# CITY OF DAVIS PUBLIC WORKS DEPARTMENT STANDARD SPECIFICATIONS

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## PART ONE GENERAL CONDITIONS

## SECTION 1 GENERAL PRINCIPLES OF INTERPRETATION AND DEFINITIONS

#### 1-1 GENERAL PRINCIPLES OF INTERPRETATION

Working titles having a masculine gender, such as "workman" and "journeyman" and the pronoun "he," are utilized in the Specifications for the sake of brevity, and are intended to refer to persons of either sex.

#### 1-2 DEFINITIONS AND TERMS

Unless the context otherwise requires, wherever in the Specifications and other Contract Documents, the following abbreviations and terms, or pronouns in place of them, are used, the intent and meaning shall be interpreted as provided in this Section.

AGREEMENT means that portion of the Contract by which the Contractor, in terms, is bound to perform the work covered by the entire contract.

BID AND BID FORM means Proposal.

BIDDER means any person, partnership, firm or corporation submitting a Proposal for the work contemplated, acting directly or through a duly authorized representative.

CITY is City of Davis, a Municipal Corporation, existing under and by virtue of the laws of the State of California.

CITY CLERK is the City Clerk of the City of Davis.

CITY COUNCIL means the City Council of the City of Davis.

CITY ENGINEER is the Public Works Director acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them.

CONTRACT CHANGE ORDER or CHANGE ORDER means a supplemental written agreement which amends or extends the Contract work. See Contract.

CONTRACT OR CONTRACT DOCUMENTS means a written agreement covering the performance of the work and the furnishing of labor and materials in the construction of the work. The Contract Documents shall include the Notice Inviting Bids, Information to Bidders, all duly issued Addenda, Proposal, Plans, Specifications, Agreement, and Contract Bonds. It will also include any and all

supplemental agreements (i.e., Change Orders) amending or extending the work contemplated and which may be required to complete the work in a substantial and acceptable manner.

CONTRACT PLANS see Plans.

CONTRACTOR is the Bidder who has entered into a contract with the City to perform work, or legal representative, successor, assign, executor, or heir.

DAYS shall mean consecutive calendar days unless otherwise specified.

DEPARTMENT is the Public Works Department of the City of Davis as designated by the Davis City Council.

INSPECTOR means the City Engineer or technical inspector or inspectors duly authorized and appointed by the City Council or City Engineer.

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) means the Manual on Uniform Traffic Control Devices of the State of California, Department of Transportation, latest edition.

PROPOSAL is the offer of the Bidder for the work when made out and submitted on the prescribed Proposal form, properly signed and guaranteed.

PLANS are the drawings, profiles, cross-sections, working drawings, and supplemental drawings, or reproductions thereof, prepared and approved by the City Engineer, which show the location, character, dimensions and details of the work.

PROJECT ENGINEER, CONSULTING ENGINEER, CIVIL ENGINEER, MECHANICAL ENGINEER, STRUCTURAL ENGINEER, PROJECT ARCHITECT, ARCHITECT, LANDSCAPE ARCHITECT, and/or any other titles used in a set of Special Provisions on a City project, are the private consultants, whether an Engineering or Architectural firm, engaged as an independent contractor by the City to design the project and provide other professional consulting services. Whenever the Special Provisions refer to one of these consultants, it shall be interpreted to be the City Engineer and/or Public Works Inspector assigned to this project. The City Engineer (Public Works Inspector) will coordinate all review of submittals, construction observations, and/or meeting attendance by any of the project consultants.

The authority of such consultants to monitor and review the work shall be strictly limited to that authority specified, and no additional authority has been granted, nor shall be inferred.

SHOP DRAWINGS mean the detail fabrication plans, working drawings, catalog cuts, design calculations, required certificates, or other information required to completely define a particular contract item. The Contractor is required to prepare and submit these items for review and approval of the City Engineer.

SPECIAL PROVISIONS are any provisions which supplement or modify these Standard Specifications.

SPECIFICATIONS are the directions, provisions and requirements contained in these Standard Specifications as supplemented by the Special Provisions.

STANDARD PLANS are the details of standard structures, devices or instructions referred to on the Plans or in the Specifications by title or number.

STATE SPECIFICATIONS mean State of California, Department of Transportation, (more commonly known as CALTRANS), Standard Specifications, latest edition.

SUBCONTRACTOR means each person or firm who is required by law to be and who is licensed to and will perform work, labor, or render services to the Prime Contractor in or about the construction of the work, or who, under subcontract to the Prime Contractor, specifically fabricates and installs a portion of the work or improvement.

Subcontractor shall include all persons or firms within the authority of the Subletting and Subcontracting Fair Practices Act, Chapter 4 of Part 1, Division 2 of the Public Contract Code, commencing with Section 4100.

TECHNICAL SPECIFICATIONS are the general information, materials, and methods specific to a project which supplement or modify the Standard Specifications.

UTILITY means tracks, overhead or underground wires, pipelines, conduits, ducts, or structures, sewers or storm drains owned, operated, or maintained in or across a public right-of-way or private easement, whether existing or proposed.

THE WORK refers to and indicates all the work to be done under Contract, unless some other meaning is indicated by the context.

#### SECTION 2 PROPOSAL REQUIREMENTS AND CONDITIONS

#### 2-1 CONTENTS OF PROPOSAL FORMS

Prospective Bidders will be furnished with Proposal forms. These forms will state the locations and description of the contemplated construction and will show the approximate quantities of the various kinds of work to be performed or materials to be furnished. It will also include a schedule of items for which bid prices are requested.

#### 2-2 APPROXIMATE ESTIMATE

The quantities given in the Notice to Contractors, Proposal and Contract forms are approximate only, being given as a basis for comparison of bids. The City of Davis does not, expressly or by implication, agree that the actual amount of work will correspond therewith. The City also reserves the right to increase or decrease the amount of any class or portion of the work, or to delete any portion of the work, as may be deemed necessary or advisable by the City Engineer.

## 2-3 EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE OF WORK

The Bidder shall examine carefully the site of the contemplated work as well as the Proposal, Plans, Specifications, and Contract forms therefor. It will be assumed that the Bidder has satisfactorily investigated the conditions to be encountered, the character, quality, and quantities of work to be performed and materials to be furnished, and the requirements of these Specifications and the Contract. After the signing of the Agreement, no consideration will be given to any claims of misunderstanding of the work or of any provisions of the Proposal, Plans, Specifications and Contract documents.

#### 2-4 PROPOSAL FORMS

All Proposals shall be made upon blank forms obtained from the Public Works Department (mailing address: 23 Russell Boulevard, Davis, CA 95616). The Bidder shall submit a Proposal on the forms furnished by the City. Proposals submitted on forms other than the one issued to the Bidder will be disregarded. The Proposal shall set forth for each item of work, in clear legible figures, the item price and total for each item. The Bidder shall fill out all blanks in the Proposal form as therein required.

The Proposal forms are bound in a Contract Book together with Notice Inviting Bids, Information to Bidders, Special Provisions and Contract forms. The Proposal Forms may be separated from the remainder of the Contract Documents and submitted separately to the City as the "Bid Documents." The Proposal Forms submitted with the Bid shall consist of the following documents: Proposal Form, including itemized Bid List; Experience Statement; List of Subcontractors; Non-Collusion Affidavit; any Addenda, and, Bid Security. The remainder of the Contract Documents are understood to be included by reference and shall be interpreted as being included in their entirety in the Bid Proposal.

The Proposal must be signed with the full name of the Bidder; if a partnership, by a member of the firm; if a limited partnership, by a general partner; if a corporation, by the appropriate officer thereof in the corporate name with the seal attached. When Proposals are signed by an agent, other than the officer or officers of a corporation authorized to sign contracts on its behalf, or a member of a partnership, a "Power of Attorney" must be on file with the City prior to opening bids, or shall be submitted with the Proposal. All Proposals otherwise submitted will be rejected as irregular and unauthorized.

The address of the Bidder must be given on the Proposal, and any addenda issued must be acknowledged by signature and must accompany the Proposal, when submitted to the City Clerk.

Proposals must be enclosed in a sealed envelope marked "Proposal" stating the nature and title of the work bid upon. It shall be delivered to the City Clerk of the City of Davis in conformity with the official call for bids. Proposals shall be delivered to the City Clerk at City Hall, 23 Russell Boulevard, Davis, California (corner of Fifth and "B" Streets).

#### 2-5 REJECTION OF PROPOSALS

Proposals may be rejected if they show any alteration of form, additions not called for, conditional bids, incomplete bids, erasures or irregularities of any kind.

#### 2-6 PROPOSAL GUARANTY

All Proposals shall be accompanied by cash, cashier's check, certified check or Bidder's bond, made payable to the City of Davis. The amount of said requirement shall be not less than ten (10%) percent of the amount of the attached bid. The Bidder's bond shall be executed by a corporation, as surety, authorized to issue surety bonds in the State of California. This requirement is a guaranty that, if awarded the Contract, the Bidder will sign the Agreement to do the work. In the event of the Bidder's failure to sign the Contract, after such award for the work, the cash, check or Bidder's bond shall be forfeited to the City of Davis as liquidated damages. The parties hereby agree and acknowledge that it is impossible or extremely impractical to figure damages in such event.

#### 2-7 WITHDRAWAL OF PROPOSALS

Any bid may be withdrawn at any time prior to the hour fixed in the Notice Inviting Bids for the opening of bids. A written request for the withdrawal of the bid shall be filed with the City Clerk, and shall be executed by the Bidder or his duly authorized representative. The withdrawal of a bid shall not prejudice the right of a Bidder to file a new bid.

Whether or not the bids are opened exactly at the time fixed in the Public Notice for Opening Bids, a bid will not be received after that time, nor may any bid be withdrawn after the bid opening time.

#### 2-8 PUBLIC OPENING OF PROPOSALS

Proposals will be opened and read publicly at the time and place indicated in the Notice Inviting Bids. Bidders or their authorized agents are invited to be present.

#### 2-9 EXPERIENCE STATEMENT

A record of the Bidder's experience in construction of a type similar to that contemplated under this Contract shall be set forth in the Bid documents. It is the intent of the City to award the Contract to the Bidder who furnishes satisfactory evidence of having the requisite experience and ability, and of having sufficient capital, facilities, and plant to enable him to prosecute the work successfully and properly, as well as to complete it within the time named in the Contract.

To determine the degree of responsibility to be credited to the Bidder, the City will weigh evidence that the Bidder has satisfactorily performed other contracts of like nature, magnitude, and comparable difficulty and rates of progress.

A record of the Bidder's experience in construction of a type similar to that contemplated under this Contract shall be set forth in the Bid documents.

#### 2-10 CONTRACTOR'S GUARANTY

Unless otherwise specified in the Special Provisions, the Contractor shall unconditionally guaranty all materials, workmanship, and equipment against defect for a period of one calendar year.

