asphalt-concrete pavement, and prior to conducting the deflection tests and video inspection as required herein, the Contractor shall, at his expense, conduct a leakage test using low pressure air. The test shall be performed using the following procedures and under the supervision of the inspecting Engineer.

Each section of sewer between two successive manholes shall be tested by plugging all pipe outlets with suitable test plugs.

All pneumatic plugs shall be seal tested before being used in the actual test installation. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked. Air shall be introduced into the plugs to 25 pounds per square inch gauge pressure (psig). The sealed pipe shall be pressurized to 5 psig. The plugs shall hold against this pressure without bracing and without movement of the plugs out of the pipe.

To commence the leakage test, air shall be slowly added until the internal pressure is raised to 4.0 psig. The compressor used to add air to the pipe shall have a blow-off valve set at 5 psig to assure that at no time the internal pressure in the pipe exceeds 5 psig. The internal pressure of 4 psig shall be maintained for at least two minutes to allow the air temperature to stabilize after which the air supply shall be disconnected and the pressure reduced to 3.5 psig. The time in minutes that is required for the internal air pressure to drop from 3.5 psig to the lower pressure indicated in the appropriate table below shall be measured and the results compared with the values tabulated below.

Gauges used to measure test pressures shall read from 0 psig to 10 psig (maximum) with 1/2 psig increments. If required, the Contractor shall supply necessary fittings to accept a TVMMWC supplied gauge.

All gauging and testing shall be done outside the manholes and no one shall be allowed to enter the manholes while the line is pressurized.

PVC Gravity Sewer Pipe Minimum Acceptable Time Required for Pressure Decrease from 3.5 to 3.0 psig

Pipe Diameter (inches)	Test Time	
	(Minutes)	(Seconds)
4	2	32
6	3	50
8	5	6
10	6	22
12	7	39
15	9	30

Pipes greater than 15 inches diameter shall be as specified in the Contract Specifications.

Vitrified Clay* Sewer Pipe Minimum Acceptable Time Required for
Pressure Decrease from 3.5 to 2.5 psig.

* Only if this kind of pipe is required on the Plans or specified in the Contract Specifications.

Pipe Diameter (inches)	Test Time		Minimum Distance Between Manholes (Feet)	K Value
	(Minutes)	(Seconds)		
4	2	0	430	0.428
6	2	45	380	0.592
8	3	45	320	0.702
10	4	46	260	1.100
12	5	40	215	1.580
15	7	0	170	2.470
18	8	36	145	3.560
21	10	6	125	4.850
24	11	6	105	6.340

Pipes greater than 24 inches in diameter shall be as specified in the Contract Specifications.

The above-tabulated values shall be used for the respective diameter pipes except where the distance between successive manholes is less than the above-tabulated values, in which case, the following formula will be used to determine the test time:

$$T=KL$$

where:

T=test time in seconds

K=value from table

L=distance between successive manholes in feet

Failure of the leakage test will be grounds for rejection of the section tested, until discovery and correction of the reason for the failure and successful retesting of the section.

64-9 Deflection (Deformation) Test, PVC Sewer Pipelines

PVC sewer pipe, which is designated as flexible in nature, shall be tested for excessive deflection. This test shall be performed after backfilling and compaction but prior to the placement of aggregate base or asphalt-concrete surfacing, and prior to television inspection as specified in Section 64-10, "Television Inspection, Installed Pipe Interior"

The Contractor shall demonstrate that the maximum pipe deflection (deformation) does not exceed 5 percent of the nominal pipe interior diameter by pulling a properly sized rigid ball or a mandrel through the main line pipe. A "rubber flush ball" does not meet the requirement for deflection testing.

Failure of the deflection test shall be grounds for rejection of the section tested. The Contractor shall undertake measures necessary to correct the deflection. Retesting of the failed section will be conducted to affirm correction. If correction requires re-laying or otherwise disturbing the pipe, the Contractor may be required by the Engineer to repeat the leakage test at no cost to the TVMMWC.

64-10 Television Inspection, Installed Pipe Interior

The Contractor shall furnish closed circuit television equipment for an interior inspection of the newly installed sewer mains. The television inspection of the sewer mains shall be made after

leakage and deflection tests have been performed and prior to placing of street aggregate base or asphalt paving. Any broken pipe, separation of joints, or any pipe exceeding the permitted tolerances for line and grade shall be replaced or repaired. Any pipe repaired or replaced shall be retested for leakage and deflection. A DVD disc showing the initial video inspection as well as any retests shall be provided to the TVMMWC at no additional cost.

The Contractor shall be responsible for all costs associated with furnishing the television inspection and making final repairs to the sewer mains and re-inspection utilizing the closed circuit television equipment.

64-11 Alignment Changes (Separation Criteria)

All non-potable water mains, which include sanitary sewers, sewer force mains, recycled water mains, storm drains, and potable water mains must meet the separation standards of the "California Waterworks Standards", contained in Section 64572, Title 22, of the California Administrative Code, or shall be installed in accordance with alternate construction criteria as specified therein. Included in the Appendix to these Specifications is a document titled "Guidance Memo No. 2003-02: Guidance Criteria for the Separation of Water Mains and Non-Potable Pipelines" published by the California Department of Health implementing said Section 64572. This document sets forth minimum spacing requirements between drinking water pipelines and sewer and other non-potable water pipelines, and has been used to set the location of the sewer main. In the event that field conditions require a change in the planned alignment (horizontal or vertical) of the sanitary sewer, under no circumstances shall a change be made without obtaining the express and written approval of both the TVMMWC inspector and the TVMMWC Design Engineer. Any change so authorized must comply with the Guidance Memo.

64-12 Measurement

Measurement for sewer main installation and service lateral installation shall be by the lineal foot of pipe installed, and shall be the actual horizontal length installed, measured through wye fittings. Wyes will not be measured separately when constructed with a lateral.

Where wyes are to be installed for future lateral connections, measurement for wye fittings shall be per each wye fitting installed.

Measurement for manholes shall be per each manhole installed.

64-13 Payment

The unit price bid per lineal foot for sewer mains shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved therein as shown on the Plans, as set forth in these Specifications and the Contract Specifications, and as directed by the Engineer. This shall include, but not be limited to, furnishing and installing the pipe, trenching, backfilling, compacting, leakage and deflection testing, and internal video inspection.

The unit price bid per lineal foot, or per each, for service laterals shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved therein as shown on the Plans, as set forth in the Specifications, and as directed by the Engineer. This shall include, but not be limited to, furnishing and installing the wye fitting, pipe, trenching, backfilling, compacting, plugging and marking, and leakage testing.

The unit price bid per each for wye fittings, where wye fittings only (no lateral) are to be installed, shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved therein as shown on the Plans, as set forth in the Specifications, and as directed by the Engineer, in excess of the cost of installing main line pipe. This shall include,

but not be limited to, furnishing and installing the wye fitting and plug, trenching, backfilling, compacting, leakage testing and internal video inspection.

When the contract does not include a pay item for wye fittings as above specified, and unless otherwise provided in the Contract Specifications, full compensation for wye fittings shown on the plans shall be considered as included in the prices bid for other sewer pipeline items of work and no separate payment will be made therefor.

The unit price bid per each for manholes shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved therein as shown on the Plans, as set forth in the Specifications, and as directed by the Engineer. This shall include, but not be limited to, furnishing and installing the manhole and pipe stub-outs, excavation, backfill and compaction, returning and adjusting manhole lids and frames to final grade following street or alley construction or reconstruction, and connections to all pipes, wet or otherwise.

SECTION 65 - SANITARY SEWER FORCE MAINS

65-1 General

This work shall consist of furnishing and installing Poly Vinyl Chloride (PVC) and Ductile Iron (DI) pipe for sewer force mains, and all appurtenances, installed complete as shown on the Plans, as specified in the Specifications, and as directed by the Engineer. Reference is made to Section 64, "Sanitary Sewer Facilities," and Section 66, "Potable Water Distribution Facilities," of these specifications.

65-2 Materials

Pipe for sewer force mains shall be either PVC pipe or DI pipe.

Where a particular pipe material, either PVC pipe or DI pipe, is designated on the Plans for sewer force main construction, the sewer force main pipe material shall be as shown on the Plans.

Where a particular pipe material is not designated on the Plans for sewer force main construction, and sewer force mains are installed in slurry cement backfill as shown on the Plans, sewer force mains may be either PVC pipe or DI pipe, at the Contractor's option, except where thrust restraint is accomplished by the use of restrained joints. Where thrust restraint is accomplished by the use of restrained joints, sewer force mains shall be DI pipe unless approved by the Engineer.

Where a particular pipe material is not designated on the Plans for sewer force main construction, and sewer force mains are not installed in slurry cement backfill as shown on the Plans, sewer force mains shall be DI pipe.

All pipe fittings for sewer force mains shall be DI fittings, conforming to the requirements of AWWA C110 for Class 250 unless approved by the Engineer.

65-2.1 PVC Pipe

PVC pipe for sewer force mains in sizes from 4 through 12 inches in diameter shall be Class 150, conforming to the requirements of AWWA C900 for DR18. PVC pipe for sewer force mains in sizes from 14 through 36 inches in diameter shall be PR 165, conforming to the requirements of AWWA C905 for DR 25. Pipe joints shall be integral bell and spigot gasketed joints conforming to the requirements of ASTM D 3139, with an elastomeric seal (gasket) conforming to the requirements of ASTM F 477, unless otherwise shown on the Plans or specified in these specifications or the Contract Specifications. The pipe shall be manufactured with standard cast iron pipe outside diameters, and the nominal laying length shall be 20 feet. The pipe shall be green in color, and shall be factory marked to indicate that it conveys wastewater not for potable use.

65-2.2 DI Pipe

Ductile iron (DI) pipe for sewer force mains shall be either Thickness Class 50 or Pressure Class 250 for pipe 16 inches in diameter or smaller, and either Thickness Class 50 or Pressure Class 200 for pipes larger than 16 inches in diameter, conforming to the provisions in Section 66, "Potable Water Distribution Facilities," of these Specifications and the Contract Specifications. The pipe shall be manufactured with standard cast iron pipe outside diameters, and the nominal laying length shall be 18 feet.

The interior surface of all DI pipe and fittings for sewer force mains shall be lined with a factory-applied lining of either:

1. Protecto 401 ceramic epoxy lining, a product of Induron Coatings, Inc., www.protecto401.com, having a nominal thickness no less than 40 mils; or

2. PolybondPlus composite fusion-bonded epoxy and polyethylene lining, a product of American Cast Iron Pipe Company, www.acipco.com, having a nominal thickness no less than 60 mils;

or approved equal. Factory application of the lining, and any necessary field applications for repairs, shall conform to the recommendations of the lining manufacturer and the pipe manufacturer.

DI pipe for sewer force mains shall be installed with a green, 8-mil polyethylene wrap conforming to the provisions in AWWA/ANSI C105/A21.5. The polyethylene wrap shall be marked with the words "CAUTION: RAW SEWAGE – DO NOT DRINK", or approved equivalent, arranged in two continuous lines of text, each on opposite sides of the polyethylene wrap.

65-2.3 Plug Valves

Plug valves shall be of the non-lubricated, eccentric type and shall be designed for a working pressure of 175 psi for valves 12 inch and smaller, and 150 psi for valves 14-inch and larger. Valves shall provide tight shut-off at rated pressure. All plug valves shall be from the same manufacturer. Plug valves shall be Ballcentric Plug Valves as manufactured by the Henry Pratt Company available from the Southwest Valve and Equipment Company at www.southwestvalve.com, or approved equal.

Plug valve bodies shall be cast iron, conforming to the provisions of ASTM A126 for Class B, with a welded-in overlay of 90% nickel alloy content on all surfaces contacting the face of the plug. The seat thickness shall be a minimum of 0.125 inch. Sprayed, plated, nickel welded rings or seats screwed into the body are not acceptable.

The valve plug shall be constructed from ASTM A536, Grade 65-45-12 ductile iron. The plug shall be one piece construction, and shall be encapsulated with a Buna-N elastomer. The plug shall provide full bi-directional shutoff capability. The closed position travel stop for the plug shall be externally adjustable.

Valve flanges shall conform to the provisions of ANSI B16.1 for Class 125. Flanged ends shall be fastened with ANSI Type A304 stainless steel nuts and bolts.

Plug valves shall be furnished with permanently lubricated, sleeve Type 326 stainless steel metallic bearings. Grit excluder seals shall be provided in the upper and lower journals to isolate the bearings.

Plug valve shaft seals shall be the self adjusting type, replaceable without removing the valve bonnet. Shaft seal shall be rated for pressure or vacuum service. Externally adjustable packing gland is not allowed

Manual gear actuators shall be totally enclosed worm and gear type permanently lubricated.

For valves 2½ to 20 inches in nominal size, the flow way shall be round, 100 percent open area, full port design. For valves greater than 20 inches in nominal size, the flow way shall be round or rectangular, 100 percent open area, full port design.

All interior ferrous surfaces exposed to fluid flows shall be factory coated with a thermo-setting 2-part epoxy or fusion epoxy coating having a minimum dry thickness of 8 mils. All exterior ferrous surfaces shall receive two coats of Plasite 7122, as produced by Carboline Company, www.carboline.com, or approved equal, with each coat having a different color and being 6 to 8 mils in dry thickness. All linings and coatings shall conform to the manufacturer's recommendations.