During this unconditional guaranty period, the Contractor shall, upon the receipt of notice in writing from the City, promptly make all repairs caused by defective materials, workmanship or equipment.

By executing the Contract Documents, the Contractor agrees that the City is authorized to provide for such repairs if, ten days after receipt of written notice from the City, the Contractor has failed to make or undertake with due diligence the repairs. In the case of an emergency, where, in the opinion of the City Engineer, delay could cause serious loss or damage, repairs may be made by the City without notice being sent to the Contractor, and all expense associated therewith shall be charged to the Contractor.

Nothing in this Section shall be construed to be a waiver of any additional rights or remedies available to the City through local, state and federal ordinances and codes.

#### 2-11 GUARANTY SECURITY

When required by the project Special Provisions, the Contractor shall file with the City a Guaranty Security, prior to acceptance of the work as complete. The Security shall be in American dollars and shall be either a Letter of Credit executed by a surety authorized to do business in the State of California, and in a form acceptable to the City, or cash, or a cashier's check, or a Certificate of Deposit. The Security shall be in the amount as specified in the project Special Provisions or as required by the City Engineer. The term of the Security shall be for one year, commencing on the date of completion of the Contract, as said date is determined by the Notice of Completion.

#### 2-12 LISTING OF SUBCONTRACTORS

Each Bidder making a bid to perform work described in these specifications shall comply with the requirements of the Subletting and Subcontracting Fair Practices Act (Public Contract Code Section

4100 et seq.), which forbids bid shopping and bid pedaling and which requires accurate listing of all subcontractors.

The Bid shall set forth the name and location of the mill, shop or office of each subcontractor who will perform work or labor or render service to the Contractor in or about the construction of the work or improvement, and the portion of the work which will be done by each subcontractor. This listing is required for subcontractors who will perform work or labor or render service of a value of more than 1/2 percent of the total bid, regardless of the amount.

Should the Contractor violate any of the provisions of the Subletting and Subcontracting Fair Practices Act, such violation shall be deemed a breach of this Contract. The City shall have all remedies provided by California law, including but not limited to, those provided in Public Contract Code Section 4110, allowing termination of the Contract or a penalty assessment of ten percent of the subcontract.

#### 2-13 ADDENDA

The City may, when it deems necessary, issue addenda to the Plans and Specifications to amend, clarify or correct matter contained therein. Such addenda shall constitute a part of said Plans and Specifications and shall be equally binding with them. Addenda shall be forwarded to all prospective Bidders.

## 2-14 CITY EMPLOYEES AND DESIGN CONSULTANT BID EXCLUSION

No City Employee shall be eligible to submit a proposal for, nor to subcontract for any portion of, nor to supply any materials for any contract administered by the City.

No engineering, architectural firm, or other professional design consultant, which has provided design services on this project, shall be eligible to submit a proposal for the contract to construct the project, nor to subcontract for any portion of the work. The ineligible firms include the prime contractor for the design, any subcontractors of portions of the design, and affiliates of either. An affiliate is a firm which is subject to the control of the same persons, through joint ownership or other form of control.

#### SECTION 3 AWARD AND EXECUTION OF CONTRACT

#### 3-1 AWARD OF CONTRACT

Time and price will be considered in making the award. In the event a Bidder to whom an award is made hereunder fails or refuses to enter into the Contract, the City may award the work to any other Bidder, time and price considered, or it may re-advertise the same. The City reserves the right to reject any and all Proposals and to waive any irregularities in any Proposal. The award, if made, will be made within 45 days after the opening of the Proposals. All bids will be compared on the basis of the Engineer's Estimate of the quantities of work to be done.

#### 3-2 CONTRACT BONDS

Coincident with the signing of the Agreement in duplicate, the Contractor shall file with the City a Performance Bond and a Labor and Material Bond. The Bonds shall be executed by a surety, authorized to do business in the State of California, listed in the current Federal Department of Treasury Circular 570, and shall be acceptable to the City of Davis. The Performance Bond shall be equal to one hundred 100 percent of the contract price. The Labor and Material Bond shall be equal to fifty 50 percent of the contract price. All Bonds shall be in American dollars.

The Labor and Materials Bond shall comply in all respects with the requirements of Civil Code Sections 3247 through 3252, inclusive and shall secure the payment of the claims of laborers, mechanics or material suppliers employed on the work under the Contract. The Performance Bond shall guarantee the faithful performance of all requirements of the Contract by the Contractor.

No change or alteration of the work or modification of the contract between the City and the Contractor shall release or exonerate any surety or sureties upon said bonds. For the purpose of protecting the City against any failure of the Contractor to perform the contract and make full payment thereunder for all work done and materials furnished, the principal and sureties on said bonds, in consideration of the approval thereof by the City, shall expressly recite and covenant therein that if, in the opinion of the City, any change of the conditions surrounding said work, any increase in the total amount of cost thereof, or any diminution of the security furnished by said bonds renders the same insufficient, such additional security as may be required by the City shall be furnished by the principal on said bonds within ten days after notice of such requirement, and that default in the furnishing of such additional security shall be deemed a breach of the contract on the part of the Contractor, and that no change in the plans or specifications and no agreement for reduced, added or extra work in accordance with the provisions therefore, whether with or without notice to or consent by the sureties, shall relieve any of the parties to said bonds.

#### 3-3 EXECUTION OF CONTRACT

Upon the award of the Contract, the successful Bidder will be promptly notified of the award, and shall, within ten calendar days from the date of receiving such notification, sign the Agreement in duplicate and deliver the same to the City.

#### 3-4 FAILURE TO EXECUTE CONTRACT

Failure to execute the Contract and file acceptable Bonds, as provided herein, within 10 calendar days after the Bidder has received notice, that the Contract has been awarded, shall be just cause for the annulment of the award and the forfeiture of the Proposal guaranty.

#### 3-5 RETURN OF PROPOSAL GUARANTIES

The City will retain the proposal guaranties of the first, second and third lowest responsible bidders until execution of the Contract. After complete execution of the Contract, all such retained guaranties will be returned to the respective bidders whose proposals they accompanied, except bidder's guaranties which have been forfeited. The proposal guaranties submitted by all other unsuccessful bidders will be returned after determination by the City of the first, second and third lowest responsible bidders.

#### 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 agrees to perform in accordance with the terms of the Contract. Where the Plans and 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. Unless otherwise specified, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals, and do all the work involved in executing the Contract in a satisfactory and expert manner.

#### 4-2 PROJECT SITE MAINTENANCE AND FINAL CLEANUP

The Contractor shall maintain the project site in a neat and orderly condition during construction. At any time during construction, the City Engineer may direct the Contractor to perform a general cleanup of the site.

Before final inspection of the work, the Contractor shall clean the project site, material sites, and all ground occupied in connection with the work. All rubbish, excess materials, falsework, temporary structures, and equipment shall be disposed of properly or otherwise removed. All areas of the work shall -be left in a neat and presentable condition. Full compensation for final cleanup will be considered as included in the prices paid for the various Contract items of work and no separate payment will be made therefor.

Nothing herein, however, shall require the Contractor to remove warning, regulatory, and guide signs prior to formal acceptance by the City.

#### 4-3 CHANGES

The City reserves the right to make alterations, deviations, additions to or deletions from the Plans and Specifications. This includes 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, as determined by the City Engineer to be necessary or advisable. The City Engineer may also require extra work as deemed necessary for the proper completion or construction of the whole work contemplated.

Any such changes will be set forth in a Contract Change Order. It will specify, in addition to the work to be done in connection with the change made, adjustment of Contract time, if any, and the basis of compensation for such work. A Contract Change Order will not become effective until approved by the City Engineer.

Upon receipt of an approved Contract Change Order, the Contractor shall proceed with the ordered work. If ordered in writing by the City Engineer, the Contractor shall proceed with the work, so ordered, prior to actual receipt of an approved Contract Change Order therefor. In such cases, the

City Engineer will, as soon as practicable, issue an approved Contract Change Order for such work and the provisions in Section 4-3.1, "Procedure and Protest," shall be fully applicable to such subsequently issued Contract Change Order.

When the compensation for an item of work is subject to adjustment under the provisions of this Section, the Contractor shall, upon request, furnish the City Engineer with adequate detailed cost data for such item of work. If the Contractor requests an adjustment in compensation for an item of work as provided in Sections 4-3.2.1 or 4-3.2.2, such cost data shall be submitted with the request.

#### 4-3.1 PROCEDURE AND PROTEST

A Contract Change Order approved by the City Engineer may be issued to the Contractor at any time. Should the Contractor disagree with any terms or conditions set forth in an approved Contract Change Order which has not been executed, the Contractor shall submit a written protest to the City Engineer. This written protest shall be submitted within 15 days after the receipt of such approved Contract Change Order. The protest shall state the points of disagreement, and, if possible, the Contract Specification references, quantities, and costs involved. If a written protest is not submitted, payment will be made as set forth in the approved Contract Change Order. Such payment shall constitute full compensation for all work included therein or required thereby. Such unprotested approved Contract Change Orders will be considered as executed Contract Change Orders as that term is used in these Specifications, and in particular in Sections 4-3.2 to 4-3.4, inclusive.

Where the protest concerning an approved Contract Change Order relates to compensation, the compensation payable for all work specified or required by said Contract Change Order to which such protest relates will be determined as provided in Sections 4-3.2 to 4-3.4, inclusive. The Contractor shall keep full and complete records of the cost of such work. He shall also permit the City Engineer to have such access thereto as may be necessary to assist in the determination of the compensation payable for such work.

Where the protest concerning an approved Contract Change Order relates to the adjustment of Contract time for the completion of the work, the time to be allowed therefor will be determined as provided in Section 8-7, "Liquidated Damages."

Proposed Contract Change Orders may be presented to the Contractor for consideration prior to approval by the City Engineer. If the Contractor signifies acceptance of the terms and conditions of such proposed Contract Change Order by executing such document, and if such Contract Change Order is approved by the City Engineer and issued to the Contractor, payment in accordance with the provisions as to compensation, therein set forth, shall constitute full compensation for all work included therein or required thereby. A Contract Change Order executed by the Contractor and approved by the City Engineer is an executed Contract Change Order as provided in these Specifications, especially Sections 4-3.2 to 4-3.4, inclusive. An approved Contract Change Order shall supersede a proposed, but unapproved, Contract Change Order covering the same work.

The City Engineer may provide for an adjustment of compensation as to a Contract item of work included in a Contract Change Order. This adjustment will be determined as provided in Sections 4-3.2 to 4-3.4, inclusive, if such item of work is eligible for an adjustment of compensation thereunder.

#### 4-3.2 INCREASED OR DECREASED QUANTITIES

Increases or decreases in the quantity of a Contract item of work will be determined by comparing the total pay quantity of such item of work with the Engineer's Estimate therefor.