Buried plug valves shall be fitted with necessary gear box, valve well, valve stem extension, operating nut, diverter position indicator, valve box, valve box lid and concrete collar. Valve stem extension shall be installed when operating nut exceeds a depth of 4 feet as measured from final grade

of valve box rim. Final grade shall be existing, proposed, or future grade of the valve box rim as shown on the Plans or as directed by the Engineer.

65-2.4 Thrust Blocks

Unless otherwise specified in the Plans or Contract Specifications, concrete for thrust blocks shall be Class 1, 2, 3, or 4 conforming to Section 90, "Portland Cement Concrete," of the State Standard Specifications.

65-3 Force Main Installation

Sewer force mains shall be installed as shown on the Plans, and shall conform to the requirements of Section 8-15, "Utility and Non-Street Facilities; Potholing," Sections 19-3, "Trench Excavation, Backfill, Compaction, and Surface Restoration," and 64-4, "Sewer Pipeline Installation," the Contract Specifications, and the pipe manufacturer's recommendations. Where required by the Plans or the Contract Specifications, slurry cement backfill for sewer force main installation shall conform to the provisions in Section 19-3.03F, "Slurry Cement Backfill," of the State Standard Specifications. Slurry cement backfill shall attain a minimum compressive strength of 300 psi at 7 days. Coloring of slurry cement backfill, if required by the Contract Specifications, shall conform to the requirements therein.

Thrust restraint for all sewer force mains shall be accomplished by the use of restrained joints, in conformance with the details shown on the Plans. Thrust blocks are not acceptable for thrust restraint for sewer force mains unless approved by the Engineer.

65-4 Tracer Wire Installation

A tracer wire shall be installed with all pipe for sewer force mains. Materials and installation shall conform to Sections 66-2.12, "Tracer Wire," and 66-6, "Tracer Wire Installation."

65-5 Plug Valve Installation

Plug valves shall be furnished and installed at the locations as shown on the Plans, as specified in the Specifications, and as directed by the Engineer. Reference is also made to Section 66, "Potable Water Distribution Facilities."

Plug valves shall be installed such that the plug rotates about a horizontal axis. Plug valves shall be installed in a manner to allow the plug to be stored in the top when the valve is open, thus protecting the plug against grit and heavy solids that may pass through the valve. Plug valves shall be installed such that they seat in the direction opposite the high pressure side such that the pressure of the water forces the plug against the seat for a tighter seal.

Plug valve box installation shall conform to the applicable details shown on the TVMMWC Standard Drawing for valves, except that the cover shall be marked "SEWER".

65-6 Leakage Testing

After completing the installation, backfill and compaction of a section of sewer force main, and after all other underground utilities including TVMMWC, other agency, and privately owned utilities are in and compacted, but prior to the placement of aggregate base or asphalt-concrete pavement, and prior to conducting the deflection tests and video inspection as required herein, the Contractor shall, at his expense, conduct a leakage test using hydrostatic pressure. The test shall be performed in accordance with the procedures set forth in Section 66-12, "Hydrostatic Pressure Test," and under the supervision of the Engineer.

The Contractor shall provide all water necessary for hydrostatic testing in conformance with the provisions in Section 17, "Water Use." The Contractor shall make all arrangements and pay all fees

necessary for the lawful disposal of water discharged during hydrostatic testing operations. Water so discharged may be used by the Contractor for construction purposes, with the prior written approval of the Engineer.

The length of installed sewer force main which has not passed hydrostatic testing at any particular time during work under Contract shall not be more than 1,400 lineal feet, unless specifically directed or allowed otherwise by the Engineer in writing. The Contractor shall provide additional lengths of restrained pipe, and/or other measures and facilities, as may be necessary to comply with this requirement.

65-7 Deflection (Deformation) Test, PVC Sewer Force Mains

Where shown on the Plans or specified in the Contract Specifications that PVC sewer force mains are to be tested for deformation, this test shall be performed after backfilling and compaction but prior to the placement of aggregate base or asphalt concrete surfacing, and prior to television inspection specified in Section 65-8, "Television Inspection, Installed Pipe Interior." The Contractor at his expense shall provide any necessary special measures to allow access to the pipe interior for testing equipment, and when complete, shall restore and seal the pipeline opening to the satisfaction of the Engineer.

The Contractor shall demonstrate that the maximum pipe deflection (deformation) does not exceed 5 percent of the nominal pipe interior diameter by pulling a properly sized rigid ball or a mandrel through the main line pipe. A "rubber flush ball" does not meet the requirement for deflection testing.

Failure of the deflection test shall be grounds for rejection of the section tested. The Contractor shall undertake measures necessary to correct the deflection. Retesting of the failed section will be conducted to affirm correction. If correction requires re-laying or otherwise disturbing the pipe, the Contractor may be required by the Engineer to repeat the leakage test at no cost to the TVMMWC.

65-8 Television Inspection, Installed Pipe Interior

The Contractor shall furnish closed circuit television equipment for an interior inspection of the newly installed sewer force mains. The television inspection of the mains shall be made after leakage and deflection tests have been performed passed, and prior to placing of street aggregate base or asphalt paving. Any broken pipe, separation of joints, or any pipe exceeding the permitted tolerances for line and grade shall be replaced or repaired. Any pipe repaired or replaced shall be retested for leakage and deflection. A DVD disc showing the initial video inspection as well as any retests shall be provided to the TVMMWC at no additional cost.

The Contractor shall be responsible for all costs associated with furnishing the television inspection and making final repairs to the sewer force mains and re-inspection utilizing the closed circuit television equipment.

65-9 Alignment Changes (Separation Criteria)

All non-potable water mains, which include sewer force mains, sanitary sewers, recycled water mains, storm drains, and potable water mains must meet the horizontal and vertical separation standards of the "California Waterworks Standards", contained in Section 64572, Title 22, of the California Administrative Code, or shall be installed in accordance with alternate construction criteria as specified therein. Included in the Appendix to these Specifications is a document titled "Guidance Memo No. 2003-02: Guidance Criteria for the Separation of Water Mains and Non-Potable Pipelines" published by the California Department of Health implementing said Section 64572. This document sets forth minimum spacing requirements between drinking water pipelines and sewer or reclaimed water pipelines, and has been used to set the location of the sewer force main. In the event that field

conditions require a change in the planned alignment (horizontal or vertical) of the sewer force main, under no circumstances shall a change be made without obtaining the express and written approval of both the TVMMWC Inspector and the TVMMWC Design Engineer. Any change so authorized must comply with the Guidance Memo.

65-10 Measurement

Measurement for sewer force main installation shall be by the lineal foot of pipe installed, and shall be the actual horizontal length installed, measured through fittings (if any).

Measurement for plug valves shall be on a per each basis, installed.

65-11 Payment

The unit price bid per lineal foot for sewer force mains shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved therein as shown on the Plans, as set forth in the Specifications, and as directed by the Engineer. This shall include furnishing and installing the pipe, couplings or special joints, trenching, backfilling, compacting, leakage and deflection testing, and internal video inspection.

Unless otherwise specified in the Contract Specifications, or if no bid item is included in the contract therefor, the cost of any fittings shall be considered as included in the cost of sewer force main, and no additional compensation will be paid therefor.

The unit price bid per each for plug valves shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved therein as shown on the Plans, as specified in the Specifications, and as directed by the Engineer. This shall include furnishing and installing the valve, valve box, and valve extension, installing concrete thrust blocks, trenching, backfilling, compacting, testing, pressure testing, water, returning and installing valve box to final grade following trench surface restoration, street or alley construction or reconstruction, and all incidentals.

SECTION 66 - POTABLE WATER DISTRIBUTION FACILITIES

66-1 General

This work shall consist of furnishing and installing potable water main pipelines, fittings, water services, fire hydrants, valves, valve and meter boxes, blow-offs, water sampling stations, and all appurtenances, including excavation and backfill, disinfection, and pressure testing, all at the locations and in the sizes shown on the Plans. All work shall be done in accordance with the Plans, the Standard Drawings, the Specifications, and as directed by the Engineer.

66-2 Materials

All materials used in constructing potable water facilities shall be new, and shall conform to these Standard Specifications, unless otherwise specified in the Contract Specifications or shown on the Plans. Pipe for water mains 12 inches and less in diameter may be either polyvinyl chloride (PVC) pipe or ductile iron (DI) pipe, at the Contractor's option, except where the specified minimum depth of cover is not achieved. Unless otherwise specified in the Contract Specifications or shown on the Plans, where a minimum depth of cover of 3.5 feet is not achieved, pipe for water mains 12 inches and less in diameter shall be DI pipe. Pipe for water mains larger than 12 inches in diameter shall be DI pipe, or where designated in the Plans or Contract Specifications, PVC pipe conforming to ASTM Designation C905.

66-2.1 PVC Pipe And Fittings For Water Mains

PVC pipe for water mains in sizes from 4 inches through 12 inches in diameter shall be Class 150 High Pressure Water Pipe conforming to the requirements of AWWA C900, the latest edition of ASTM Specification Designation D 1784, and wall thickness meeting the requirements of DR18. Where Special Pipe is shown on the Plans or specified in the Contract Specifications, special pipe shall be Class 200 and wall thickness to meet requirements of DR 14.

Pipe joints shall be integral bell and spigot gasketed joints conforming to the requirements of ASTM D 3139, with a solid cross section elastomeric seal (gasket) conforming to the requirements of ASTM F 477. The bell section shall consist of an integral wall section and shall be at least as strong as the pipe wall.

Pipe shall withstand a quick burst test pressure of 755 psi in accordance with ASTM D 1599, applied in 60 to 70 seconds. Pipe shall withstand a drop impact test of 73° F at impact of a falling 20 lb. missile with a 2" radius nose according to ASTM D 2444.

The pipe shall be manufactured with standard cast iron pipe outside diameters, and the nominal laying length shall be 20 feet for all sizes. PVC pipe for water mains shall be blue in color, and clearly labeled with the following information:

Manufacturer's name or trademark	Legend: Class, Potable Water
Nominal pipe size	ASTM Designation

Unless otherwise shown on the Plans or specified in the Contract Specifications, pipe fittings for PVC pipe for water mains pipe shall be ductile iron, conforming to the requirements of AWWA C110 for Class 350, and Section 66-2.2, "Ductile Iron Pipe and Fittings for Water Mains," of these Specifications unless approved by the Engineer.

Pipe and fittings must be assembled with a nontoxic lubricant.

66-2.2 Ductile Iron Pipe And Fittings For Water Mains

Ductile iron (DI) potable water main pipe shall conform to the requirements of AWWA C150 for Pressure Class 150 or higher, or Special Thickness Class 50 or higher, unless a higher class designation is shown on the Plans or specified in the Contract Specifications. Each pipe shall be subjected to a hydrostatic pressure test of at least 500 psi at the point of manufacture.

No field welding of DI pipe is permitted, unless specifically directed or approved otherwise in writing by the Engineer. All welding of DI pipe for welded outlets, or other DI pipe features for which welding is shown on the Plans or specified in the Contract Specifications, shall be shop welding done by the pipe manufacturer.

Pipe shall have standard asphaltic coating on the exterior. Pipe shall also have a cement mortar lining on the interior in accordance with AWWA/ANSI C104/A21.4, or latest revision. DI pipe for water mains shall have a blue, 8-mil polyethylene wrap conforming to the provisions in AWWA/ANSI C105/A21.5. The polyethylene wrap shall be marked with the words "POTABLE WATER", or approved equivalent, arranged in two continuous lines of text, each on opposite sides of the polyethylene wrap. The class or nominal thickness, net weight without lining, and casting period shall be clearly marked on each length of pipe. Additionally, the manufacturer's mark, country where cast, year in which the pipe was produced, and the letters "DI" or "ductile" shall be cast or stamped on the pipe.

Except as provided below, all pipe shall be furnished with Push-on Type Joints, such as "Tyton" or "Fastite." Joints shall be in accordance with AWWA/ANSI C111/A21.11, of latest revision, and be furnished complete with all necessary accessories.

Pipe fittings shall be ductile iron, conforming to the requirements of AWWA C110, Class 350 for pipe diameters 24 inches or less, and Class 250 for pipe diameters greater than 24 inches unless approved by the Engineer. Fittings shall have a standard asphaltic coating on the exterior. Fittings shall also have a cement mortar lining on the interior in accordance with AWWA/ANSI C104/A21.4, of latest revision.

Fittings for DI water mains larger than 12 inches in diameter shall be restrained joint fittings. Where required, pipe joints adjacent to restrained joint fittings shall be restrained pipe joints. The length of pipe for which joint restraint is required adjacent to restrained joint fittings shall conform to the details shown on the Plans. Thrust blocks shall not be used for DI water mains larger than 12 inches in diameter, unless otherwise directed or approved by the Engineer.

66-2.3 Thrust Blocks

Unless otherwise specified in the Plans or Contract Specifications, concrete for thrust blocks shall be Class 1, 2, 3, or 4 conforming to Section 90, "Portland Cement Concrete," of the State Standard Specifications.

66-2.4 Water Services

Materials for Water services shall conform to the applicable details shown on the Standard Drawings therefor and the provisions in these Standard Specifications. Water service fittings shall be "no-lead" compliant, brass.

66-2.5 Gate Valves

Gate valves shall conform to the details shown on the Plans and Standard Drawings therefor, and to the requirements of AWWA Standard C-509 Valves shall be manufactured by Mueller Co. or TVMMWC approved equal, with iron body, bronze mounted, double disc, non-rising stem with one "O" ring seal above and below the thrust collar, nut operated, and turning left (counterclockwise) to open, right (clockwise) to close.

Valves shall be manufactured to be compatibly jointed with the water pipe or fittings being valved as shown on the Plans or specified in the Contract Specifications. Reference is made to the applicable Standard Drawings therefor for flanged connection requirements.

Buried valves shall be provided with valve wells per the Standard Drawing to allow access to the valve operator. Valve wells shall be constructed of 8-inch diameter PVC water main pipe. Where the valve operator is deeper than 4 feet below future grade, a valve stem extension shall be provided. Valve stem extensions shall be hot dipped galvanized square steel tubing, shall securely “fit-up” to the operating nut on the valve and shall have a nominal 2-inch nut at the top of the extension. Centering discs near the top and bottom of the extension shall be provided. Valve stem extensions shall be extended to within 12 to 18 inches of finished grade.

Valves at hydrant and/or wet tap locations shall be flanged on one side to directly connect to the tee on the main supply side of the valve, as shown on the Standard Drawings. For DI water mains larger than 12 inches in diameter, the Contractor shall construct valve foundations conforming to the details shown on the Plans and Standard Drawings.

66-2.6 Butterfly Valves

This work shall consist of furnishing all materials and installing butterfly valves, as shown on the Plans, as specified in the Specifications, and as directed by the Engineer.

Butterfly valves and the materials used in their manufacture shall conform to the provisions in the most recent revisions of AWWA C504 and NSF/ANSI Standard 61, and these specifications.

The design pressure class for butterfly valves shall be class 150B.

Butterfly valves shall be Groundhog butterfly valves as manufactured by Henry Pratt, Line Seal butterfly valves as manufactured by the Mueller Company, or approved equal. The valve manufacturer shall have 10 years experience manufacturing butterfly valves. The valve manufacturer’s name, year of manufacture, valve size, model number and rated design pressure shall be cast on the body of each valve.

The operating direction to open shall be left (counterclockwise) and to close shall be right (clockwise). The direction to open shall be cast on the operating nut or hand-wheel.

Butterfly valves shall be of the tight closing, rubber seat type suitable for underground installation, as shown on the Plans. Valves shall have a full uninterrupted 360 degree sealing surface and shall shut off completely at the rated design pressure in either direction of flow. Valves shall be suitable for very infrequent operation after extended periods of inactivity.

All valves and actuators shall be specially designed for service below grade where groundwater may completely submerge the valve and operator nut.

Valves shall be short body and shall be constructed of cast iron conforming to the provisions in ASTM A126 for Class B, or ductile iron conforming to the provisions in ASTM A536, for Grade 65-45-12 or Grade 70-50-05.

Flanged end valves shall be faced and drilled as specified in ANSI B16.1 for Class 125, unless otherwise shown on the Plans.

Seats shall be Buna-N rubber body seats of one-piece construction molded, bonded or retained in a machined cavity in the valve body. Seats may not be located on the disc, and may not be mechanically retained by segments and or screws.

Shafts and disc shaft fasteners for butterfly valves rated at 150 psi shall be constructed of Type 304 or Type 316 stainless steel.

Valve packing shall be of the self-adjusting Chevron type. The valve shall be fitted with sleeve bearings that are corrosion resistant and self-lubricated.

Discs for butterfly valves shall be rated at 150 psi and shall be ductile iron conforming to the provisions in ASTM A536 for Grade 65-45-12 or Grade 70-50-05, or cast iron conforming to the provisions in ASTM A48 for Class 40, or cast iron conforming to the provisions in ASTM A126 for Class B. The valve disc shall be secured to the shaft by means of solid, smooth sided, stainless steel or Monel taper pins or dowel pins having a circular cross section. Each taper or dowel pin shall extend through the shaft and shall be mechanically secured in place. The use of bolts, setscrews, knurled or fluted dowel pins, expansion pins, roll pins, tension pins, spring pins, torque plugs or other devices in lieu of the specified pins will not be allowed.

Butterfly valve discs shall have a continuous stainless steel edge welded or applied to the disc as specified in AWWA C504. The twin-wire arc method for applying the stainless steel edge to the disc is not allowed.

Manual actuators shall be worm gear or traveling nut style that must be within 4 turns of having at least 2 turns per diameter inch of the valve size to rotate the disc 90 degrees. Actuators shall be of totally enclosed, self-locking worm gear or traveling nut type with adjustable stops, factory set, to limit disc travel. Actuator cases shall be designed for installation and operating in a buried or submerged location and shall be fully gasketed, sealed and grease packed. Actuators shall be capable of withstanding and external water pressure of 10 psi without leakage to the interior of the operator. Actuators shall be sized to produce a torque of 1.5 times the required valve torque. The required valve torque shall be based on the rated pressure at 16 feet per second and 150 psi differential pressure using the method described in the Appendix to AWWA C504. Stop limiting devices must withstand 450 ft-lbs. of input torque against the open and closed stops without failure. Test reports and proof-of-design for the actuator may be required to be submitted for design of stop limiting devices and internal components.

All interior and exterior ferrous surfaces shall be factory coated with two or more coats of 2-part epoxy coating to a minimum dry film thickness of 12 mils.

Butterfly valve installation shall conform to the details shown on the Plans, and the applicable details shown on the Standard Drawing for valve installation. For water mains, the valve box shall conform to the details shown on the Standard Drawing therefor.

66-2.7 Valve Boxes

Each valve shall be provided with a valve box in conformance with the applicable Standard Drawing therefor. Valve boxes shall be precast concrete with heavy cast iron ring seating a deeply ribbed cast iron cover providing an 8-inch diameter clear opening, and shall be Christy No. G5 traffic box, or approved equal. Cover marking shall read "Water". A one-piece 8-inch inside diameter PVC riser extension shall be provided to allow unobstructed access to the valve-operating nut unless approved by the Engineer.

66-2.8 Fire Hydrants And Fire Services

Fire hydrants and Fire Services shall be furnished as indicated on the Standard Drawing pertaining thereto. Fire Hydrants shall be of the wet barrel type, with each outlet operated by an independent valve. The inlet to the hydrant shall be 6 inches formed to connect to the feeder pipe. Hydrants shall be provided with break-off fittings and with 30 inch bury and extensions as necessary.

66-2.9 Copper Tubing

All copper tubing shall conform to the latest revision of ASTM Specification Designation B 88 as latest amended. The tubing shall be made of copper having a purity of at least 99.9 percent as determined by electrolytic assay, except that silver may be counted as copper. Copper tubing shall be seamless, shall be of one grade, designated type "K," soft, as listed in the above specifications. The tubes shall be clean, smooth, round, of proper dimension, free from grooving, indentations, cracks, flaws and scale and shall not crack when flaring.

The name or trademark of the manufacturer and a symbol indicative of the type shall be permanently marked at intervals not greater than 20 inches on the tubing.

66-2.10 Other Service Material

All service material shall be as indicated on the Plans, Standard Drawings, or as specified in the Contract Specifications.

66-2.11 Nuts, Bolts, Screws and Fasteners

All nuts, bolts, screws and fasteners used for connecting flanges, valve body parts, etc., below the ground surface shall be manufactured of nickel-cadmium steel, or approved equal (equipment within valve boxes is considered below ground). Nuts and bolts used for above ground installation on pipe flanges, etc., shall be hexagonal head machine bolts and hexagonal nuts conforming to ASTM Designation A307, Grade B. All bolt threads shall be lubricated with graphite and oil. Exposed portions of nuts and bolts shall be coated with a bitumastic material to retard corrosion.

66-2.12 Tracer Wire

Tracer wire shall be #10 stranded copper, with white insulation.

66-3 Trenching And Excavation

Trenching and excavating for water mains and service lines shall conform to the requirements of Section 8-15, "Utility and Non-Street Facilities; Potholing," and Section 19-3, "Trench and Structure Excavation, Backfill, Compaction, and Surface Restoration."

66-4 Alignment Changes (Separation Criteria)

All potable water mains, and non-potable water mains which include sanitary sewers, sewer force mains, storm drains, and recycled water mains, must meet the separation standards of the "California Waterworks Standards", contained in Section 64572, Title 22, of the California Administrative Code, or shall be installed in accordance with alternate construction criteria as specified therein. Included in the Appendix to these Specifications is a document titled "Guidance Memo No. 2003-02: Guidance Criteria for the Separation of Water Mains and Non-Potable Pipelines" published by the California Department of Health implementing said Section 64572. This document sets forth minimum spacing requirements between drinking water pipelines and sewer or reclaimed water pipelines, and has been used to set the location of the water main. In the event that field conditions require a change in the planned alignment (horizontal or vertical) of the water main, under no circumstances shall a change be made without obtaining the express and written approval of both the TVMMWC inspector and the TVMMWC Design Engineer. Any change so authorized must comply with the Guidance Memo.

66-5 Installation Of Water Mains, Fittings, And Valves

Potable water mains, fittings, valves, and all appurtenances shall be furnished and installed as shown on the Plans, in conformance with the Specifications, the Standard Drawings, and as directed by the Engineer. Water mains shall be installed true to the alignment and profile shown on the Plans. Occasional minor variations of two inches or less from the alignment shown on the Plans, and one

inch or less from the profile shown on the Plans, will be permitted, provided that such variations occur gradually, over a distance of 20 feet or more, and are approved by the Engineer.

Where necessary to avoid conflicts with existing utilities, the depth of cover shall be increased or decreased as approved by the Engineer. Such adjustments shall be accomplished by gradual changes in pipe depth whenever possible, utilizing joint deflections not exceeding manufacturer's recommendations. When fittings are required to accomplish such changes in depth of cover, no 90-degree bends may be used unless otherwise directed or approved by the Engineer. Any changes in the planned alignment, horizontal or vertical, shall be made in strict accordance with Section 66-4, "Alignment Changes (Separation Criteria)." Unless required otherwise by specific pipe elevations, cover, or clearance depths shown or not shown on the Plans, water mains shall be installed with a minimum depth of cover of 42 inches.

As installation progresses, all pipe, valves, fittings, hydrants, etc., shall be thoroughly cleaned of all dirt, rocks and other debris that may be found in the interior of the material. The Engineer may direct the Contractor to swab the pipe to clean it. At the end of each day's work, all ends of the pipe shall be closed by means of a pre-manufactured cap or special bulkhead or by other means approved by the Engineer.

Water pipe and fittings shall be installed in compliance with the manufacturer's recommendations, with each length of pipe having an even bearing on a properly prepared trench bottom for its entire length, with depressions cut for couplings, bells and fittings. Optional alternate methods of supporting the pipe slightly above the bottom of the trench on earth mounds may be implemented by the Contractor if approved by the pipe manufacturer and the procedures are carried out in strict compliance with his instructions. Use of blocks to support pipe or fittings is prohibited. Valves and fire hydrants shall be installed as indicated on the Standard Drawings and as directed by the Engineer. Hydrants shall be installed plumb, with steamer outlet facing the curb.

Pipe may be cut by methods approved by CAL-OSHA that will produce a square cut. No wedge type roller cutters will be allowed. PVC or DI pipe, in lengths shorter than 3 feet may be used to make connections where approved by the Engineer. Such pipe shall conform to Section 66-2, "Materials," of these Specifications.

Rubber gasketed joints shall be made in compliance with the manufacturer's recommendations and as follows:

1. The gasket seat in the socket and the gasket shall be wiped clean with a cloth. The gasket shall be placed in the socket with the large end entering first. It shall then be sprung into the gasket seat so that the groove fits over the head in the seat. A thin film of lubricant shall then be applied to the inside surface of the gasket that will come in contact with the entering pipe.
2. The plain end of the pipe to be entered shall be wiped clean and placed in proper alignment with the bell of the pipe to which it is to be joined. In some cases it may be desirable to apply a thin film of lubricant to the outside of the plain end.
3. The joint shall then be made by exerting sufficient force on the entering pipe (by methods approved by the Engineer) so that its plain end is moved past the gasket until it makes contact with the base of the socket and has been shoved "home". Allowance shall be provided, in making the joint, for expansion of the pipe.

4. Whenever necessary to deflect the pipe from a straight line either in vertical or horizontal plane to avoid obstructions, or where long radius curves are permitted, the degree of deflection of joints shall not exceed the manufacturer's recommendations and must be approved by the Engineer.

Wet tap connections shall be made at the locations shown on the Plans and in conformance with the applicable TVMMWC Standard Drawings.

Disinfection of pipe for potable water mains shall conform to the provisions of Section 66-11, "Sterilization of Water Facilities."

Hydrostatic testing shall conform to the provisions in Section 66-12, "Hydrostatic Pressure Test."

Damage to any pipe, fittings, valves, or appurtenances shall be grounds for rejection of the damaged material. Any repairable damage to the pipe, lining or fittings shall be repaired by the Contractor at his expense. The Contractor shall be responsible for any damage to materials until the time of acceptance of the finished work.

66-6 Tracer Wire Installation

A tracer wire shall be installed with all pipe for potable water mains. The wire shall be secured in an approved manner to the outside top center of the pipe to prevent movement during backfill operations. The tracer wire from each direction of the pipe shall extend up into each valve or blowoff box, with an excess of 4 feet of wire coiled and attached to the inside of the box in a manner that allows easy access to the wires. The wires shall be tagged "Tracer Wire" with a waterproof label. Ends of wire shall not be attached to each other or grounded.