If the total pay quantity of any item of work required under the Contract varies from the Engineer's Estimate therefor by 25 percent or less, payment will be made for the quantity of work of said item performed at the Contract unit price therefor, unless eligible for adjustment pursuant to Section 4-3.3, "Changes in Character of Work."

If the total pay quantity of any item of work required under the Contract varies from the Engineer's Estimate therefor by more than 25 percent, in the absence of an executed Contract Change Order specifying the compensation to be paid, the compensation payable to the Contractor will be determined in accordance with Sections 4-3.2.1, 4-3.2.2, or 4-3.2.3, as the case may be.

#### 4-3.2.1 INCREASES OF MORE THAN 25 PERCENT

Should the total pay quantity of any item of work required under the Contract exceed the Engineer's Estimate therefor by more than 25 percent, the work in excess of 125 percent of such estimate and not covered by an executed Contract Change Order specifying the compensation to be paid therefor will be paid for by adjusting the Contract unit price, as hereinafter provided, or at the option of the City Engineer, payment for the work involved in such excess will be made on the basis of force account as provided in Section 9-3.

Such adjustment of the Contract unit price will be the difference between the Contract unit price and the actual unit cost, which will be determined as hereinafter provided, of the total pay quantity of the item. If the costs applicable' to such item of work include fixed costs, such fixed costs will be deemed to have been recovered by the Contractor by the payments made for 125 percent of the Engineer's Estimate of the quantity for such item, and in computing the actual unit cost, such fixed costs will be excluded. Subject to the above provisions, such actual unit cost will be determined by the City Engineer in the same manner as if the work were to be paid for on a force account basis as provided in Section 9-3, or such adjustment will be as agreed to by the Contractor and the City Engineer.

When the compensation payable for the number of units of an item of work performed in excess of 125 percent of the Engineer's Estimate is less than \$5,000 at the applicable Contract unit price, the City Engineer reserves the right to make no adjustment in said price, except that an adjustment will be made if requested in writing by the Contractor.

#### 4-3.2.2 DECREASES OF MORE THAN 25 PERCENT

Should the total pay quantity of any item of work required under the Contract be less than 75 percent of the Engineer's Estimate therefor, an adjustment in compensation pursuant to this Section will not be made unless the Contractor so requests in writing. If the Contractor so requests, the quantity of said item performed, unless covered by an executed Contract Change Order specifying the compensation payable therefor, will be paid for by adjusting the Contract unit price as hereinafter provided. At the option of the City Engineer, payment for the quantity of the work of such item performed will be made on a force account basis as provided in Section 9-3, provided however, that

in no case shall the payment for such work be less than that which would be made at the Contract unit price.

Such adjustment of the Contract unit price will be the difference between the Contract unit price and the actual unit cost, which will be determined as hereinafter provided, of the total pay quantity of the item, including fixed costs. Such actual unit cost will be determined by the City Engineer in the same manner as if the work were to be paid for on a force account basis as provided in Section 9-3; or such adjustment will be as agreed to by the Contractor and the City Engineer.

The payment for the total pay quantity of any such item of work will in no case exceed the payment which would be made for the performance of 75 percent of the Engineer's Estimate of the quantity for such item at the original Contract unit price.

#### 4-3.2.3 ELIMINATED ITEMS

Should any Contract item of the work be eliminated in its entirety, in the absence of an executed Contract change Order covering such elimination, payment will be made to the Contractor for actual costs incurred in connection with such eliminated Contract item, if incurred prior to the date of notification in writing by the City Engineer of such elimination.

If acceptable material is ordered by the Contractor for the eliminated item prior to the date of notification of such elimination by the City Engineer, and if orders for such material cannot be canceled, it will be paid for at the actual cost to the Contractor. In such case, the material paid for shall become the property of the City and the actual cost of any further handling will be paid for. If the material is returnable to the vendor and if the City Engineer so directs, the material shall be returned and the Contractor will be paid for the actual cost of charges made by the vendor for returning the material. Payment will be made for the actual cost of handling returned material.

Payment for the actual costs or charges as provided in this Section 4-3.2.3 will be computed in the same manner as if the work were to be paid for on a force account basis as provided in Section 9-3.

#### 4-3.3 CHANGES IN CHARACTER OF WORK

If an ordered change in the Plans and Specifications materially changes the character of the work of a Contract item from that on which the Contractor based the bid price, and if the change increases or decreases the actual unit cost of such changed item as compared to the actual or estimated actual unit cost of performing the work of said item in accordance with the Plans and Specifications originally applicable thereto, in the absence of an executed Contract Change Order specifying the compensation payable, an adjustment in compensation therefor will be made in accordance with the following provisions of this section.

The basis of such adjustment in compensation will be the difference between the actual unit cost to perform the work of said item or portion thereof involved in the change as originally planned and the actual unit cost of performing the work of said item or portion thereof involved in the change, as changed. Actual unit costs will be determined by the City Engineer in the same manner as if the work were to be paid for on a force account basis as provided in Section 9-3, or such adjustment will be as agreed to by the Contractor and the City Engineer. Any such adjustment will apply only to the

portion of the work of said item actually changed in character. At the option of the City Engineer, the work of said item or portion of item which is changed in character will be paid for on a force account basis, as provided in Section 9-3.

If the compensation for an item of work is adjusted under this Section 4-3.3, the costs recognized in determining such adjustment shall be excluded from consideration in making an adjustment for such item of work under the provisions in Section 4-3.2, "Increased or Decreased Quantities."

Failure of the City Engineer to recognize a change in character of the work at the time the approved Contract Change Order is issued shall not be construed as relieving the Contractor of his duty and responsibility of filing a written protest within the 15-day limit as provided in Section 4-3.1, "Procedure and Protest."

#### 4-3.4 EXTRA WORK

New and unforeseen work will be classed as extra work when determined by the City Engineer that such work is not covered by any of the various items for which there is a bid price or by combinations of such items. In the event portions of such work are determined by the City Engineer to be covered by some of the various items for which there is a bid price or combination 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 and Specifications.

The Contractor shall do such extra work and furnish labor, material and equipment therefor upon receipt of an approved Contract Change Order or other written order of the City Engineer. In the absence of such approved Contract Change Order or other written order of the City Engineer, the Contractor shall not be entitled to payment for such extra work.

Payment for extra work required to be performed pursuant to the provisions in this Section 4- 3.4, in the absence of an executed Contract Change Order, will be made on a force account basis, as provided in Section 9-3, or as agreed to by the Contractor and the City Engineer.

#### 4-3.5 DIFFERING SITE CONDITIONS

For any digging of trenches or other excavations that extend deeper than four feet below the surface, the following shall apply:

#### 4-3.5.1 NOTICE REQUIREMENT

The Contractor shall promptly, and before the following conditions are disturbed, notify the City of Davis, in writing, of any:

#### 4-3.5.1.1 HAZARDOUS MATERIALS PER STATE LAW

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.

#### 4-3.5.1.2 DIFFERING PHYSICAL CONDITIONS

Subsurface or latent physical conditions at the site differing from those indicated in the project documents.

#### 4-3.5.1.3 UNKNOWN PHYSICAL CONDITIONS

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.

#### 4-3.5.2 CITY INVESTIGATION AND ACTION

The City of Davis shall promptly investigate the conditions, and if it 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, the City shall issue a Change Order under the procedures described in the Contract.

#### **4-3.5.3 DISPUTES**

In the event that a dispute arises between the City of Davis 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.

#### SECTION 5 CONTROL OF WORK

#### 5-1 AUTHORITY OF CITY ENGINEER

The City Engineer shall decide all questions as to the quality or acceptability of materials furnished and work performed, as to the manner of performance and rate of progress of the work, as to the interpretation of the Plans and Specifications, as to the acceptable fulfillment of the Contract on the part of the Contractor, and as to compensation. The City Engineer's decision shall be final and shall include the authority to enforce and make effective such decisions and orders which the Contractor fails to carry out promptly.

#### 5-1.1 FUNCTION OF PROJECT ENGINEER

The Project Engineer is the design professional engaged as an independent contractor by the City of Davis to design the project and to advise the City Engineer, in all aspects of the construction phase of the project. The Project Engineer's functions include advice and assistance to the City Engineer in the correct interpretation and application of the Plans and Specifications. However, the City Engineer is the City's representative on the project, not the Project Engineer. The Project Engineer is not authorized to issue addenda, interpretations, or change orders, or in any other way to bind the City in discussions with the Contractor.

Copies of all correspondence relating to the proper performance of the Contract Documents sent from the Contractor to the City Engineer shall be delivered as well to the Project Engineer. The City Engineer then shall consult with the Project Engineer prior to responding to the Contractor's requests.

When discussions between the Contractor and the City Engineer occur either on the site or elsewhere, but the Project Engineer is not present, the City Engineer in all cases reserves the right to consult with and obtain the advice of the Project Engineer prior to issuing a final opinion or instruction, and to revise any opinions or instructions that may have been given prior to such consultation.

#### 5-2 PLANS AND SHOP DRAWINGS

The Contract Plans furnished consist of general drawings and show such details as are necessary to give a comprehensive idea of the construction contemplated. All authorized alterations affecting the requirements and information given on the Contract Plans shall be in writing.

The Plans shall be supplemented by such Shop Drawings prepared by the Contractor as are necessary to adequately control the work. No change shall be made by the Contractor in any Shop Drawing after they have been approved by the City Engineer.

When first submitted by the Contractor, each drawing shall be a good quality original accompanied by two duplicate originals or two prints. If approved without change or correction, three approved

copies of paper will be furnished to the Contractor. If extensive additions or corrections are required, the City Engineer will return one marked-up copy to the Contractor, together with the originals, for correction and resubmission. Approved originals will be retained by the City Engineer.

Prior to approval of Shop Drawings, payment will not be allowed nor shall material be furnished or fabricated, nor any work performed, for which such drawings are required.

It is expressly understood that approval of the Contractor's Shop Drawings shall not relieve the Contractor of any of his responsibility under the Contract for the successful completion of the work in conformity with the requirements of the Plans and Specifications. Such approval shall not operate to waive any of the requirements of the Plans and Specifications or relieve the Contractor of any obligation thereunder. Defective work, materials and equipment may be rejected regardless of any such approval.

Full compensation for furnishing all Shop Drawings shall be considered as included in the prices paid for the Contract items of work to which such drawings relate and no additional compensation will be allowed therefor.