66-7 Thrust Blocks

Thrust blocks shall not be used for DI water mains larger than 12 inches in diameter, unless otherwise directed or approved by the Engineer. Thrust blocks shall be constructed at all fittings and valves for PVC water mains as required by these Standard Specifications, and as shown on the applicable Standard Drawing. Thrust blocks shall be constructed at all fittings and valves for DI water mains 12 inches in diameter and smaller, in conformance with the provisions in these Standard Specifications, and as shown on the applicable Standard Drawings. In lieu of thrust blocks at fittings, restrained joint fittings and restrained pipe joints may be used with the prior written approval of the Engineer. For DI water mains 12 inches in diameter and smaller, thrust blocks shall be constructed at all valves, in conformance with the provisions in these specifications, and as shown on the applicable Standard Drawing.

Concrete thrust blocks shall be provided on water mains at all points in the line where a change in direction of more than 5 degrees occurs, at all gate valves 10 inches or larger, at all fire hydrant buries and at all dead ends. Thrust blocks shall be installed between the fittings and undisturbed earth of the trench wall and shall be at least the minimum dimensions shown on the Standard Drawings. For conditions not covered on said standard, the bearing area shall be as required by the Engineer.

66-8 Valve Box Installation

Valve boxes shall be installed as shown on the Standard Drawings therefor. The valve box cover shall be centered over the valve operating nut, with boxes and extensions plumb.

In existing surfaced areas, valve boxes shall be installed to finish grade, concrete collars poured and the pavement patched in accordance with Section 19-3, "Trench and Structure Excavation, Backfill, Compaction, and Surface Restoration." In undeveloped areas where no surfacing exists or is

contemplated in conjunction with the water installation, valve boxes shall be brought to a level 1-1/2 inches above existing ground elevation and concrete collars poured. In areas where street or alley surfacing is to be done in conjunction with or immediately after utility installation, such as new subdivisions, valve boxes shall be installed to finish grade after paving has been completed, a concrete collar poured, and the pavement patched as above required. Unless specifically provided otherwise in the Contract Specifications, the Contractor shall return and install the valve box to finish grade as specified.

66-9 Water Service Installation

Water service lines (including domestic metered service lines and fire service lines), equipment and appurtenances shall be installed in accordance with the manufacturer's recommendations, as shown on the Plans and the Standard Drawings therefor. The Contractor shall mark the location of water service lines by putting a "W" mark on the curb face. Said mark is to be chiseled into existing concrete or stamped in new concrete before it has set.

66-10 Backfill, Compaction, And Surface Restoration

Backfilling, compacting and restoration of surfaces of trenches and excavations for water facilities shall conform to the requirements of Section 19-3, "Trench and Structure Excavation, Backfill, Compaction, and Surface Restoration."

66-11 Sterilization Of Water Facilities

Newly installed water mains and facilities shall be disinfected in accordance with the latest revisions of AWWA Standards and these specifications prior to placing in service.

While completely separated from existing mains, and isolated from existing mains and prior to pressure testing and prior to acceptance of work, the entire pipeline including all valves, fittings, hydrants, service laterals, and other accessories shall be sterilized in accordance with AWWA Specification C 601 which provides detail specifications for:

- A. Limiting contaminated materials from entering the water mains during construction or repair.
- B. Removing, by flushing, contaminating materials that may have entered the water main during construction or repair.
- C. Disinfecting any residual contamination that may remain after cleaning.
- D. Determining the bacteriologic quality of fresh water in the main after disinfecting the main.

All mains shall be flushed with potable water after completion of construction and prior to disinfecting. The Contractor shall provide a sufficient number of suitable outlets at the end(s) of the line(s) being sterilized in addition to those required by the Plans, to permit the main to be flushed with water at a velocity of at least 5.5 feet per second over its entire length. The outlets provided shall meet the requirements for fittings as specified for the type main constructed. Temporary blow-offs may be installed during the sterilization and flushing to satisfy those requirements. Drainage facilities shall be constructed such that the water lines cannot be contaminated through flushing outlets.

The outlets provided shall meet the requirements for fittings as specified for the type main constructed. Temporary blow-offs may be installed during the sterilization and flushing to satisfy those requirements. Drainage facilities shall be constructed such that the water lines cannot be contaminated through flushing outlets.

After flushing, chlorine gas or chlorine compound solution made with liquid chlorine, calcium hypochlorite in solution or sodium hypochlorite solution shall be water mixed and introduced into the mains to form a chlorine concentration of approximately 100 parts per million (ppm) or that which will provide a minimum residual of 50 ppm in all parts of the line after 24 hours have elapsed. During the sterilization process, all valves, hydrants, and other accessories shall be operated. After chlorination, the water shall be flushed from the line at its extremities until the replacement water tests are equal chemically and bacteriologically to those of the permanent source of supply.

The placing of HTH capsules or tablets in pipe sections during the laying process will be considered as an acceptable method of introducing chlorine for the test.

The chlorine water solutions shall be diluted to a chlorine concentration of not more than 100 ppm and not less than 50 ppm measured in the water lines. The Contractor shall keep adequate chlorine residual testing and indicating apparatus available on the site during the entire sterilization period.

After final flushing, the flushing fittings shall be plugged with devices intended for this purpose, at the pressure class of the pipe. Where water main is coated, plugs and outlets shall be similarly coated.

Bacteriologic samples of water for the specified bacteriologic test shall be taken from each end of the sterilized main (located downstream of the point of introduction of chlorine disinfectant), and at other locations as determined necessary by the Engineer. When an entire water main is to be tested, it shall be completely isolated from the existing system. Bacteriologic samples shall be taken a minimum of 48 hours after the mains have been flushed of all chlorine. Such samples shall be obtained by the Contractor using pipe and fittings supplied by the Contractor as directed by the Engineer. Bacteriologic samples shall be obtained in the following manner:

At corporation stops, risers shall be installed that will discharge water directly downward towards the ground. The discharge point of the risers shall be a minimum of 24 inches above the ground. Risers shall include the necessary bends to accomplish the foregoing, and shall be equipped with in-line valves near the discharge points to regulate the flow. The Contractor shall provide and supply these hookups, full compensation therefor to be included in the amount bid for the various water main bid items.

For mains over 1,320 feet in length with no services, samples in addition to those obtained at each end shall be taken at intermediate points in such a manner that at least one sample is taken for each 660 feet of main.

The recommended procedure of sterilizing and testing water mains is as follows:

1. Chlorine residual of between 50 and 100 ppm is introduced into the water mains.
2. 24 hours later, treated water is flushed from the water mains.
3. 48 hours after flushing, water samples are taken for bacteriologic tests.
4. 96 hours after samples are taken, results of water samples are reported to the Contractor.
5. If the bacteriologic tests show a coliform M.P.N./100 ML water of less than 1.1 on all samples, the water facilities tested will be considered clear. In the event the coliform number

is 1.1 or above, the sterilization procedure shall be commenced again within 24 hours of notice by the TVMMWC that the bacteriologic tests failed.

Should the end of any of the foregoing periods fall on a TVMMWC nonworking day, the order of procedure will be continued to the next regular TVMMWC working day.

The Contractor shall provide all water necessary for disinfection, in conformance with the provisions in Section 17, "Water Use." The Contractor shall make all arrangements and pay all fees necessary for the lawful disposal of water discharged during disinfection and hydrostatic testing operations. Potential recipients with which the Contractor may wish to negotiate arrangements for the disposal of water include, but are not necessarily limited to, TVMMWC, private property owners, Madera Irrigation District (MID), and the County of Madera. Water so discharged may be used by the Contractor for construction purposes, with the prior written approval of the Engineer.

66-12 Hydrostatic Pressure Test

After the water pipe and all appurtenances have been laid, backfill has been placed and compacted and all compaction tests have passed and the pipe has passed the bacteriologic disinfection test, but prior to placement of aggregate base or pavement material, a hydrostatic pressure test shall be conducted on the entire pipeline, while completely isolated from any existing water mains, for a period of one hour at a hydrostatic pressure of 150 psi, unless specified differently. All valves in the pipeline shall be in the open position during system testing. Any leaks, failures, or imperfect construction revealed by such test shall be promptly corrected by the Contractor and retested until all visible leakage has been stopped and test results do not exceed the allowable leakage which shall be determined by the following equation:

$$L = \frac{N \times D \times P^{0.5}}{7,400}$$

- where: L = allowable leakage (gal/hr)
 N = number of joints in the tested line
 D = nominal inside diameter of pipe (inches)
 P = average test pressure (psi)

The Contractor shall provide all water necessary for hydrostatic testing, in conformance with the provisions in Section 17, "Water Use." The Contractor shall make all arrangements and pay all fees necessary for the lawful disposal of water discharged during hydrostatic testing operations. Potential recipients with which the Contractor may wish to negotiate arrangements for the disposal of water include, but are not necessarily limited to, TVMMWC, private property owners, Madera Irrigation District (MID), and the County of Madera. Water so discharged may be used by the Contractor for construction purposes, with the prior written approval of the Engineer.

The length of water main which has not passed hydrostatic testing, at any specific time during the work, shall not be more than 1,400 lineal feet, unless specifically directed or allowed otherwise by the Engineer in writing. The Contractor shall provide additional lengths of restrained pipe, and/or other measures and facilities, as necessary to comply with this requirement.

Tests shall not be made until at least 36 hours after the last concrete thrust or reaction blocking shall have been cast with high early strength cement, or at least 7 days after the last concrete thrust or

reaction blocking shall have been cast with standard cement. All equipment, testing and repair shall be furnished by the Contractor.

66-13 Measurement

Measurement for water main installation and fitting installation shall be by the lineal foot of pipe installed, and shall be the actual horizontal length installed, measured through fittings.

Measurement for gate and butterfly valves shall be per each valve installed.

Measurement for fire hydrants, complete, shall be per each fire hydrant assembly installed.

Measurement for water service lines shall be per each water service line installed.

Measurement for fire service lines shall be per each fire service line installed.

66-14 Payment

The unit price bid per lineal foot for water mains shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved therein as shown on the Plans, as set forth in the Specifications, and as directed by the Engineer. This shall include furnishing and installing the pipe and fittings, installing concrete thrust blocks, trenching, backfilling, compacting, sterilization, hydrostatic pressure testing, water, and all incidentals.

The unit price bid per each for gate or butterfly valves shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved therein as shown on the Plans, as set forth in the Specifications, and as directed by the Engineer. This shall include furnishing and installing the valve, valve box, and valve extension, installing concrete thrust blocks, trenching, backfilling, compacting, testing, sterilization, pressure testing, water, returning and installing valve box to final grade following trench surface restoration, street or alley construction or reconstruction, and all incidentals.

The unit price bid per each for fire hydrants, complete, shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved therein as shown on the Plans, as set forth in the Specifications, and as directed by the Engineer. This shall include furnishing and installing the hydrant assembly (pipe, fittings, structures, break-off fittings, bury, extensions, gate valve and valve box), furnishing and installing protection posts where required, excavation, backfill and compaction, returning and adjusting valve box to final grade following trench surface restoration, street or alley construction or reconstruction, testing, sterilization, water, and all incidentals. Unless otherwise indicated in the Contract Specifications, the cost of furnishing and installing any wet tap required for the hydrant shall be included in the unit price bid for fire hydrants, complete.

The unit price bid per each for water service lines shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved therein as shown on the Plans, as set forth in the Specifications, and as directed by the Engineer. This shall include furnishing and installing the service pipe and appurtenances (including all taps, fittings, stops, saddles, spacers, meter box and lid, etc.), trenching, backfilling, compacting, testing, sterilization, water, adjusting meter box to finish sidewalk grade, and all incidentals.

The unit price bid per each for fire service lines, complete, shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved therein as shown on the Plans, as set forth in the Specifications, and as directed by the Engineer. This

shall include furnishing and installing the fire service pipe, fittings, structures, gate valve and valve box, thrust blocks, connection to main pipe, and all excavation, backfill and compaction, returning and adjusting valve box to final grade following trench surface restoration, street or alley construction or reconstruction, testing, sterilization, and all incidentals. Unless otherwise indicated in the Contract Specifications, the cost of furnishing and installing any wet tap required for the fire service line shall be included in the unit price bid for fire service lines, complete.

Payment for wet taps, except those directly associated with fire hydrants or fire service installations, shall be as set forth in the Contract Specifications.

SECTION 67 - RECYCLED WATER DISTRIBUTION SYSTEMS

67-1 General

This work shall consist of furnishing all materials and constructing recycled water mains, as shown on the Plans and Standard Drawings, as specified in the Specifications, and as directed by the Engineer. Recycled water mains shall conform to the provisions in Section 66, "Potable Water Distribution Facilities," except as may be specified in this Section 67.

67-2 Materials

All materials used in constructing recycled water facilities shall be new, and shall conform to these Standard Specifications, unless otherwise specified in the Contract Specifications or shown on the Plans. Pipe for recycled water mains 12 inches and less in diameter may be either polyvinyl chloride (PVC) pipe or ductile iron (DI) pipe, at the Contractor's option, except where the specified minimum depth of cover is not achieved. Where the specified minimum depth of cover is not achieved, pipe for recycled water mains 12 inches and less in diameter shall be ductile iron (DI) pipe.

Pipe for recycled water mains larger than 12 inches in diameter shall be ductile iron (DI) pipe, or where shown on the Plans or specified in the Contract Specifications, PVC pipe conforming to ASTM Designation C905.

67-2.1 PVC Pipe And Fittings For Recycled Water Mains

PVC pipe and fittings for recycled water mains shall conform to the provisions in Section 66-2.1, "PVC Pipe and Fittings for Water Mains," except as specified in this Section 67-2.1.