#### 5-2.1 TRENCH EXCAVATION SAFETY PLANS

Attention is directed to Section 7-1.10, "Trench Safety." Excavation for any trench five feet or more in depth shall not begin until the Contractor has received approval, from the City Engineer, of the Contractor's detailed plan for worker protection from the hazards of caving ground during the excavation of such trench. Such plan shall be submitted at least five days before the Contractor intends to begin excavation for the trench and shall show the details of the design of shoring, bracing, sloping or other provisions to be made for worker protection during such excavation. No such plan shall allow the use of shoring, sloping or a protective system less effective than that required by the Construction Safety Orders of the Division of Industrial Safety.

If any submitted plans vary from the shoring or sloping requirements of the Construction Safety Orders of the Division of Industrial Safety, so as to provide a less effective protective system, the plans shall be prepared and signed by a Civil Engineer in the State of California and shall be submitted at least three weeks before the Contractor intends to begin excavation for the trench.

## 5-2.2 VARIATIONS FROM PLANS AND SPECIFICATIONS OR OTHER CONTRACT DOCUMENTS

Any portion of the work which does not conform to the Plans, Specifications, or other Contract Documents, shall be clearly identified by the Contractor in a written letter proposing such change, which letter shall accompany any required Shop Drawing Submittals. The Contractor shall include any design calculations prepared by registered professionals in the letter proposing the change.

## 5-3 CONFORMITY WITH CONTRACT DOCUMENTS AND ALLOWABLE DEVIATIONS

Work and materials shall conform to the lines, grades, cross-sections, dimensions and material requirements, including tolerances, shown on the Plans or indicated in the Specifications. Although

measurement, sampling and testing may be considered evidence of conformity, the City Engineer shall be the sole judge of whether the work or materials deviate from the Plans and Specifications. The City Engineer's decision shall be final as to any allowable deviations therefrom.

#### 5-4 COORDINATION AND INTERPRETATION OF PLANS, STANDARD SPECIFICATIONS, AND SPECIAL PROVISIONS

These Standard Specifications, the Standard Plans, Project Plans, Special Provisions, Contract Change Orders, 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 complementary, and to describe and provide for a complete work.

Where conflicts exist between these Specifications, the Plans and/or any reference specifications, such conflicts shall be clarified according to the following order, the first ranked taking precedence over the lower ranked:

- 1. Special Provisions
- 2. Project Plans
- 3. Standard Plans
- 4. Standard Specifications
- 5. Referenced Specifications
- 6. Approved Shop Drawings

Should it appear that the work to be done or any of the matters relative thereto are not sufficiently detailed or explained in these Specifications, the Special Provisions, or the Plans, the Contractor shall apply to the City Engineer for such further explanations as may be necessary. The Contractor shall conform to any such further explanations as part of the Contract. In the event of any doubt or question arising respecting the true meaning of these Specifications, the Special Provisions or the Plans, reference shall be made to the City Engineer, whose decision thereon shall be final.

In the event of any discrepancy between any drawing and the figures written thereon, the figures shall be taken as correct. Detail drawings shall prevail over general drawings.

#### 5-5 ORDER OF WORK

When required by the Special Provisions or Plans, the Contractor shall follow the sequence of operations as set forth therein.

Full compensation for conforming to such 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.

#### 5-6 SUPERINTENDENCE

The Contractor shall designate in writing before starting work, an authorized representative who shall have the authority to represent and act for the Contractor. The Contractor shall give the City Engineer 10 days written notice prior to changing an authorized representative. Said 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 City Engineer shall be made for any emergency work which may be required.

Whenever the Contractor or an 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 City Engineer, which shall be received and obeyed by the superintendent, foreman, or crew leader who may have charge of the particular work in reference to which the orders are given.

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

#### 5-7 LINES AND GRADES

The City Engineer will set such stakes or marks as determined to be necessary to establish the lines and grades required for the completion of the work, as specified in these Specifications, on the Plans and in the Special Provisions.

When such stakes or marks are required, the Contractor shall notify the City Engineer of such requirement in writing a reasonable length of time in advance of starting operations that require such stakes or marks. In no event, shall a notice of less than two working days be considered a reasonable length of time.

Stakes and marks set by the City Engineer shall be carefully preserved by the Contractor for the use of the City Engineer, as well as the Contractor. In case such stakes and marks are destroyed or damaged, they will be replaced at the City Engineer's earliest convenience. The Contractor will be charged for the cost of necessary replacement or restoration of stakes and marks which in the judgment of the City Engineer were carelessly or willfully destroyed or damaged by the Contractor's operations. This charge will be deducted from any money due or to become due the Contractor.

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 City Engineer. In the absence of such report, the Contractor shall be responsible for any error in the grade of the finished work.

Grades for underground conduits will be set at the surface of the ground. The Contractor shall transfer them to the bottom of the trench.

#### 5-8 INSPECTION

The City Engineer shall at all times have access to the work during its construction, and shall be furnished with every reasonable facility for ascertaining that the materials and the workmanship are in accordance with the requirements and intentions of these Specifications, the Special Provisions,

and the Plans. All work done and all materials furnished shall be subject to the City Engineer's inspection.

The inspection of the work or materials shall not relieve the Contractor of any obligations to fulfill the Contract as prescribed. Work and materials not meeting such requirements shall be made good. Unsuitable work or materials may be rejected, notwithstanding that such work or materials have been previously included in a progress estimate.

Projects financed in whole or in part with State or Federal funds or other public funds shall be subject to inspection at all times by the State, Federal or other appropriate agency.

The Contractor shall give 24 hours notice when an inspection is required. This notice shall be given at the office of the City Engineer. Upon failure to give such notice, any work performed in the absence of the City Engineer shall be subject to rejection.

#### 5-8.1 HOURS OF WORK

The Contractor shall schedule all work activities for regular working hours during weekdays, 7:00 am to 6:00 pm, Monday through Friday, with Saturdays, Sundays, and Legal Holidays being excluded. Inspection services will generally not be provided for work performed outside of these normal working hours. It is not expected that any work will be performed outside of these normal working hours. If the Contractor elects to work during non-normal work hours, then the Contractor shall arrange for inspection services during these hours.

#### 5-9 REMOVAL OF REJECTED AND UNAUTHORIZED WORK

All work which has been rejected shall be remedied, or removed and replaced by the Contractor in an acceptable manner without compensation for such removal, replacement, or remedial work.

Any work done beyond the lines and grades shown on the Plans or as established by the City Engineer, or any extra work done without written authority will be considered as unauthorized work and no payment will be made therefor.

Upon order of the City Engineer, unauthorized work shall be remedied, removed, or replaced at the Contractor's expense.

Upon failure of the Contractor to comply promptly with any order of the City Engineer made under this Section 5-9, the City may cause rejected or unauthorized work to be remedied, removed, or replaced, and to deduct the costs from any money due or to become due the Contractor.

#### 5-10 EQUIPMENT AND PLANTS

Only equipment and plants suitable to produce the quality of work and materials required will be permitted to operate on the project.

All vehicles used to haul materials over existing streets and highways shall be equipped with pneumatic tires and be appropriately licensed if necessary.

## 5-11 CHARACTER OF WORKERS

Any subcontractor or person employed by the Contractor appearing to the City Engineer to be incompetent or to act in a disorderly or improper manner, shall be discharged immediately on the order of the City Engineer, and such person shall not again be employed on the work.

## 5-12 FINAL INSPECTION

The City Engineer will not make the final inspection until the work provided and contemplated by the Contract has been completed, including the satisfactory performance of all functional and operation testing, and the final cleaning up performed.

## 5-13 PUNCH LIST

The City Engineer shall notify the Contractor in writing of any deficiencies to be remedied prior to final acceptance, by preparing a written list, commonly known in the industry as a punch list.

The Contractor shall remedy all items shown on the punch list.

The Contract shall not be modified or amended by the issuance of a punch list(s). It is provided solely for the benefit of the Contractor to enable determination of what items must be corrected before final acceptance will be recommended by the City Engineer.

## 5-14 SUGGESTIONS TO CONTRACTOR ADOPTED AT OWN RISK

Any plan or method of work suggested by the City Engineer to the Contractor, but not specified or required, if adopted or followed by the Contractor in whole or in part, shall be used at the risk and responsibility of the Contractor, and the City Engineer and the City shall assume no responsibility therefor.

## 5-15 CONSTRUCTION ACCESS (TRUCK ROUTES)

Truck and construction equipment traffic shall use the City's designated truck routes for access to the construction site. For projects that are not directly served by the designated truck routes, the City Engineer will specify the authorized route to be used from the truck route to the project site. The Contractor shall use the specified route to and from the site as the only access route for vehicles exceeding 3 tons GVW. The Contractor shall ensure that all project traffic including subcontractors and material suppliers comply with the specified route.

# 5-16 REMOVAL, RELOCATION OR PROTECTION OF EXISTING UTILITIES

In accordance with the provisions of Section 4215 of the California Government Code, any contract to which a public agency as defined in Section 4401 is a party, the public agency shall assume the responsibility, between the parties to the contract, for the timely removal, relocation, or protection of

existing main or trunkline utility facilities located on the site of any construction project that is a subject of the contract, if such utilities are not identified by the public agency in the plans and specifications made a part of the invitation for bids. The agency will compensate Contractor for the costs of locating, repairing damage not due to the failure of the Contractor to exercise reasonable care, and removing or relocating such utility facilities not indicated in the plans and specifications with reasonable accuracy, and for equipment on the project necessarily idled during such work.

The Contractor shall not be assessed liquidated damages for delay in completion of the project, when such delay was caused by the failure of the public agency or the owner of the utility to provide for removal or relocation of such utility facilities.

Nothing herein shall be deemed to require the public agency to indicate the presence of existing service laterals or appurtenances when the presence of such utilities on the site of the construction project can be inferred from the presence of other visible facilities, such as buildings, meter and junction boxes, on or adjacent to the site or construction; provided, however, nothing herein shall relieve the public agency from identifying main or trunklines in the plans and specifications.

If the Contractor while performing the Contract discovers utility facilities not identified by the public agency in the contract Documents it shall immediately notify the public agency and utility in writing.

The public utility, where they are the owner, shall have the sole discretion to perform such repairs or relocation work or permit the Contractor to do such repairs or relocation work at a reasonable price.

## 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, except materials that are designated in the Special Provisions to be furnished by the City and materials furnished by the City in accordance with Section 9-3.1.2, "Materials."

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 an expert 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 City Engineer or designated representative. The Contractor shall furnish without charge such samples as may be required. The Contractor shall furnish the City Engineer a list of his sources of materials and the locations at which such materials will be available for inspection. The City Engineer may inspect, sample or test materials at the source of supply or other locations. But such inspection, sampling or testing will not be undertaken until the City 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 City Engineer or authorized representative has free access at all times to the material to be inspected, sampled or tested. It is understood that such 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 such material nor of continued acceptance of material presumed to be similar to that upon which inspections and tests have been made. Inspection and testing so performed shall not relieve the Contractor or 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 City 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 CITY FURNISHED MATERIALS

Upon request of the Contractor, materials furnished by the City will be delivered to the contractor within a reasonable time at the points designated in the Special Provisions. They shall be hauled to the site of the work by the Contractor, at the Contractor's expense. The cost of handling and placing all materials, after they are delivered to the Contractor, shall be considered as included in the Contract prices for the items in connection with which they are used.

The Contractor will be held responsible for all delivered material, and deductions will be made from any money due the Contractor to make good any shortages and deficiencies, from any cause whatsoever, which may occur after such delivery.

#### 6-3 SHORTAGE OF MATERIALS

Articles or materials to be incorporated in the work shall be stored in such a manner as to ensure the preservation of their quality and fitness for the work, and to facilitate inspection.

## 6-4 DEFECTIVE MATERIALS

All materials which the City Engineer has determined do not conform to the requirements of the Plans and Specifications will be rejected whether in place or not. They shall be removed immediately from the site of the work, unless otherwise permitted by the City Engineer. No rejected materials, the defects of which have been subsequently corrected, shall be used in the work, unless approval in writing has been given by the City Engineer. Upon failure of the Contractor to comply promptly with any order of the City Engineer made under the provisions in this Section 6-4, the City Engineer shall have authority to cause the removal and replacement of rejected material and to deduct the cost thereof from any money due or to become due the Contractor.

## 6-5 TRADE NAMES AND ALTERNATIVES

For convenience in designation on the Plans or in the Specifications, certain articles or materials to be incorporated in the work are designated under a trade name or the name of a manufacturer and its catalogue information. The use of an alternative article or material which is of equal quality and of the required characteristics for the purpose intended will be permitted, subject to the following requirements:

The burden of proof as to the quality and suitability of alternatives shall be upon the Contractor who shall furnish all information necessary as required by the City Engineer. The City Engineer shall be the sole judge as to the quality and suitability of alternative articles or materials and shall make all final decisions. Whenever the Specifications permit the substitution of a similar or equivalent material or article, no tests or action relating to the approval of such substitute material will be made until the request for substitution is made in writing by the Contractor. Such written request shall be accompanied by complete data as to the equality of the material or article proposed. Such request shall be made in ample time to permit approval without delaying the work.

## 6-6 PLANT INSPECTION

The City Engineer may inspect the production of material, or the manufacture of products at the source of supply. Plant inspection, however, will not be undertaken until the City Engineer is assured of the cooperation and assistance of both the Contractor and the material producer. The City Engineer or an authorized representative shall have free entry at all times to such parts of the plant as

concern the manufacture or production of the materials. Adequate facilities shall be furnished free of charge to make the necessary inspection. The City assumes no obligation to inspect materials at the source of supply.

## 6-7 CERTIFICATES OF COMPLIANCE

A Certificate of Compliance shall be furnished prior to the use of any materials for which these Specifications or the Special Provisions require that such a certificate be furnished. In addition, when so authorized in these Specifications or in the Special Provisions, the City Engineer may permit the use of certain materials or assemblies prior to sampling and testing if accompanied by a Certificate of Compliance. The certificate shall be signed by the manufacturer of the material or the manufacturer of assembled materials and shall state that the materials involved comply in all respects with the requirements of the Specifications. A Certificate of Compliance shall be furnished with each lot of material delivered to the work and the lot so certified shall be clearly identified in the certificate.

All materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of responsibility for incorporating material in the work which conforms to the requirements 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 City reserves the right to refuse to permit the use of material on the basis of a Certificate of Compliance.

The form of the Certificate of Compliance and its disposition shall be as directed by the City Engineer.

#### 6-8 TESTING

Unless otherwise specified, all tests shall be performed in accordance with the methods used by the California Department of Transportation and shall be made by the City Engineer or a designated representative.

The Department has developed methods for testing the quality of materials and work. These methods are identified by number and are referred to in the Specifications as California Test. Copies of individual California Tests are available at the Transportation Laboratory, Sacramento, California, and will be furnished to interested persons upon request.

Whenever a reference is made in the Specifications to a California Test by number, it shall mean the California Test in effect on the day the Notice to Contractors for the work is dated.

Whenever the Specifications provide an option between two or more tests, the City Engineer will determine the test to be used.

Whenever a reference is made in the Specifications to a specification, manual, or test designation either of the American Society for Testing and Materials , the American Association of State Highway and Transportation Officials, 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 to Contractors for the work is dated. Whenever said specification, manual or test designation provides for test reports (such as certified mill test reports) from the manufacturer, copies of such reports, identified as to the lot of material, shall be furnished to the City Engineer. The manufacturer's test reports shall supplement the inspection, sampling and testing provisions in Section 6, "Control of Materials," and shall not constitute a waiver of the City's right to inspect. When material which cannot be identified with specific test reports is proposed for use, the City Engineer may 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 and paid for by the Contractor. The number of such samples and test specimens shall be entirely at the discretion of the City Engineer.

When requested by the City 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 City Engineer, except as provided in Section 6-7, "Certificates of Compliance."

The City will pay for all initial testing. In the event of failing tests, the Contractor shall pay the cost of subsequent retesting as necessary and as determined by the City Engineer.

## 6-9 CONSTRUCTION WATER

When a new water system in any subdivision or other improvement project has been connected to the existing City water system, the water usage shall be subject to City regulation in accordance with the provisions of Section 7-3. All subsequent water use by the Contractor via the new improvements will be allowed subject to issuance of an approved Permit by Public Works. This condition applies whether or not the project has been accepted by the City.

#### 6-9.1 CONSTRUCTION WATER ON CITY PROJECTS

Water is available from the nearest fire hydrant or from the nearest blow off valve with permission of the Water Division Manager. There is no charge for the quantity used, however the City Contractor must obtain and possess a permit issued by the Public Works Department (1717 Fifth Street). The Contractor must truck or pipe the water to the construction site at their expense. The Contractor shall be responsible for maintaining any temporary piping in good condition such that there is minimal water waste. A suitable gate valve shall be attached to the fire hydrant or blow off valve used as the connection point.

#### 6-10 SALVAGE

All items labeled salvage on the Plans shall remain property of the City. Exercising due care, the Contractor shall remove, disassemble if appropriate, clean of loose dirt, haul, stock pile if so directed, and deliver all such items undamaged to the City's Corporation Yard (1717 Fifth Street) unless specifically directed otherwise in the Plans and Specifications.

## SECTION 7 LEGAL RELATIONS AND RESPONSIBILITY

#### 7-1 LAWS TO BE OBSERVED

The Contractor shall keep fully informed of all existing and future state and federal laws, and county and municipal ordinances and regulations which in any manner affect those engaged or employed in the work, or the materials used in the work, or which in any way affect the conduct of the work, and with all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same.

The Contractor shall at all times observe and comply with all existing laws, ordinances, regulations, orders, and decrees of bodies or tribunals having any jurisdictional authority over the work; and shall cause all agents and employees of the Contractor to do the same. The Contractor shall indemnify and hold harmless the City of Davis, its officers, agents, and employees from any and all claims or liabilities, including, but not limited to, fines and penalties, arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or the Contractor's agents and employees. If any discrepancy or inconsistency is discovered in the Plans, Drawings, Specifications, or Contract for the work in relation to any such law, ordinance, regulation, order or decree, the Contractor shall forthwith report the same to the City Engineer in writing.

#### 7-1.1 HOURS OF LABOR

Eight hours labor constitutes a legal day's work. The Contractor shall forfeit, as a penalty to the City of Davis, \$25 for each worker employed in the execution of the Contract by the Contractor or any subcontractor for each calendar day during which such worker is required or permitted to work more than 8 hours in any one calendar day or more than 40 hours in any one calendar week in violation of the provisions of the Labor Code, and in particular, Section 1810 to Section 1815, thereof, inclusive. Work performed by employees of the Contractor 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 1-1/2 times the basic rate of pay, as provided in said Section 1815.

## 7-1.2 PREVAILING WAGE

The Contractor shall comply with Labor Code Sections 1774 and 1775. In accordance with said Section 1775, the Contractor shall forfeit as penalty to the City of Davis, \$50 for each calendar day or portion thereof, for each worker paid less than the prevailing rates. The prevailing rates are determined by the Director of Industrial Relations for such work or craft in which such worker is employed for any work done under the Contract in violation of the provisions of the Labor Code and in particular, Labor Code Sections 1770 to 1780, inclusive. In addition to said penalty and pursuant to said Section 1775, the difference between such prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing wage rate shall be paid to each worker by the Contractor.

Pursuant to the provisions of Section 1773 of the Labor Code of the State of California, the City has obtained the general prevailing rate of wages (which rate includes employer payments for health and welfare, pension, vacation, travel time. and subsistence pay as provided for in Section 1773.1 of said Code, apprenticeship or other training programs authorized by Section 3093 of said Code, and similar purposes) applicable to the work to be done, for straight time, overtime, Saturday, Sunday and holiday work. The holiday wage rate listed shall he applicable to all holidays recognized in the collective bargaining agreement of the particular craft, classification or type of worker concerned. These wage rates are set forth in the Department of Transportation publication entitled General Prevailing Wage Rates, which is a part of the Contract.

Pursuant to Section 1773.2 of the Labor Code, general prevailing wage rates set forth in the Department of Transportation publication entitled General Prevailing Wage Rates, which is a part of the Contract, shall be posted by the Contractor at a prominent place at the site of the work. The wage rates at the time of the bid advertisement date of this project will remain in effect for the life of this project.

The City will not recognize any claim for additional compensation because of the payment by the Contractor of any wage rate in excess of the prevailing wage rate set forth in the Contract. The possibility of wage increases is one of the elements to be considered by the Contractor in determining a bid, and will not under any circumstances be considered as the basis of a claim against the City on the Contract.

#### 7-1.3 PAYROLL RECORDS

The Contractor's attention is directed to the provisions of Labor Code Sections 1776 and 1812. The Contractor shall be responsible for compliance by subcontractors.

A copy of all payrolls shall be submitted weekly to the City Engineer, upon request. Payrolls shall contain each employee's full name, address, social security number, correct classification, rate of pay, daily and weekly number of hours worked, itemized deductions and actual wages paid. They shall also indicate apprentices and ratio of apprentices to journeymen. The employee's address and social security number need only appear on the first payroll on which the employee's name appears. The payroll shall be accompanied by a "Statement of Compliance" signed by the employer or designated agent indicating that the payrolls are correct and complete and that the wage rates contained therein are not less than those required by the Contract. The "Statement of Compliance" shall be on standard forms furnished by the Contractor. The Contractor shall be responsible for the submission of copies of payrolls of all subcontractors.

The penalties specified in Section 1813 of the Labor Code for noncompliance with the provisions of Section 1811 may be deducted from any money due or which may become due to the Contractor.