PVC pipe for recycled water mains shall be purple in color, (Pantone Color #512) and shall be factory marked with the words "CAUTION: NONPOTABLE WATER – DO NOT DRINK" in black letters, arranged in a continuous line of text on both sides and for the full length of the pipe.

67-2.2 Ductile Iron Pipe And Fittings For Recycled Water Mains

Ductile iron (DI) pipe and fittings for recycled water mains shall conform to the provisions in Section 66-2.2, "Ductile Iron Pipe and Fittings for Water Mains," except as specified in this Section 67-2.2.

DI pipe for recycled water mains shall be installed with a purple, 8-mil, polyethylene wrap conforming to the provisions in AWWA/ANSI C105/A21.5. The polyethylene wrap shall be marked with the words "CAUTION: NONPOTABLE WATER – DO NOT DRINK", or approved equivalent, arranged in two continuous lines of text, each on opposite sides the polyethylene wrap and for the full length of the pipe.

67-2.3 Thrust Blocks, Valves, Valve Boxes

Thrust Blocks, Valves, and Valve Boxes shall conform to the applicable sections in Section 66, "Potable Water Distribution Facilities," and the following provisions.

The valve operator, or valve extension for deep valves, shall be marked with a purple weatherproof tag containing the words "Recycled Water- Do Not Drink" in black letters. Valve boxes and lids shall be Christy Type G-4, with the words "Recycled Water" stamped in prominent letters on top of the lid.

67-2.4 Recycled Water Services

Materials for recycled water services shall conform to the applicable details shown on the Plans, the Standard Drawings, and the Specifications. Recycled water services shall not have concrete collars.

67-2.5 Nuts, Bolts, Screws, Fasteners, Other Service Materials

Nuts, Bolts, Screws, Fasteners, and Other Service Materials shall conform to the applicable sections in Section 66, “Potable Water Distribution Facilities.”

67-2.6 Tracer Wire

Tracer wire shall conform to Section 66-2.12, “Tracer Wire.”

67-3 Trenching, Excavation, Backfill, Compaction, And Surface Restoration

Trenching and other excavating, backfill, compaction, and surface restoration for recycled water mains and services shall conform to the requirements of Section 8-15, “Utility and Non-Street Facilities; Potholing,” and Section 19-3, “Trench and Structure Excavation, Backfill, Compaction, and Surface Restoration.”

67-4 Alignment Changes (Separation Criteria)

All alignment changes, horizontal or vertical, shall conform to the provisions of Section 66-4, “Alignment Changes (Separation Criteria).”

67-5 Installation Of Recycled Water Mains, Fittings And Valves

Installation of Recycled Water Mains, Fittings and Valves shall conform to the provisions of Section 66-5, “Installation of Water Mains, Fittings and Valves,” and the following provisions. Unless required otherwise by specific pipe elevations or cover or clearance depths shown on the Plans, recycled water mains shall be installed with a minimum depth of cover as shown in the following table. Where necessary to avoid conflicts with existing utilities, the depth of cover shall be increased as required. Such adjustments shall be accomplished by gradual changes in pipe depth whenever possible, utilizing joint deflections not exceeding manufacturer's recommendations. When fittings are required to accomplish such changes in depth of cover, no 90-degree bends may be used, unless otherwise directed or approved by the Engineer.

Pipe Diameter	Minimum Depth of Cover
6” or Smaller	36”
8” and 10”	42”
12”	48”
14” and 16”	54”
18” or Larger	60”

Recycled water mains shall be installed true to the alignment and profile shown on the Plans. Occasional variations of two inches or less from the alignment shown on the Plans, and one inch or less from the profile shown on the Plans, will be permitted, provided that such variations occur gradually, over a distance of 20 feet or more, in the opinion of the Engineer. Reference is made to Section 67-4, “Alignment Changes (Separation Criteria).”

Where proposed recycled water mains are to be connected to existing recycled water mains, the existing recycled water mains may or may not be in service or under pressure. The Contractor shall contact the Engineer to determine the status before attempting any connections. Existing recycled water mains can be expected, as a minimum, to be filled with water. The Contractor shall dewater

existing recycled water mains as necessary to facilitate the connection of proposed recycled water mains.

Pipe shall be installed with the wording "RECYCLED WATER-DO NOT DRINK" facing upwards.

A tracer wire shall be installed with all recycled water mains, in conformance with the applicable provisions in Section 66, "Potable Water Distribution Facilities," of these Specifications.

Sterilization of recycled water mains is not required.

67-6 Tracer Wire Installation

A tracer wire shall be installed with all pipe for recycled water mains. Materials and installation shall conform to Sections 66-2.12, "Tracer Wire," and 66-6, "Tracer Wire Installation."

67-7 Thrust Block, Valve Box Installation

Thrust Blocks and Valve Boxes shall be installed in accordance with Section 66-7, "Thrust Blocks," and 66-8, "Valve Box Installation."

67-8 Water Service Installation

Recycled water service lines (including metered service lines where required), equipment and appurtenances shall be installed in accordance with the manufacturer's recommendations, as shown on the Plans and the Standard Drawings therefor. The Contractor shall mark the location of recycled water service lines by putting a "RW" mark on the curb face. Said mark is to be chiseled into existing concrete or stamped in new concrete before it has set.

67-9 Hydrostatic Pressure Test

Hydrostatic pressure testing shall be performed in accordance with Section 66-12, "Hydrostatic Pressure Test."

67-10 Measurement

Measurement for recycled water main installation and fitting installation shall be by the lineal foot of pipe installed, and shall be the actual horizontal length installed, measured through fittings.

Measurement for gate, butterfly, or other valves shall be per each valve installed.

Measurement for recycled water service lines shall be per each water service line installed.

67-11 Payment

The unit price paid per lineal foot for recycled water mains shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved therein as shown on the Plans, as set forth in the Specifications, and as directed by the Engineer. This shall include furnishing and installing the pipe and fittings, installing concrete thrust blocks, trenching, backfilling, compacting, hydrostatic pressure testing, water, and all incidentals.

The unit price paid per each for gate, butterfly, or other valves shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved therein as shown on the Plans, as set forth in the Specifications, and as directed by the Engineer. This shall include furnishing and installing the valve, valve box, and valve extension, installing concrete thrust blocks, trenching, backfilling, compacting, testing, sterilization, pressure testing, water, returning and installing valve box to final grade following trench surface restoration, street or alley construction or reconstruction, and all incidentals.

The unit price paid per each for recycled water service lines shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved therein as shown on the Plans, as set forth in the Specifications, and as directed by the Engineer. This shall include furnishing and installing the service pipe and appurtenances (including all taps, fittings, stops, saddles, spacers, meter box and lid, if required), trenching, backfilling, compacting, testing, adjusting meter box (if required) to finish sidewalk grade, and all incidentals.

SECTION 68 - JACKING PIPE

68-1 General

This work shall consist of furnishing, boring, and jacking into place at the locations and type of pipe shown on the Plans or specified in the Contract Specifications, in accordance with these Standard Specifications and Standard Drawings, and as directed by the Engineer.

Reinforced concrete pipe with rubber gasket joints, as a carrier pipe as specified in this Section 68, may be jacked into place directly without a jacked steel casing unless noted otherwise. All other carrier pipe must be installed within a jacked steel casing.

68-2 Materials

68-2.1 Steel Casing Pipe

Steel casing pipe shall be of the outside diameter (OD) and minimum wall thickness not less than that shown on the Plans and shall be butt welded of sheets conforming to ASTM A-570 commercial grade or of plate conforming to ASTM A-283. If the Contractor's operations require a greater wall thickness for successful installation of the steel casing pipe to line and grade without damage, the Contractor shall provide steel casing pipe of such greater wall thickness at no additional cost to the TVMMWC.

Steel casing pipe shall be of the size and class (or strength designation) shown on the Plans or specified in the Contract Specifications, except that the class of pipe designated has been determined for vertical loads only. Additional facilities, reinforcement, or strength of pipe required to withstand jacking pressure shall be determined and furnished by the Contractor at his expense.

All field joints also shall be butt welded full circumference or by other means approved by the Engineer. Joints to be field welded shall be shop cut to ensure a true 90° to the longitudinal axis of the pipe. Use of a jacking band to reinforce the end of the pipe receiving the jacking thrust will be required. It shall be the Contractor's responsibility to provide joints that are capable of resisting the jacking stresses without failure.

68-2.2 Casing Spacers

Casing spacers shall be prefabricated stainless steel, and shall be as designed and manufactured by Pipeline Seal & Insulator, Inc., Houston, Texas, www.pipeline Seal.com (PSI), and shall be PSI Model S8G-2 for carrier pipes up to 24 inches in diameter, and shall be Model S12G-2 for larger carrier pipes, or approved equal. Casing spacers shall be specifically designed and fabricated for the specific project and application for which they are furnished. Casing spacers shall electrically isolate the carrier pipe from the casing.

Casing spacer materials shall also conform to the following requirements:

1. Bands shall be 304 stainless steel, 8 inches wide for carrier pipes up to 24 inches in diameter, and 12 inches wide for larger carrier pipes. Bands shall be two segment, 14-gauge bands for carrier pipes less than 42 inches in diameter, and shall be three or more segment, 12-gauge bands for larger carrier pipes. Bands shall be fitted with a flexible PVC liner on the inner surface of the band. The PVC liner shall have a thickness of 0.09 inch, a hardness of 85-90 (ASTM D2240, Durometer "A"), and a dielectric strength of not less than 58,000 volts (ASTM D149).

2. Risers shall be 304 stainless steel, 10 gauge, designed and fabricated to support the carrier pipe and its liquid load. Risers shall be sized to position, support and stabilize the carrier pipe in the casing.
3. Runners shall be high pressure molded, glass-reinforced polymer having a compressive strength not less than 18,000 psi. Runners shall be not less than two inches wide, shall be at least 8 inches long for use with an 8 inch casing band, and at least 11 inches long for use with a 12-inch casing band. Runners shall be attached to the band or riser, as applicable for the particular casing spacer design, by 3/8 inch welded 304 stainless steel studs and lock nuts. The studs and locknuts shall be recessed below the wearing surface of the runner so as to provide a clearance of at least 1/2 inch to the interior surface of the casing pipe in the installed condition, allowing for runner wear during carrier pipe installation. The recess shall be filled with a corrosion inhibiting filler approved by the Engineer.
4. Hardware for joining band sections shall be 304 stainless steel studs, locknuts and washers. Hardware shall be 5/16 inch for carrier pipes up to 42 inch diameter and 3/8 inch for carrier pipes 42 inch and larger.

The casing spacer manufacturer shall have implemented a quality management system, and shall hold a current certificate of registration, issued by a certifying organization acceptable to the Engineer, certifying that the quality management system conforms to the provisions of ISO 9001:2000 and is applicable to the manufacturing of casing spacers. A copy of the certificate of registration shall be submitted to the Engineer.

68-2.3 Casing End Seals

Casing end seals shall be PSI Model "C", or Model "S", as manufactured by Pipeline Seal and Insulator, Inc., Houston, TX, or approved equal. Concrete plugs shall not be used for casing end seals unless otherwise shown on the plans or specified in the Contract Specifications. In such cases, concrete shall be Class 2 conforming with Section 90, "Portland Cement Concrete," of the State Standard Specifications.

68-2.4 Reinforced Concrete Pipe

Where reinforced concrete pipe, as a carrier pipe, is specified to be jacked into place directly without a jacked steel casing, said reinforced concrete pipe conforming to ASTM Specification C76, latest revision, shall be furnished. The reinforced concrete pipe shall be constructed such that no bells protrude from the outside periphery of the pipe. Sleeves for joints on reinforced concrete pipe shall be furnished and manufactured of galvanized steel, stainless steel, or fiberglass, sufficient in strength to withstand all loads, and which will maintain a rubber-gasketed watertight joint.

68-3 Tunnel Safety Orders

Reference is made to the Tunnel Safety Orders of the California Department of Industrial Relations, and to any other applicable safety codes. The tunnel site (jacking location) will be classified as to gas hazard by the California Department of Industrial Relations. The classification document issued by the State will be included in the Appendix of the Contract Specifications. The Contractor shall comply with the Tunnel Safety Orders, and shall attend a preconstruction safety meeting with a representative of the Division of Occupational Safety and Health, Mining and Tunneling Unit, wherein the Contractor shall present his safety program. Any subcontractors involved in such tunneling shall likewise be present. The Contractor shall contact the California Department of Industrial Relations, Division of Occupational Safety and Health. Reference is made to Section 19- 3.02, "Trench and Structure Excavation," of these Specifications for additional safety requirements.

68-4 Excavating Jacking And Receiving Pits

Before starting excavation, the Contractor shall submit drawings or details of jacking pit bracing, casing pipe, jacking equipment, skids or concrete support blocks, bracing to prevent pipe shifting or flotation, and all other equipment or methods to be used.

Excavation for jacking and receiving pits shall conform to the provisions in Section 8-15, Utility and Non-Street Facilities; Potholing,” Section 19-3.02, “Trench and Structure Excavation,” and to the following provisions.

Jacking and receiving pits shall not extend beyond vertical planes passing through the jacking and receiving pit limits shown on the Plans, and shall be sheathed, shored, sloped or braced in accordance with the Safety Regulations of the State of California, Department of Industrial Relations, Division of Industrial Safety.

68-5 Boring And Jacking

Unless otherwise specified, the methods and equipment used in jacking operations shall be optional with the Contractor, provided that the proposed method is approved by the Engineer. Such approval, however, shall in no way relieve the Contractor of the responsibility for making a satisfactory installation meeting the criteria set forth on the Plans or specified in the Contract Specifications, or these specifications. Only workers experienced in jacking operations shall be used in performing the work.