The Contractor shall forfeit to the City of Davis \$25 per day, per worker, where such worker is required or permitted to work eight hours in anyone calendar day and/or 40 hours in any one calendar week in violation of the provisions of California Labor Code Section 1810, et seq.

The Contractor and each subcontractor shall preserve their payroll records for a period of 3 years from the date of completion of the Contract.

## 7-1.4 LABOR NONDISCRIMINATION

Attention is directed to Section 1735 of the Labor Code, which reads as follows:

"A contractor shall not discriminate in the employment of persons upon public works on any basis listed in subdivision (a) of Section 12940 of the Government Code, as those bases are defined in Sections 12926 and 12926.1 of the Government Code, except as otherwise provided in Section 12940 of the Government Code. Every contractor for public works who violates this section is subject to all the penalties imposed for a violation of this chapter."

Attention is also directed to the requirements of the California Fair Employment and Housing Act (Government Code Sections 12900 et. seq.), to the regulations promulgated by the Fair Employment and Housing Commission to implement said Act, and to the nondiscrimination, affirmative action and equal employment opportunity requirements in the Special Provisions.

#### 7-1.5 CITY OF DAVIS FAIR EMPLOYMENT PRACTICES

## 7-1.5.1 REQUIREMENT

In the performance of this Contract, the Contractor will not discriminate against any employee or applicant for employment because or race, creed, color, national origin. ancestry, sex, age, religion, sexual preference, material status, physical handicap, or medical condition; the Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated equally during employment, without regard to their race, creed, color, national origin, ancestry, sex, age, religion, sexual preference, marital status, physical handicap, or medical condition. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection of training, including apprenticeship. The Contractor shall post in conspicuous places, available to employees and applicants for employment, notices to be provided by the City of Davis setting forth the provisions of this Fair Employment Practices section.

### 7-1.5.2 ACCESS TO RECORDS

The Contractor will permit access to records of employment, employment advertisements, application forms, and other pertinent data and records by the City of Davis Human Relations Commission, or any other agency of the State of California designated by the awarding authority, for the purpose of investigation to ascertain compliance with the Fair Employment Practices section of this Contract.

#### 7-1.5.3 REMEDIES FOR VIOLATION

Remedies for willful violation are as follows:

A. The City of Davis may determine a willful violation of the Fair Employment Practices provision to have occurred upon receipt of a final judgment having that effect from a court in an action to which Contractor was a party, or upon receipt of a written notice from the Davis Human Relations Commission, that it has investigated and determined that the Contractor has violated the Fair Employment Practices Act and has issued an order, under Government Code Section 12970, which has become final, or obtained an order for relief under Government Code Section 12974.

B. For willful violation of this Fair Employment Practices provision, the City of Davis shall have the right to terminate this Contract either in whole, or in pan, and any loss or damage sustained by the City of Davis in securing the goods, or services hereunder shall be borne and paid for by the Contractor and by the surety under the Performance Bond, if any, and the City of Davis may deduct from any money due, or that thereafter may come due to the Contractor, the difference between the price named in the Contract and the actual cost thereof to the City of Davis.

## 7-1.6 EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS

The City of Davis is an equal opportunity employer. It is the policy of the City that minority business enterprise (MBE) and women business enterprise (WBE) shall have the maximum opportunity to participate in the performance of construction contracts. If specific MBE/WBE goals are not stated in the Special Provisions, the Contractor is still expected to ensure that MBE/WBEs have the maximum opportunity to participate in the performance of the contract. Therefore the Contractor shall take all necessary and reasonable steps to ensure participation of MBE/WBEs. The Contractor shall not discriminate on the basis of race, color, national origin, sex, or sexual orientation. Failure to carry out these requirements shall constitute a breach of contract and may result in the termination of the contract.

#### 7-1.7 APPRENTICES

Attention is directed to Sections 1777.5, 1777.6 and 1777.7 of the California Labor Code and Title 8, California Code of Regulations, Section 200 et seq. To ensure compliance and complete understanding of the law regarding apprentices, and specifically the required ratio thereunder, each Contractor or subcontractor shall, where some question exists, contact the Division of Apprenticeship Standards, 455 Golden Gate Avenue, San Francisco, California, or one of its branch offices prior to commencement of work on the public works Contract. Responsibility for compliance with this Section lies with the Prime Contractor. It is State policy to encourage the employment and training of apprentices on public works contracts as may be permitted under local apprenticeship standards.

## 7-1.8 WORKERS' COMPENSATION

Pursuant to the requirements of Section 1860 of the Labor Code, the Contractor will be required to secure the payment of workers' compensation to his employees in accordance with the provisions of Section 3700 of the Labor Code. Prior to the commencement of work, the Contractor shall sign and file with the City Engineer a certification in the following form:

"I am aware of the provisions of Section 3700 of the Labor Code which requires every employer to be insured against liability for worker's compensation or to undertake self-insurance in accordance with the provisions of said Code and I will comply with such provisions before commencing the performance of the work of this Contract."

Said certification is included in the Contract, and signature and return of the Contract as provided in Section 3-3, "Execution of Contract," shall constitute signing and filing of the said certificate.

The Contractor shall post, and cause all subcontractors to post, in a conspicuous place on the project site, a statement as required by Labor Code Section 3550, stating the name of the Workers' Compensation insurance carrier or that the employer is self-insured, and who is responsible for claims adjustment. The notice shall also include advice as to the injured employee's right to receive medical care, to select or change the treating physician pursuant to the provisions of Labor Code Section 4600, and the right to receive temporary disability indemnity, permanent disability indemnity, vocational rehabilitation services, and death benefits, as appropriate.

The Contractor and all subcontractors shall also give every new employee, either at the time the employee is hired or by the end of the first pay period, written notice of the information contained in Labor Code Section 3550.

## 7-1.9 CONTRACTOR'S LICENSING LAWS

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

#### 7-1.10 TRENCH SAFETY

The Contractor shall comply with all applicable laws, ordinances and regulations relating to trench safety. The Contractor shall at all times maintain suitable barricades, warning devices, trench shoring, bracing, and covers and other protective measures as deemed appropriate by the City Engineer, which measures shall provide only the highest suitable level of protection to all workers, inspectors and the general public. Attention is directed to the provisions of Section 7-6, "Public Convenience," Section 7-7, Public Safety," and Section 7-9, "Preservation of Property." Attention is directed to the provisions of Section 6705 of the Labor Code concerning trench excavation safety plans and to Section 5-2.1, "Trench Excavation Safety Plans."

## 7-1.11 SOUND CONTROL REQUIREMENTS

The Contractor shall comply with all local sound control and noise level rules, regulations and ordinances which apply to any work performed pursuant to the Contract.

Each internal combustion engine, used for any purpose on the job or related to the job, shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without said muffler.

## 7-2 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, State Sales Tax and Federal Excise Tax.

## 7-3 PERMITS AND LICENSES

The Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work.

The Prime Contractor shall obtain a City of Davis Business License. The dollar amount claimed for "gross receipts" shall be the dollar amount awarded to the Contractor.

An Encroachment Permit, issued by the Department of Public Works, is required for the use of City-supplied water, including water drawn from construction areas or subdivisions under construction. All use of City-supplied water shall be regulated by the City Engineer. The Permittee shall abide by the Water Use Permit requirements in effect at the time of issuance. The use of City water may be revoked by the City Engineer at any time, without prior notice.

In the event that the City has obtained permits, licenses or other authorizations, applicable to the work, the Contractor shall comply with the provisions of said permits, licenses and other authorizations.

#### 7-4 PATENTS

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

## 7-5 SAFETY AND HEALTH PROVISIONS

The Contractor shall conform to all applicable occupational safety and health standards, rules, regulations and orders established by the State of California. Local emergency phone numbers (police, fire, ambulance, hospital) shall be posted on the job site in a conspicuous location.

## 7-5.1 **JOBSITE TOILET FACILITIES**

Fixed or portable chemical toilets shall be provided for the use of the employees. Toilets at the site shall conform to the OSHA Safety and Health Standards for Construction.

## 7.6 PUBLIC CONVENIENCE

This Section 7-6 defines the Contractor's responsibility with regard to convenience of the public and public traffic in connection with construction operations.

Attention is directed to Section 7-7, "Public Safety" for provisions relating to the Contractor's responsibility for the safety of the public. The requirements in said Section 7-7 are in addition to the requirements of this Section 7-6 and the Contractor will not be relieved of any responsibilities as set forth in said Section 7-7 by reason of conformance with any of the provisions in this Section 7-6.

In the event of a suspension of the work, attention is directed to Section 8-5, "Temporary Suspension of Work."

The Contractor shall conduct operations so as to offer the least possible obstruction and inconvenience to the public. The Contractor 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 Special Provisions, all public traffic shall be permitted to pass through the work with as little inconvenience and delay as possible. Where possible, such traffic shall be routed on new or existing paved surfaces.

Spillage resulting from hauling operations along or across any public traveled way shall be removed immediately by the Contractor at the Contractor's expense.

Existing traffic signal and street lighting systems shall be kept in operation for the benefit of the traveling public during progress of the work. Other forces will continue routine maintenance of existing systems.

Construction operations shall be conducted in such a manner so as to cause as little inconvenience as possible to abutting property owners. Convenient access to driveways, houses, and buildings along the line of work shall be maintained. When the abutting property owner's access across the right-orway 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.

The Contractor is responsible for providing 24-hour per day dust control. Dust control measures shall be applied as necessary, or as directed by the City Engineer to prevent the transport off-site of any dust or other airborne nuisance.

Additional water or dust palliative shall be applied if ordered by the City Engineer for the alleviation or prevention of dust nuisance. No separate payment will be made for any work performed or material used to control dust resulting from the Contractor's performance of the work, or caused by public traffic: either inside or outside the right-of-way. Full compensation for such dust control will be considered as included in the prices paid for the various items of work involved.

In order to expedite the passage of public traffic through or around the work and where ordered by the City Engineer, the Contractor shall install and maintain in good condition, signs, lights, flares,

temporary railing (Type K), barricades, and other facilities for the sole convenience and direction of public traffic. Also, where directed by the City Engineer, the Contractor shall furnish competent flaggers whose sole duties shall consist of directing the movement of public traffic through or around the work.

Should the Contractor fail to install or maintain traffic control devices required by the City Engineer or the Special Provisions, the City Engineer may cause such installation or maintenance by other forces and shall deduct the cost thereof from money due or to become due the Contractor under the Contract.

Whenever a section of surfacing or pavement has been completed, the Contractor shall open it to use by public traffic if the City Engineer so orders or may open it to use by public traffic if the City Engineer so consents. In either case, the Contractor will not be allowed any compensation due to any delay, hindrance, or inconvenience to operations caused by such public traffic, but will thereupon be relieved of responsibility for damage to the work caused by public traffic, within the limits of such use. The Contractor will not be relieved of cleanup and finishing operations, or of any other responsibility under the Contract.

Except as otherwise provided in this Section 7-6 or in the Special Provisions, full compensation for conforming to the requirements in this Section 7-6 and in the Special Provisions shall be considered as included in the prices paid for the various Contract items of work and no additional compensation will be allowed therefor.

## 7-7 PUBLIC SAFETY

It is the Contractor's responsibility to provide for the safety of traffic and the public during construction.

Attention is directed to Section 7-10, "Responsibility for Damage." Attention is also directed to Section 7-6, "Public Convenience," for provisions relating to the Contractor's responsibility for providing for the convenience of the public in connection with operations required to complete work under the Contract.

Whenever the Contractor's operations create a condition hazardous to traffic or to the public, the Contractor shall furnish, erect and maintain such fences, temporary railing (Type K), barricades, lights, signs and other devices and take such other protective measures as are necessary to prevent accidents or damage or injury to the public. 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. All such measures shall be performed at the Contractor's sole expense and without cost to the City.

Signs, lights, flags, and other warning and safety devices and their use shall conform to the requirements set forth in the current "California Manual on Uniform Traffic Control Devices," published by the California Department of Transportation.

No material or equipment shall be stored where it will interfere with the free and safe passage of public traffic. 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 for use by public traffic.

Should the Contractor appear to be neglectful or negligent in furnishing warning devices and taking protective measures as above provided, the City 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 City Engineer point out the inadequacy of warning devices and protective measures, such action on the part of the City Engineer shall not relieve the Contractor from responsibility for public safety or abrogate obligation to furnish and pay for these devices and measures.

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

## 7-8 USE OF EXPLOSIVES

The use of explosives is not allowed, unless otherwise provided in the Special Provisions.

## 7-9 PRESERVATION OF PROPERTY

Attention is directed to Section 7-10, "Responsibility for Damage." Due care shall be exercised to avoid injury to existing highway improvements or facilities, utility facilities, adjacent property, and roadside trees, shrubs, and other plants that are not to be removed.

Trees, shrubs, and other plants that are not to be removed, and pole lines, fences, signs, markers and monuments, buildings and structures, conduits, pipelines under or above ground, sewer and water lines, all street facilities, and any other improvements or facilities within or adjacent to the work shall be protected from injury or damage. If ordered by the City Engineer, the Contractor shall provide and install suitable safeguards, approved by the City Engineer, to protect such objects from injury or damage. If such objects are injured or damaged by reason of the Contractor's operations, they shall be replaced or restored at the Contractor's expense. The facilities 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 accompanying the Contract, if any such objects are a part of the work being performed under the Contract. The City Engineer may make or cause to be made such temporary repairs as are necessary to restore to service any damaged highway facility. The cost of such repairs shall be borne by the Contractor and may be deducted from any money due or to become due to the Contractor under the Contract.

Attention is directed to the possible existence of underground main or trunk line facilities not indicated on the plans or in the special Provisions 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 Special Provisions. The Contractor shall ascertain the exact location of underground main or trunk lines whose presence is indicated on the plans or in the Special Provisions, and the location of their service laterals or other appurtenances, and of existing service laterals or appurtenances of any other underground facilities which can be inferred from the presence of visible facilities such as buildings,

meters and junction boxes. This determination shall be made prior to doing work that may damage any of such facilities or interfere with their service.

The Contractor shall immediately notify the City Engineer of any delays to operations which are a direct result of underground main or trunk line facilities which were not indicated on the plans or in the Special Provisions or were located in a position substantially different from that indicated on the plans or in the Special Provisions. Such delays will be considered right-of-way delays within the meaning of Section 8-9, "Right-Of-Way Delays," and compensation for such delay will be determined in accordance with said Section 8-9. The Contractor shall be entitled to no other compensation for any such delay.

Except as provided above, full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in protecting or repairing property as specified in this Section 7-9, shall be considered as included in the prices paid for the various Contract items of work and no additional compensation will be allowed therefor.

## 7-10 RESPONSIBILITY FOR DAMAGE

The Contractor shall defend, indemnify and save harmless the City and all its officers, agents, and employees from any and all claims, demands, damages, costs, expenses or liability occasioned by the performance or attempted performance of the provisions hereof or in any way arising out of the Contract, including, but not limited to, inverse condemnation, equitable relief, or any wrongful act, or any negligent act or omission to act on the part of the Contractor or any of its agents, employees, independent contractors, or subcontractors; provided, further, that the foregoing shall apply to any wrongful acts, or any actively or passively negligent acts or omissions to act, committed jointly or concurrently by the Contractor, the Contractor's agents, employees or independent contractors or subcontractors, and the City, its agents, employees, or independent contractors.

Such indemnity obligation expressly extends to and includes any and all claims, demands, damages, costs, expenses or liability occasioned as a result of damages to adjacent property caused by the conduct of the work.

Such indemnity obligation expressly extends to and includes any and all claims, demands, damages, costs, expenses or liability occasioned as a result of the violation by the Contractor, the Contractor's agents, employees, or independent contractors or subcontractors, of any provisions of federal or state law, including, but not limited to, fines or penalties.

Such indemnity obligation also expressly extends to and includes any claims, demands, damages, costs, expenses or liability occasioned by injury to or death of any person, or any property damage to property owned by any person while on or about the premises of the work or as a result of the work, whether such persons are on or about the premises by right or not, whenever the work is alleged to have been a contributing cause in any degree whatsoever.

Nothing contained in the foregoing indemnity provisions shall be construed to require the Contractor to indemnify the City in contravention of Section 2782 of the Civil Code.

## 7-11 INSURANCE REQUIREMENTS

The Contractor shall obtain, at the Contractor's sole cost and expense, all insurance required herein. Certificate of Insurance and Endorsements shall be delivered to the City prior to execution of the Contract and before any work commences.

Certificate of Insurance and Endorsements shall be submitted on the forms supplied by the City of Davis per Section 7-11.6. <u>A Waiver of Subrogation is required on all City projects for the Contractor's Worker's Compensation Insurance.</u>

The Contractor shall maintain in full force and effect for the duration of this Contract, liability insurance on all of its operations with an insurance carrier satisfactory to the City, insuring without limitation, against claims arising from bodily and personal injury, including death resulting from any act or occurrence arising out of the performance of this Contract, including acts involving vehicles.

The City reserves the right to require complete, certified copies of all required insurance policies, at any time.

#### 7-11.1 MINIMUM SCOPE OF INSURANCE

The coverage shall at least be as broad as:

- A. Insurance Services Office form Number GL 0002 (Ed. 1173) covering Comprehensive General Liability and Insurance Services Office form GL 0404 covering Broad Form Comprehensive General Liability; or Insurance Services Office Commercial General Liability coverage ("occurrence" form CG 00(1).
- B. Insurance Services Office form Number CA 0001 (Ed. 1187) covering Automobile Liability, Code 1 "any auto."
- C. Workers' Compensation insurance as required by the Labor Code of the State of California and Employers Liability insurance.

## 7-11.2 MINIMUM LIMITS OF INSURANCE

The Contractor shall maintain limits no less than:

- A. Comprehensive General Liability: \$1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage.
- B. Automobile Liability: \$1,000,000 combined single limit per accident for bodily injury and property damage.
- C. Workers' Compensation and Employers Liability: Workers' compensation limits as required by the Labor Code of the State of California and Employers Liability limits of \$1,000,000 per accident.

## 7-11.3 DEDUCTIBLES AND SELF-INSURED RETENTIONS

Any deductibles or self-insured retentions must be declared to and approved by the City. At the option of the City either: the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the City, its officials and employees; or the Contractor shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

#### 7-11.4 OTHER INSURANCE PROVISIONS

The policies are to contain, or be endorsed to contain, the following provisions:

# 7-11.4.1 GENERAL LIABILITY AND AUTOMOBILE LIABILITY COVERAGE

The City, its officers, officials, employees and volunteers are to be covered as insureds as respects: liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor; premises owned, leased or used by the Contractor; or automobiles owned, leased, hired or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the City, its officers, officials, employees or volunteers.

The Contractor's insurance coverage shall be primary insurance as respects the City, its officers, official, employees and volunteers. Any insurance or self-insurance maintained by the City, its officials, employees or volunteers shall be excess of the Contractor's insurance and shall not contribute with it.

Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the City, its officers, officials, employees or volunteers.

The Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

# 7-11.4.2 WORKERS' COMPENSATION AND EMPLOYERS LIABILITY COVERAGE

The insurer shall agree to waive all rights of subrogation against the City, its officers, officials, employees and volunteers for losses arising from work performed by the Contractor for the City.

## 7-11.4.3 ALL COVERAGES

Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except, after 30 days prior written notice by certified mail, return receipt requested, has been given to the City.

## 7-11.5 ACCEPTABILITY OF INSURERS

Insurance is to be placed with insurers with a Bests' rating of no less than A:VII.

## 7-11.6 VERIFICATION OF COVERAGE

The Contractor shall furnish to the City certificates of insurance and original endorsements affecting coverage required by this clause. The Certificates and endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The certificates and endorsements are to be on forms provided by the City and are to be received and approved by the City before work commences.

#### 7-11.7 SUBCONTRACTORS

The 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 the requirements stated herein.

## 7-12 LEGAL ACTIONS AGAINST THE CITY

In the event litigation is brought against the City concerning the compliance of the City with State or Federal laws, rules or regulations, or other applicable rules, regulations or ordinances, the provisions of this Section shall apply.

- A. If, pursuant to court order, the City prohibits the Contractor from performing all or any portion of the work, the delay will be considered a delay within the meaning of Section 8-9, "Right-Of-Way Delays," unless the Contract is terminated as hereinafter provided.
- B. If, pursuant to court order (other than an order to show cause) the City is prohibited from requiring the Contractor to perform all or any portion of the work, the City may, if it so elects, eliminate the enjoined work pursuant to Section 4-3, "Changes," or terminate the Contract.
- C. If the final judgment in the action prohibits the City from requiring the Contractor to perform all or any portion of the work, the City will either eliminate the enjoined work pursuant to Section 4-3, "Changes," or terminate the Contract.
- D. If the Contract is to be terminated, the termination and the determination of the payable to the Contractor shall be governed by the provisions of Section 8-10, "Termination of Contract."

## 7-13 DISPOSAL OF MATERIAL

The Contractor shall make arrangements for disposal of materials, and pay all costs involved.

Prior to disposal of any materials on private property, the Contractor shall submit to the City Engineer satisfactory evidence of having entered into agreements with the property owners of the disposal site and of having obtained any permits, licenses and environmental clearances that may be required.

The Contractor shall obtain written authorization from the property owner on whose property the disposal is to be made. The Contractor shall also file with the City Engineer said authorization or a copy thereof together with a written release from the property owner absolving the City of Davis from any and all responsibility in connection with the disposal of material on said property.