Excavation for the casing or concrete pipe not using a casing pipe shall be accomplished by boring or by hand digging. Sluicing or jetting with water will not be permitted. If the Contractor elects to utilize uninterrupted around-the-clock bore and jack operations to prevent "freezing" of the casing or carrier pipe, or to preclude instability at the heading of the bore and jack, or should the Contractor be required by the TVMMWC or other permitting agencies to utilize such procedures upon encountering such conditions, the bore and jack operations, once commenced, shall be continued uninterrupted until casing or RC pipe installation is complete. Full compensation for additional costs incurred as a result of such continuous operations, including any overtime inspection involved, shall be considered as included in the Contract unit price paid per linear foot for the steel casing pipe item involved, and no additional compensation will be allowed therefor.

Steel casing pipe and carrier pipe shall be installed as shown on the Plans, in conformance with the Contract Specifications, these specifications, and as directed by the Engineer. Steel casing pipe shall be installed such that carrier pipe, when installed to the lines and grades shown on the Plans, will be approximately centered within its casing pipe.

Carrier pipe to be installed within steel casing shall be as indicated on the Plans and specified in the Contract Specifications. Casing spacers shall be installed within 2 feet of each end of the casing pipe, at each side of each carrier pipe joint, and at evenly spaced intermediate locations to provide a maximum distance between casing spacers of 5 feet on center. The carrier pipe shall be supported on skids during the installation of the pipe. The skids shall be installed in such a manner as to relieve the couplings from all load and bearing. Casing spacers shall be installed in conformance with the manufacturer's recommendations and as specified in these specifications.

At the successful completion of the installation, casing end seals shall be installed in accordance with Plans and Contract Specifications. Care shall be taken during the placement of these seals that the pipe is not damaged, deflected or displaced.

The Contractor shall diligently monitor soil and groundwater conditions encountered during casing and/or carrier pipe installation, and shall provide any and all necessary groundwater seepage control and dewatering.

The excavated hole, whether bored or hand dug, shall not be more than 1 inch in diameter greater than the outside limits of the casing (or reinforced concrete pipe jacked without casing pipe). If the nature of the material is such that caving will likely occur and which may result in a greater space than above specified, a metal shield or jacking head shall be installed which extends a minimum of 18 inches ahead of the jacked casing or pipe. The metal shield shall cover a minimum of the upper 1/2 of the periphery of the jacked casing or pipe. Excavation shall not proceed beyond the shield.

Where ground conditions at the face of the jacking pit are such that sloughing or caving of ground is likely to occur at the face of the excavation upon commencement thereof, the face of the pit shall be made stable so that an excessive void is not carried with the face of the excavation for the length of the casing or pipe. This may be accomplished by solid sheathing at the portal of the jack, or excavating and backfilling the face of the pit with cohesive material.

Cavities or voids outside the limits specified above, regardless of cause, shall be backfilled with sand, soil, cement, or cement mortar as provided herein or as directed by the Engineer. All casing pipe 24 inches in diameter or larger, and all reinforced concrete pipe 24 inches in diameter or larger, shall be furnished with preinstalled fittings suitable for attachment to grout pumping equipment. Such grout connections, unless otherwise indicated on the Plans, shall be placed at 30°, 120°, 240° and 330°, measured clockwise, from vertical, around the circumference of the casing or pipe, and at intervals in each row, along the pipe, of no greater than 10 feet. Alternate bottom holes shall be staggered, and alternate top holes shall be staggered, so that one hole will occur at the top every 5 feet and one hole will occur at the bottom every 5 feet.

Immediately after completion of the jacking or boring operation, if in the opinion of the Engineer, excessive voids have been created outside the jacked pipe, lean grout shall be injected through the grout connections in such a manner as to completely fill all voids outside the casing pipe or reinforced concrete pipe resulting from the jacking or boring operation. The lean grout shall consist of one part Portland cement to not more than 4 parts sand by volume, placed at low pressure. Grout pressure is to be controlled so as to avoid deformation of casing pipe and/or avoid movement of the surrounding soil. Sand for grout to be placed outside the casing shall be of such fineness that 100 percent will pass a No. 8 sieve and not less than 35 percent will pass a No. 50 sieve. After completion of grouting, the grout connections shall be closed with cast-iron threaded plugs.

For jacked reinforced concrete pipe, if the annular space in the joints on the inside of the pipe exceeds one inch, the space shall be filled with cement mortar for the full periphery of the joint and finished smooth and flush with the interior walls of the pipe. Filling and finishing annular spaces shall be accomplished after the entire installation is completed for larger pipe. The Contractor shall adhere to the safety requirements of Section 68-3, "Tunnel Safety Orders," and Section 19-3.02, "Trench and Structure Excavation."

In general, excavated material shall be removed from the casing or reinforced concrete pipe as jacking progresses and no accumulation of excavated material within the casing will be permitted. Should appreciable loss of ground occur in installations where the face of the excavation is accessible, the voids shall be backpacked promptly to the extent practicable with an approved soil cement.

68-6 Grade Tolerance

The Contractor's attention is called to the fact that extreme care will be required in placing the casing pipe so as to permit the construction of the carrier pipe to the lines and grades shown on the Plans. It shall be the Contractor's responsibility for selecting a size of casing, at or above the minimum specified, in order that the jacking may be done with a sufficient degree of accuracy to permit installation of the carrier pipe to the grade as shown on the Plans within the tolerances set forth in these Specifications for the particular carrier pipe installed. Any and all increased costs resulting from the Contractor's use of steel casing pipe with greater diameter or thickness than the minimum specified shall be borne solely by the Contractor. Variations from theoretical alignment and grade of the steel casing pipe at the time of completion of jacking shall not exceed one percent of the distance from the jacking point, except as follows.

Reinforced concrete pipe jacked into place without steel casing shall not vary from theoretical alignment and grade at the time of completion of jacking by more than 6 inches in 100 feet for storm drain, and 1 inch in 100 feet for sanitary sewer carrier pipe.

68-7 Frac-Out Contingency Plan

Unless otherwise specified in the Contract Specifications, a Frac-Out Contingency Plan will be required. Such Plan shall be prepared in accordance with the following provisions and submitted to the Engineer.

For jack-and-bore tunneling activities that use drilling lubricants, the Contractor shall prepare and implement a contingency plan that is intended to minimize the potential for a release of drilling lubricant (frac-out) associated with tunneling activities; provide for the timely detection of frac-outs; and ensure an organized, timely, and "minimum-impact" response in the event of a frac-out and release of drilling lubricant. The contingency plan shall include, at a minimum, the following measures:

1. A full-time monitor shall attend all drilling to look for observable frac-out conditions or lowered pressure readings on drilling equipment.
2. If a frac-out is identified, all work shall stop, including the recycling of drilling lubricant. In the event of a frac-out into water, the pressure of water above the tunnel may keep excess mud from escaping through the fracture. The location and extent of the frac-out shall be determined, and the frac-out shall be monitored for 4 hours to determine whether the drilling lubricant congeals (bentonite will usually harden, effectively sealing the frac-out location).
3. If the drilling lubricant congeals, no other actions shall be taken that would potentially suspend sediments in the water column.
4. Surface releases of bentonite shall be allowed to harden and then shall be removed.
5. The contingency plan shall identify additional measures to be taken to contain or remove the drilling lubricant if it does not congeal.

68-8 Backfill, Compaction, Restoration Of Surfaces

Jacking and receiving pits shall be backfilled and compacted, and the surface restored, in accordance with Section 19-3, "Trench and Structure Excavation, Backfill, Compaction, and Surface Restoration."

68-9 Measurement

Measurement for steel casing pipe jacked into place shall be by the lineal foot of casing pipe jacked into place as shown on the Plans or directed by the Engineer.

Measurement for reinforced concrete pipe with rubber gasket joints (without steel casing), jacked into place, shall be by the lineal foot of pipe jacked into place as shown on the Plans or directed by the Engineer.

Where carrier pipe is indicated on the Plans to be placed within a jacked casing pipe, carrier pipe will be measured by the lineal foot of pipe installed.

68-10 Payment

The unit price bid per lineal foot for steel casing pipe, jacked into place, shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved therein as shown on the Plans, as specified in the Specifications, and as directed by the Engineer. This shall include excavating, backfilling and compacting the jacking and receiving pits, boring and tunneling, furnishing and installing the casing complete with grout fittings, furnishing and installing metal shields, furnishing and installing skids and tie downs, spacers, bands, grouting and backfill of voids, sealing ends of casing, and all other incidental work over and above that associated with the normal work of furnishing and installing the carrier pipe in a trench situation.

The unit price bid per lineal foot for reinforced concrete pipe with rubber gasket joints, jacked into place, shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved therein as shown on the Plans, as set forth in the Specifications, and as directed by the Engineer. This shall include, but not be limited to, excavating, backfilling and compacting the jacking and receiving pits, boring and tunneling, furnishing and installing the pipe complete with grout fittings, furnishing and installing metal shields, grouting and backfill of voids, and all incidentals.

Carrier pipe to be placed in casing pipe as shown on the Plans will be paid for on a lineal foot basis as normal in-trench pipe as set forth in these Specifications for the particular type of pipe to be installed.

SECTION 70 - MISCELLANEOUS STREET IMPROVEMENTS

70-1 General

This work shall consist of constructing or reconstruction of miscellaneous street improvements, including relocation of mail boxes, signs, fences or walls, witnessing and resetting survey monuments, lowering and adjusting existing facilities to finish grade, removal and replacement of connecting driveways, drive approaches, and other connecting facilities, all as shown on the Plans and applicable Standard Drawings, as specified in the Specifications, and as directed by the Engineer.

70-2 Survey Monuments

The Contractor shall comply with the provisions in Section 5-14, "Construction Surveying/Staking." Survey monument wells to replace known monuments to be damaged or destroyed by the work shall be furnished and installed at the locations shown on the Plans and as directed by the Engineer. The survey monument well shall be furnished and constructed in conformance with the applicable Standard Drawings. The Contractor shall retain a licensed land surveyor to survey and reset said monument and furnish and install the well and appurtenances.

All known monuments, corners, or other survey markers to be disturbed by the work shall be tied by temporary survey markers in conformance with professional standards prior to beginning construction. Temporary ties and resetting of monuments, corners, or other markers shall be performed by a licensed land surveyor obtained by the Contractor prior to beginning construction. Monuments, corners, or other markers shall be re-set to their original precise location and elevation, and marked as required. Known monuments, corners, or survey markers not to be disturbed by the work shall be protected from damage. Any known monuments, corners or markers damaged or destroyed due to the Contractor's failure to protect them shall be replaced in conformance with the applicable Standard Drawing and this Section 70-2 at the Contractor's expense.

70-3 Adjusting Existing Facilities To Finish Grade

Existing facilities shall include manhole frames and covers, water valve boxes and covers, water meter boxes and covers, and other similar existing facilities that must fit or match the final finished surface of the improvement in which they are located. The facilities shall be adjusted to grade within five (5) working days following the completion of the surfacing in which they are located.

Sewer, recycled water, and storm drain manhole frames and covers, and water or recycled water valve boxes and covers shall be temporarily lowered below the grading plane and triangulated or monumented to provide quick location throughout the construction process. The manhole frames and covers, and valve boxes and covers shall then be raised to finish grade, concrete collars poured and asphalt-concrete patch placed, in accordance with the Standard Drawings and as directed by the Engineer.

Other existing facilities shall be adjusted to finish grade in accordance with the applicable utility or facility authority involved, and as directed by the Engineer. Where the utility or facility authority involved desires to do the work with their own forces and/or materials, the Contractor shall pay all the costs associated therewith.

70-4 Measurement And Payment

Unless otherwise specified in the Contract Specifications, Miscellaneous Street Improvements shall be measured and paid for on a lump sum basis. Payment shall include full compensation for all labor, equipment and materials required to complete all the work described herein, as shown on the Plans and as specified in the Contract Specifications.

If the Contract does not include a pay item for Miscellaneous Street Improvements, the cost thereof shall be included in the prices bid for the other various items of work and no separate payment will be made therefor.

SECTION 73 - CONCRETE CURBS, SIDEWALKS, SURFACE IMPROVEMENTS

73-1 General

This work shall consist of constructing concrete curbs, gutters, curb and gutters, curb depressions, sidewalks, curb ramps, driveway approaches, alley approaches, valley gutters, fence mowstrips and median caps of the form and dimensions shown on the Plans or Standard Drawings, as set forth in the Specifications, and as directed by the Engineer. Curb ramps shall also comply with the most current Federal and State Accessibility Standards, whichever is more restrictive.

All concrete improvements as above defined shall be constructed by using fixed forms, except that curbs, curb and gutters, and valley gutters may be constructed by using an extrusion or slip-form machine.

73-2 Portland Cement Concrete

Concrete for curbs, sidewalks, and other surface improvements shall conform the requirements of Section 90, "Portland Cement Concrete," of the State Standard Specifications, and shall be Class 1 or Class 2, except valley gutters shall be Class 1.

For extruded or slip-formed concrete improvements, the maximum size of aggregate used shall be at the option of the Contractor, but in no case shall the maximum size be larger than 1 inch or smaller than 3/8 inch. For extruded or slip-formed concrete, the cement content shall be as specified for Class 1 concrete.

73-3 Reinforcement

Where the use of steel reinforcement is indicated on the Plans or Standard Drawings, it shall be furnished and installed in accordance with Section 52, "Reinforcement," of the State Standard Specifications, except that Section 52-1.01, "Payment," of the State Standard Specifications is hereby deleted.

73-4 Subgrade Preparation

Subgrade Preparation shall conform to the requirements of Section 19-2.07, "Subgrade Preparation, Compaction," and shall be constructed true to grade and cross-section, as shown on the Plans or directed by the Engineer. It shall be thoroughly watered and rolled or hand tamped to obtain a relative compaction of no less than 95 percent under curbs, gutters, driveway approaches, valley gutters and curb ramps, and a relative compaction of no less than 90 percent under sidewalks, mowstrips and concrete median caps prior to placing the concrete unless directed differently by the Project Specifications. All soft or spongy material shall be removed to a depth of not less than 18 inches or to stable soil below subgrade elevation for curbs, gutters, valley gutters and driveways and 3 inches below for caps, mowstrips, sidewalks and curb ramps, and the resulting space filled with earth, sand or gravel of a quality that when moistened and compacted will form a stable foundation unless directed differently by the Project Specifications.

The subgrade and forms shall be wet immediately in advance of placing concrete.

73-5 Construction

Concrete shall not be placed on frozen or ice-coated ground or subgrade or on ice-coated forms, reinforcing steel, structural steel, conduits, precast members, or construction joints. Under rainy conditions, placing of concrete shall be stopped before the quantity of surface water is sufficient to damage surface mortar or cause a flow or wash of the concrete surface, unless the Contractor provides adequate protection against damage. All concrete that has been frozen, or damaged by other causes,

as determined by the Engineer, shall be removed and replaced by the Contractor at the Contractor's expense.

Fixed form construction shall conform to Section 73-1.03C, "Fixed Forms," of the State Standard Specifications, and as set forth in this Section 73-5. Extruded or slip-formed construction shall conform to Section 73-1.03D, "Extruded or Slip-Form," of the State Standard Specifications, and as set forth in this Section 73-5. The extrusion machine shall go no faster than the curb and/or gutter or valley gutter can be finished using good workmanlike practices.

Construction Joints

Construction joints shall be as shown on the Standard Drawings, and as specified below for both fixed form and extruded or slip-formed construction, as follows:

- (a) Where concrete improvements such as curb and gutter, valley gutters, and sidewalk, are to be placed adjacent to existing pavement, the pavement shall be sawcut and removed 6 inches beyond the inside edge of the formwork. The edge of the existing pavement shall not be used as formwork.
- (b) Expansion joints for curbs and gutters, sidewalks, mowstrips, valley or alley gutters, median island curbs and median caps shall be constructed at no greater than 45 foot intervals, and at the ends of curb returns. Expansion joints for curb, gutter and sidewalks and median curbs and caps shall be collinear. Expansion joints for curbs and gutters shall also be constructed on each side of curb depressions for driveway approaches. Expansion joints for sidewalks shall also be constructed on each side of driveway approaches. Expansion joints for fence mowstrips shall occur at post locations. All expansion joints shall be tooled with a 3/8 inch maximum radius edger, and filled with 3/8 inch thick premolded joint filler conforming to ASTM Specification Designation D1751.
- (c) Weakened plane joints shall be placed at 15 foot intervals, except that for mowstrips they shall be placed at each post location not having an expansion joint. Weakened plane joints may be made by the use of plastic materials. Plastic weakened plane joint material shall be at least 1 inch deep, T-shaped 1/8 inch thick plastic strip, with a minimum 3/4 inch wide pull-top stiffener. This plastic strip shall have a suitable anchor to prevent vertical movement. After preliminary troweling, the concrete shall be parted to a depth of approximately 2 inches with a joint knife or a thin metal straight edge. The plastic strip shall then be inserted in the impression so that the upper surface of the pull-top stiffener is flush with the concrete, and the pull-top stiffener shall be immediately peeled off. After the pull-top is removed, the concrete shall be floated to fill all voids adjacent to the strip. During final troweling, the edges at plastic control joints shall be finished to a radius not to exceed 1/8 inch using a slit jointer tool. The finished joint opening shall not be wider than 1/8 inch exclusive of radii.
- (d) The above spacing for construction joints shall be required in lieu of the spacing indicated in Section 73, "Concrete Curbs and Sidewalks," of the State Standard Specifications.
- (e) Mowstrips may not be poured monolithically with sidewalks or other concrete improvements unless approved by the Engineer.

The surface of sidewalks, wheelchair ramps and driveway approaches shall be scored, stamped, or otherwise marked as shown on the Plans, Standard Drawings, Contract Specifications, or as directed by the Engineer, utilizing a scoring tool, which will leave the edges rounded. The construction of curb ramps shall include any special surfacing required to be affixed to the concrete surface.

Where steel dowels are set forth on the Plans to anchor proposed concrete curbs to existing pavement, adhesives may not be substituted therefor.

73-6 Finish

Immediately upon stripping curb forms and prior to backfill, all rock pockets or honeycombs shall be repaired to the satisfaction of the Engineer.

Finish of concrete surface improvements shall be free from blemishes and shall be as follows:

- (a) Curbs -Trowel smooth and finish with a light brush.
- (b) Sidewalks and mowstrips -Medium sweat finish.
- (c) Gutters, valley gutters and median caps -Finish with medium broom.
- (d) Driveway approaches -Finish with a medium broom, except wings shall be finished with a light broom and sidewalk area to receive a medium sweat finish.
- (e) Curb ramps -Finish as indicated on the Standard Drawings.

Broomed surfaces to be used by pedestrian traffic shall be broomed transverse to the line of traffic.

73-7 Tolerances

The top and face of finished curbs shall be true and straight and the top surface of curbs shall be of uniform width, free from humps, sags, or other irregularities. When a straightedge 10 feet long is laid on the top or face of the curb or on the surface of gutters, or valley gutters, the surface shall not vary more than 1/8 inch from the edge of the straightedge, except at designed grade changes or curves.

The surface of sidewalks, wheelchair ramps, driveway and alley approaches, mowstrips and median caps shall not vary more than 3/16 inch along a 10 foot straightedge, except at grade changes.

73-8 Curing

All surface concrete improvements shall be cured by application of an approved curing compound in conformance with the requirements of Subsection 90-1.03B, "Curing Compound Method," of the State Standard Specifications.

73-9 Backfilling

After removal of forms, the area adjacent to the newly constructed concrete improvement shall be cleaned of all surplus concrete and other debris and the area filled with clean earth suitable for planting (except in front of the gutter). Backfill shall be placed behind the curb prior to any excavation in the street area below the plane of the bottom of curb and gutter.

Where there is a planter strip between the curb and the sidewalk, the planter strip shall be filled to within 1 inch of the top of curb and sidewalk with clean earth suitable for planting. The area of traffic divider (median) islands not to be capped with concrete shall be backfilled with clean earth suitable for planting to within 2 inches of a line extending between adjacent tops of curb.

73-10 Measurement

Unless otherwise specified in the Contract Specifications, concrete curb, concrete gutter, alley gutter, concrete curb and gutter, and concrete mowstrip shall be measured by the lineal foot. Curb depressions will be included in the measurement of length of concrete curb, or concrete curb and gutter, as the case may be.

Unless otherwise specified in the Contract Specifications, concrete sidewalks and curb ramps, concrete driveway approaches, concrete alley approaches, concrete valley gutters and concrete median caps shall be measured by the square foot. Measurement of concrete driveway approaches and concrete alley approaches shall be made from the back of the curb to the back of the approach.

73-11 Payment

Payment for concrete curb, concrete gutter, concrete curb and gutter, and concrete mowstrip shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved therein as shown on the Plans, as set forth in the Specifications, and as directed by the Engineer, including subgrade preparation.

Payment for concrete sidewalks and curb ramps, concrete driveway approaches, concrete alley approaches, concrete valley gutters and concrete median caps shall include full compensation for furnishing all labor, materials, tools, equipment, special surfacing materials, and incidentals and for doing all the work involved therein as shown on the Plans, as set forth in the Specifications, and as directed by the Engineer, including subgrade preparation. Compensation for steel reinforcement required for concrete valley gutters or any other facilities requiring steel reinforcement shall be included in the cost for concrete valley gutters or other facilities requiring steel reinforcement.

APPENDIX

STATE OF CALIFORNIA DEPARTMENT OF HEALTH SERVICES

M e m o r a n d u m

Date: April 14, 2003 (**Revised Date: October 16, 2003**)

To: Regional and District Engineers

From: David P. Spath, Ph.D., Chief (*Original signed by Dave*)
Drinking Water and Environmental Management
601 North 7th Street, MS 216
Sacramento, CA 95814 (916) 322-2308

Subject: **GUIDANCE MEMO NO. 2003-02: GUIDANCE CRITERIA FOR THE SEPARATION OF WATER MAINS AND NON-POTABLE PIPELINES**

The purpose of this memo is to update guidance dated April 5, 1983 for consistency with proposed 2003 regulations. Should there be any modification to the proposed Water Works Standards that may impact the content of this guidance, the guidance will be amended accordingly.

GUIDANCE: CRITERIA FOR THE SEPARATION OF WATER MAINS AND NON-POTABLE PIPELINES

BACKGROUND

When buried water mains are in close proximity to non-potable pipelines, the water mains are vulnerable to contamination that can pose a risk of waterborne disease outbreaks. For example, sewers (sanitary sewer mains and sewage force mains) frequently leak and saturate the surrounding soil with sewage due to structural failure, improperly constructed joints, and/or subsidence or upheaval of the soil encasing the sewer. If a nearby water main is depressurized and no pressure or negative pressure occurs, that situation is a public health hazard that is compounded if an existing sewer is broken during the installation or repair of the water main. Further, failure of a water main in close proximity to other pipelines may disturb their bedding and cause them to fail. In the event of an earthquake or other disaster, simultaneous failure of all pipelines could occur.

The most effective protection against this type of drinking water contamination is adequate construction and separation of non-potable pipelines and water mains. The Waterworks Standards (Title 22, Chapter 16, Section 64572) provide separation criteria for new construction. However, when these criteria cannot be met, the risk of contamination can be reduced by increasing the structural integrity of pipe materials and joints, and ensuring minimum separation requirements are met. Therefore, the following guidance details construction criteria for the installation of water mains and non-potable pipelines to minimize the risk of contamination of drinking water.

DEFINITIONS

- **COMPRESSION JOINT** - A push-on joint that seals by means of the compression of a rubber ring or gasket between the pipe and a bell or coupling.
- **CONTINUOUS SLEEVE** - A protective tube of high-density-polyethylene (HDPE) pipe with heat fusion joints or other non-potable metallic casing without joints into which a pipe is inserted.
- **DISINFECTED TERTIARY RECYCLED WATER** - Wastewater that has been filtered and subsequently disinfected in accordance with Section 60301.230, Chapter 3 (Water Recycling Criteria), Title 22, California Code of Regulations.
- **HOUSE LATERAL** - A sewer line connecting the building drain and the sanitary sewer main serving the street.
- **SUPPLY LINE** - Pipelines conveying raw water to be treated for drinking purposes in accordance with Section 64572 ©, **proposed** Water Works Standards.
- **WATER MAIN** – Means any pipeline, except for user service lines, within the distribution system in accordance with Section 64551.70, **proposed** Water Works Standards.
- **RATED WORKING WATER PRESSURE** - A pipe classification system based on internal working pressure of the fluid in the pipe, type of pipe material, and the thickness of the pipe wall.
- **SANITARY SEWER MAIN** - A gravity sewer conveying untreated municipal wastewater.
- **SEWAGE FORCE MAIN** - A pressurized sewer conveying untreated municipal wastewater.

APPLICABILITY

Note that the construction criteria presented in this document apply to house laterals that cross above a water main, but not to those house laterals that cross below a water main.

Water mains or non-potable pipelines that are 24-inches in diameter or larger may pose a higher degree of public health concern because of the large volumes of flow involved. Therefore, installation of water mains or non-potable pipelines 24-inches in diameter or larger should be reviewed and approved in writing by the Department on a case-by-case basis prior to construction.

In no case, should water mains and non-potable pipelines conveying sewage or other liquids be installed in the same trench.

REGULATORY REQUIREMENTS

Any new development project in which all the underground facilities are being constructed for the first time must comply with the following regulatory requirements:

Existing requirements:

Section 64630.(Title 22 CA Code of Regulations) Water Main Installation“

- (a) Water mains shall be installed at least:
 - (1) Ten feet (3 meters) horizontally from and 1 foot (0.3 meters) higher than sanitary sewer mains located parallel to the main.
 - (2) One foot (0.3 meters) higher than sanitary sewer mains crossing the main.
 - (3) Ten feet (3 meters), and preferably 25 feet (7.5 meters), horizontally from sewage leach fields, cesspools, seepage pits and septic tanks.
- (b) Separation distances specified in (c) shall be measured from the nearest outside edges of the facilities.
- (c) Where the requirements of (c) and (d) cannot be met due to topography, inadequate right-of-way easements, or conflicts with other provisions of these regulations, lesser separation is permissible if:
 - (1) The water main and the sewer are located as far apart as feasible within the conditions listed above.
 - (2) The water main and the sewer are not installed within the same trench.
 - (3) The water main is appropriately constructed to prevent contamination of the water in the main by sewer leakage.
- (d) Water mains shall be disinfected according to AWWA Standard C601-81 before being placed in service.
- (e) Installation of water mains near the following sources of potential contamination shall be subject to written approval by the Department on a case-by-case basis:
 - (1) Storage ponds or land disposal sites for wastewater or industrial process water containing toxic materials or pathogenic organisms.
 - (2) Solid waste disposal sites.
 - (3) Facilities such as storage tanks and pipe mains where malfunction of the facility would subject the water in the main to toxic or pathogenic contamination.

Although the following requirements have not yet been adopted, they should be within the next two years and should be used as guidance for future construction.

Proposed requirements as of the date of this document:

Section 64572. Water Main Separation

(a) New water mains and new supply lines shall not be installed in the same trench as, and shall be at least 10 feet horizontally from, and one foot vertically above, any parallel pipeline conveying:

- (1) Untreated sewage,
- (2) Primary or secondary treated sewage,
- (3) Disinfected secondary-2.2 recycled water (defined in section 60301.220),
- (4) Disinfected secondary-23 recycled water (defined in section 60301.225), and
- (5) Hazardous fluids such as fuels, industrial wastes, and wastewater sludge.

(b) New water mains and new supply lines shall be installed at least 4 feet horizontally from, and one foot vertically above, any parallel pipeline conveying:

- (1) Disinfected tertiary recycled water (defined in section 60301.230), and
- (2) Storm drainage.

(c) New supply lines conveying raw water to be treated for drinking purposes shall be installed at least 4 feet horizontally from, and one foot vertically below, any water main.

(d) If crossing a pipeline conveying a fluid listed in subsection (a) or (b), a new water main shall be constructed perpendicular to and at least one foot above that pipeline. No connection joints shall be made in the water main within eight horizontal feet of fluid pipeline.

(e) The vertical separation specified in subsections (a), (b), and (c) is required only when the horizontal distance between a water main and pipeline is ten feet or less.

(f) New water mains shall not be installed within 100 horizontal feet of any sanitary landfill, wastewater disposal pond, or hazardous waste disposal site, or within 25 feet of any cesspool, septic tank, sewage leach field, seepage pit, or groundwater recharge project site.

(g) The minimum separation distances set forth in this section shall be measured from the nearest outside edge of each pipe barrel.

ALTERNATIVE CRITERIA FOR CONSTRUCTION

Water Mains, and Sewers and Other Non-potable Fluid-carrying Pipelines

When new water mains, new sanitary sewer mains, or other non-potable fluid-carrying pipelines are being installed in existing developed areas, local conditions (e.g., available space, limited slope, existing structures) may create a situation in which there is no

alternative but to install water mains, sanitary sewer mains, or other non-potable pipelines at a distance less than that required by the regulations [existing Section 64630 (proposed Section 64572)]. In such cases, through permit action, the Department may approve alternative construction criteria. The alternative approach is allowed under the proposed regulation Section 64551(c):

“A water system that proposes to use an alternative to the requirements in this chapter shall demonstrate to the Department how it will institute additional mitigation measures to ensure that the proposed alternative would not result in an increased risk to public health.”

Appropriate alternative construction criteria for two different cases in which the regulatory criteria for sanitary sewer main and water main separation cannot be met are shown in **Figures 1 and 2**.

- **Case 1** - New sanitary sewer main and a new or existing water main; alternative construction criteria apply to the sanitary sewer main.
- **Case 2** - New water main and an existing sanitary sewer main; alternative construction criteria may apply to either or both the water main and sanitary sewer main.

Case 1: New Sanitary Sewer Main Installation (Figures 1 and 2)

Zone Special Construction Required for Sanitary Sewer Main

- A. Sanitary sewer mains parallel to water mains shall not be permitted in this zone without prior written approval from the Department and public water system.
- B. If the water main paralleling the sanitary sewer main does not meet the Case 2 Zone B requirements, the sanitary sewer main should be constructed of one of the following:
 1. High-density-polyethylene (HDPE) pipe with fusion welded joints (per AWWA C906-99);
 2. Spirally-reinforced HDPE pipe with gasketed joints (per ASTM F-894);
 3. Extra strength vitrified clay pipe with compression joints;
 4. Class 4000, Type II, asbestos-cement pipe with rubber gasket joints;
 5. PVC sewer pipe with rubber ring joints (per ASTM D3034) or equivalent;
 6. Cast or ductile iron pipe with compression joints; or
 7. Reinforced concrete pressure pipe with compression joints (per AWWA C302-95).

- C. If the water main crossing below the sanitary sewer main does not meet the requirements for Case 2 Zone C, the sanitary sewer main should have no joints within ten feet from either side of the water main (in Zone C) and should be constructed of one of the following:
1. A continuous section of ductile iron pipe with hot dip bituminous coating; or
 2. One of the Zone D options 1, 3, 4, or 5 below.
- D. If the water main crossing above the sanitary sewer main does not meet the Case 2 Zone D requirements, the sanitary sewer main should have no joints within four feet from either side of the water main (in Zone D) and be constructed of one of the following:
1. HDPE pipe with fusion-welded joints (per AWWA C906-99);
 2. Ductile iron pipe with hot dip bituminous coating and mechanical joints (gasketed, bolted joints);
 3. A continuous section of Class 200 (DR 14 per AWWA C900-97) PVC pipe or equivalent, centered over the pipe being crossed;
 4. A continuous section of reinforced concrete pressure pipe (per AWWA C302-95) centered over the pipe being crossed; or
 5. Any sanitary sewer main within a continuous sleeve.

Case 2: New water mains Installation (Figures 1 and 2)

Zone Special Construction Required for Water Main

- A. No water mains parallel to sanitary sewer mains shall be constructed without prior written approval from the Department.
- B. If the sanitary sewer main paralleling the water main does not meet the Case 1 Zone B requirements, the water main should be constructed of one of the following:
1. HDPE pipe with fusion welded joints (per AWWA C906-99);
 2. Ductile iron pipe with hot dip bituminous coating;
 3. Dipped and wrapped one-fourth-inch-thick welded steel pipe;
 4. Class 200, Type II, asbestos-cement pressure pipe;
 5. Class 200 pressure rated PVC water pipe (DR 14 per AWWA C900-97 & C905-97) or equivalent; or
 6. Reinforced concrete pressure pipe, steel cylinder type, per AWWA (C300-97 or C302-99 or C303-95).

- C. If the sanitary sewer main crossing above the water main does not meet the Case 1 Zone C requirements, the water main should have no joints within ten feet from either side of the water main (in Zone C) and be constructed of one of the following:
1. HDPE pipe with fusion-welded joints (per AWWA C906-99);
 2. Ductile iron pipe with hot dip bituminous coating;
 3. Dipped and wrapped one-fourth-inch-thick welded steel pipe;
 4. Class 200 pressure rated PVC water pipe (DR 14 per AWWA C900-97 & C905-97); or
 5. Reinforced concrete pressure pipe, steel cylinder type, per AWWA (C300-97 or C301-99 or C303-95).
- D. If the sanitary sewer main crossing below the water main does not meet the requirements for Case 1 Zone D, the water main should have no joints within eight feet from either side of the sanitary sewer main (in Zone D) and should be constructed as for Zone C.

Water Mains and Pipelines Conveying Non-potable Fluids

When the basic separation criteria cannot be met between water mains and pipelines conveying non-potable fluids, the requirements described above for sanitary sewer mains should apply. This includes the requirements for selecting special construction materials and the separation requirements shown in Figures 1 and 2. Note that not all construction materials allowed for sanitary sewer mains will be appropriate for other non-potable fluid lines. For example, certain plastic lines may not be appropriate for the transport of some fuel products. The selection of compatible materials of construction for non-potable fluids is a decision to be made by the project engineer.

Water Mains and Sewage Force Mains

- Sewage force mains shall not be installed within ten feet (horizontally) of a water main.
- When a sewage force main must cross a water main, the crossing should be as close as practical to the perpendicular. The sewage force main should be at least one foot below the water main.

- When a new sewage force main crosses under an existing water main, and a one-foot vertical separation cannot be provided, all portions of the sewage force main within eight feet (horizontally) of the outside walls of the water main should be enclosed in a continuous sleeve. In these cases, a minimum vertical separation distance of 4 inches should be maintained between the outside edge of the bottom of the water main and the top of the continuous sleeve.
- When a new water main crosses over an existing sewage force main, the water main should be constructed of pipe materials with a minimum rated working pressure of 200 psig or the equivalent.

Water Mains and Tertiary Treated Recycled Water or Storm Drainage

The basic separation criteria for water mains and pipelines conveying tertiary treated recycled water or storm drainage lines are a 4-foot horizontal separation where lines are running parallel and a 1-foot vertical separation (water line above recycled or storm drainage) where the lines cross each other.

When these criteria cannot be met, the Zone A criteria apply where lines are running parallel, and the Zone C and Zone D criteria apply where the lines cross each other as shown on Figures 1 and 2. For these situations, the Zone “P” criteria are in effect and prohibit construction less than 1 foot in parallel installations and less than 4 inches in vertical (crossing) situations.

For tertiary treated recycled water and storm drainage lines, the Zone B criteria (requirements for special pipe) do not apply as the basic separation criteria is a four-foot horizontal separation criteria for parallel lines. The tertiary treated recycled water lines should be constructed in accordance with the color-coding, and labeling requirements per Section 116815, California Health and Safety Code of Regulations.

MISCELLANEOUS GUIDANCE

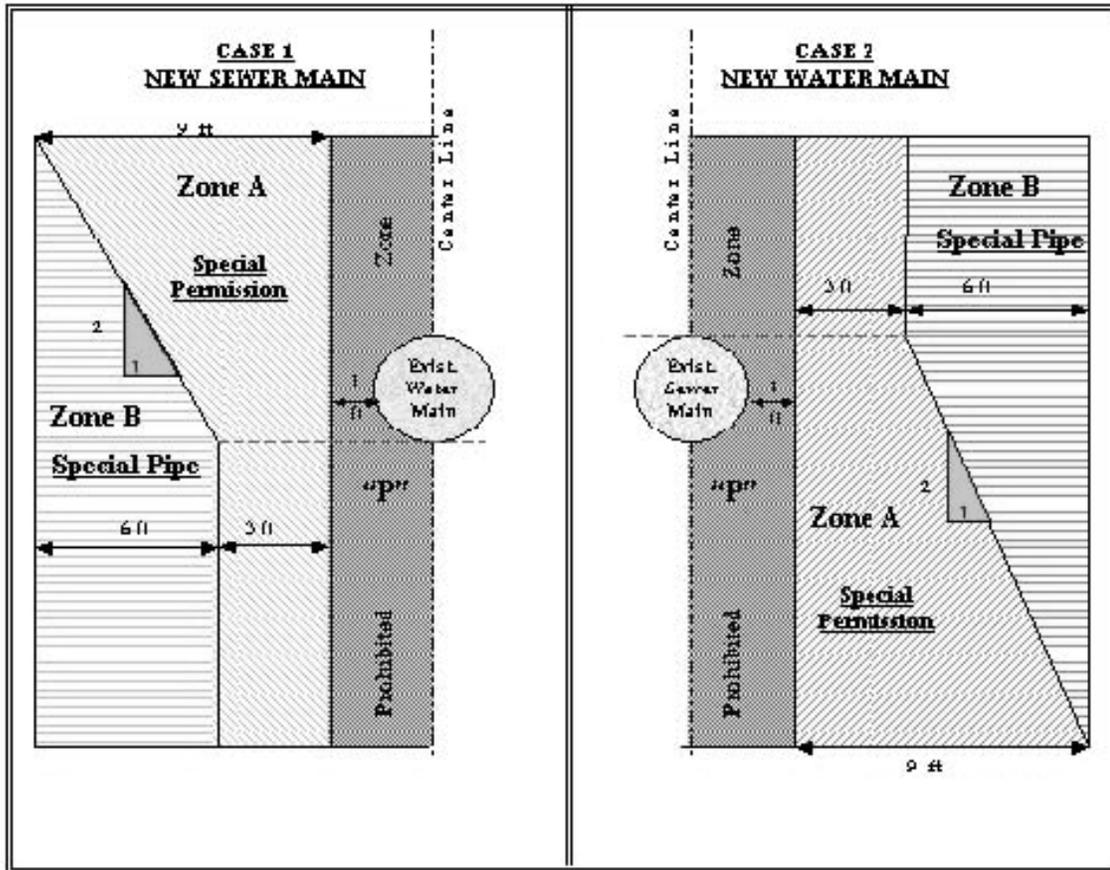
- More stringent requirements may be necessary if conditions such as high groundwater exist. HDPE or similar pipe may be required to provide flexibility to move without potential joint leaks.
- Sanitary sewer mains should not be installed within 25 feet horizontally of a low head (5 psig or less pressure) water main.
- New water mains and sanitary sewer mains should be pressure tested in accordance with manufacturer’s specifications.
- When installing water mains, sewers, or other pipelines, measures should be taken to prevent or minimize disturbances of existing pipelines. Disturbance of the conduit’s supporting base could eventually result in pipeline failure.

- Special consideration should be given to the selection of pipe materials if corrosive conditions are likely to exist. These conditions may be due to soil type and/or the nature of the fluid conveyed in the conduit, such as a septic sewage producing corrosive hydrogen sulfide.

NOTE: Dimensions are from the outside of the water main to the outside of the other pipeline, manhole, or sleeve.

FIGURE 1 PARALLEL CONSTRUCTION

Not To Scale



Note: Zones identical on either side of center lines.

Zones "p" is a prohibited zone. Section 64630 (a) (2) California Code of Regulations, Title 22 (Current); or Section 64572 (a) California Code of Regulations, Title 22 (Proposed).

FIGURE 2 CROSSINGS
Not To Scale