Before acceptance of the Contract, the City Engineer may require the Contractor to submit written evidence that the owner of the disposal site is satisfied that the Contractor has complied with the provisions of the agreement between the owner and the Contractor.

Full compensation for all costs involved in disposing of materials as specified in this Section 7-13, including all costs of hauling, shall be considered as included in the price paid for the Contract item of work involving such materials and no additional compensation will be allowed therefor.

#### 7-14 COOPERATION

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 said limits, the Contractor shall cooperate with all such 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.

#### 7-15 RELIEF FROM MAINTENANCE AND RESPONSIBILITY

Upon the request of the Contractor, the City Engineer may relieve the Contractor of the duty of maintaining and protecting certain portions of the work which have been completed in all respects, in accordance with the requirements of the Contract, and to the satisfaction of the City Engineer, and thereafter except with consent, the Contractor will not be required to do further work thereon. In addition, such action by the City Engineer will relieve the Contractor of responsibility for injury or damage to said completed portions of the work resulting from use by public traffic or from the action of the elements or from any other cause but not from injury or damage resulting from the Contractor's own operations or negligence. However, nothing in this Section 7-15 providing for relief from maintenance and responsibility will be construed as relieving the Contractor of full responsibility for making good defective work or materials found at any time before the formal written acceptance of the entire Contract by the City.

# 7-16 CONTRACTOR'S RESPONSIBILITY FOR THE WORK MATERIALS

Until the acceptance of the Contract, the Contractor shall have the charge and care of the work and of the materials to be used therein (including materials for which partial payment has been made, or materials which have been furnished by the City), and shall bear the risk of injury, loss or damage to any part thereof by the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work, except as provided in Sections 7-6, "Public Convenience," and 7-15, "Relief from Maintenance and Responsibility."

The Contractor shall rebuild, repair, restore, and make good all injuries, losses, or damages to any portion of the work or the materials occasioned by any cause before its completion and acceptance and shall bear the expense thereof. Where necessary to protect the work or materials from damage, the Contractor shall provide suitable drainage of any roadway and erect such temporary structures as are necessary to protect the work or materials from damage at no expense to the City. The suspension of the work from any cause whatever shall not relieve the Contractor of responsibility for the work and materials as herein specified.

## 7-17 ACCEPTANCE OF CONTRACT

When the City Engineer has made the final inspection as provided in Section 5-12, "Final Inspection," and determines that the Contract work has been completed in all respects in accordance with the Plans and Specifications, the City Engineer will recommend that the City formally accept the Contract. Immediately upon and after such acceptance by the City, the Contractor will be relieved of the duty of maintaining and protecting the work as a whole, and will not be required to perform any further work thereon. The Contractor shall also be relieved of responsibility for injury to persons or property or damage to the work which occurs after the formal acceptance by the City. Attention is also directed to provisions of Section 9-8, "Payment after Acceptance."

## 7-18 PROPERTY RIGHTS IN 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 soil. All such material shall become the property of the City of Davis.

## 7-19 PERSONAL LIABILITY

Neither the City Council, the City Engineer, nor any other officer or authorized employee of the City of Davis shall be personally responsible for any liability arising under or by virtue of the Contract.

# SECTION 8 PROSECUTION AND PROGRESS

## 8-1 SUBCONTRACTING

The Contractor shall give personal attention to the fulfillment of the Contract and shall control the work.

No subcontractor will be recognized as such, and all persons engaged in the work of construction will be considered as employees of the Contractor. The Contractor will be held responsible for the subcontractor's work, which work shall be subject to the provisions of the Contract and Specifications.

The Contractor's own organization shall perform Contract work amounting to not less than 50 percent of the original total Contract price, except that any designated "Specialty Items" may be performed by subcontract. The amount of any such "Specialty Items" so performed may be deducted from the original total Contract price before computing the amount of work required to be performed by the Contractor's own organization. When items of work in the Engineer's Estimate are preceded by the letter (S), said items are designated "Specialty Items." Where an entire item is subcontracted, the value of work subcontracted will be based on the Contract item bid price. When a portion of any 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 City Engineer.

Before work is started on a subcontract, the Contractor shall file with the City 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 so subcontracted.

When a portion of the work which has been subcontracted by the Contractor is not being prosecuted in a manner satisfactory to the City, the subcontractor shall be removed immediately, when required by the City Engineer, and shall not again be employed on the work.

#### 8-1.1 SUBCONTRACT DOCUMENTS

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

### 8-2 ASSIGNMENT

The performance of the Contract may not be assigned, except upon the written consent of the City Council. Consent will not be given to any proposed assignment which would relieve the original

Contractor or surety of their responsibilities under the Contract nor will the City Council consent to any assignment of a part of the work under the Contract.

The Contractor may assign money due or to become due under the Contract and such assignment will be recognized by the City, if given proper notice thereof, to the extent permitted by law, but any assignment of money shall be subject to all proper set-offs in favor of the City and to all deductions provided for in the Contract. All money withheld, whether assigned or not, shall be subject to being used by the City for the completion of the work in the event that the Contractor should be in default therein.

### 8-3 BEGINNING OF WORK

After the Contract has been executed, the City will issue to the Contractor a written notice stating the first working day of the Contract. The Contractor shall diligently prosecute the Contract to completion within the specified time limit.

Time is of the essence in this Contract.

Should the Contractor begin work in advance of receiving notice that the Contract has been approved as above provided, any work performed in advance of the said date of approval shall be considered as having been done at the Contractor's own risk and as a volunteer unless said Contract is so approved.

The delivery of the Contract to the City, for execution and approval, properly executed on behalf of the Contractor and surety shall constitute the Contractor's authority to enter upon the site of the work and to begin operations, subject to assuming the risk of the disapproval of the Contract, as above provided, and subject also to the following:

- A. Notice in writing of the Contractor's intention to start work prior to approval, specifying the intended start date, shall be given to the City at least 24 hours in advance;
- B. The Contractor shall, on commencing operations, take all precautions required for public safety and shall observe all provisions of the Contract; and
- C. All work performed according to the Contract prior to its approval under the authorization hereof, will, when the Contract is approved, be considered authorized work and will be paid for as provided in the Contract.

## 8-3.1 PRE-CONSTRUCTION CONFERENCE

A pre-construction conference will be held at the office of the City Engineer (Davis Public Works Department, 1717 Fifth Street) for the purpose of discussing with the Contractor, the scope of work, Plans, Specifications, existing conditions, submittals, materials, construction equipment, and other essential matters relating to the satisfactory completion of the work. This conference will be held prior to the issuance of the Notice to Proceed on City projects or prior to commencing work on private development projects. The Contractor's representative(s) shall include the project onsite superintendent, other primary superintendents and may also include major sub-contractors.

#### 8-4 PROGRESS SCHEDULE

On all City projects, a progress schedule shall be prepared and submitted prior to the Pre-Construction Meeting. An amount up to 10% of the first progress billing, or up to \$5,000, whichever is greater, shall be deducted from the first progress payment in the event that the Progress Schedule has not been submitted or a Business License has not been obtained prior to the date of the first billing for work completed by the Contractor. This deduction will be in addition to the normal 10% retention.

When requested by the City Engineer, the Contractor shall submit a practicable progress schedule within ten working days of the City Engineer's written request.

The Contractor may choose a form upon which to furnish the schedule. The schedule shall show the order in which the Contractor proposes to carry out the work, the dates on which the various salient features of the work will be started (including procurement of materials, plant, and equipment), the contemplated dates for completing the said salient features, the critical path (controlling items of work) and any float time for the work items. The progress schedules submitted shall be consistent in all respects with the time and order of work requirements of the Contract.

#### 8-5 TEMPORARY SUSPENSION OF WORK

The City Engineer shall have the authority to suspend the work wholly or in part, for such period as deemed necessary, due to unsuitable weather, or to such other conditions as are considered unfavorable for the suitable prosecution of the work, or for such time as deemed necessary due to the failure on the part of the Contractor to carry out orders given, or to perform any provision of the Contract. The Contractor shall immediately comply with the written order of the City Engineer to suspend the work wholly or in part. The suspended work shall be resumed when conditions are favorable and methods are corrected, as ordered or approved in writing by the City Engineer.

In the event that a suspension of work is ordered as provided above, and should such suspension be ordered because the Contractor failed to carry out orders or to perform any provision of the contract; or because weather conditions are unsuitable for performing any item or items of work which the City Engineer judges could have been performed prior to such unsuitable weather had the Contractor diligently prosecuted the work when weather was suitable; the Contractor, at the Contractor's expense, shall do all the work necessary to provide a safe, smooth, and unobstructed passageway through the Construction area for use by public traffic during the period of such suspension, as provided in Sections 7-6, "Public Convenience," and 7-7, "Public Safety," and as specified in the Special Provisions for the work. In the event that the Contractor fails to perform the work above specified, the City will perform such work and the cost thereof will be deducted from money due or to become due the Contractor.

In the event of a suspension of work under any of the conditions set forth in this Section 8-5, such suspension of work shall not relieve the Contractor of responsibilities specified in Section 7, "Legal Relations and Responsibility."

### 8-6 TIME OF COMPLETION

The Contractor shall complete all or any designed portion of the work called for under the Contract in all parts and requirements within the time set forth in the Special Provisions.

A working day is defined as any day, except as follows:

- A. Saturdays, Sundays and legal holidays;
- B. 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 City Engineer, from proceeding with at least 75 percent of the normal labor and equipment force engaged on such operation or operations for at least 60 percent of the total daily time being currently spent on the controlling operation or operations;
- C. Days on which the Contractor is prevented, by reason of requirements in the Special Provisions, from working on the controlling operation or operations for at least 60 percent of the total daily time being currently spent on such controlling operation or operations.

If any portion of a day is legal holiday, the entire day will be considered as a non-working day within the meaning of this Section 8-6. The City of Davis uses the CALTRANS Work Day Calendar, a copy of which may be obtained at the Public Works Office.

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 said day, and the major portion of the day could be considered to be suitable for such construction operations.

The current controlling operation or operations are to be construed to include any feature of the work considered at the time by the City Engineer and the Contractor, which, if delayed, will delay the time of completion of the Contract.

Determination that a day is a non-working day by reason of inclement weather or conditions resulting immediately therefrom shall be made and agreed upon during such day by conference between the City Engineer and the Contractor. In the event of failure to agree, the Contractor will be allowed 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 City Engineer; otherwise the decision of the City Engineer shall be deemed to have been accepted by the Contractor as correct. The City 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 accordance with the provisions in Section 8-5, "Temporary Suspension of Work."

## 8-7 LIQUIDATED DAMAGES

If the work required under this Contract is not finished or completed within the number of days specified in the Special Provisions, or within any period of delay authorized by the City Engineer, or pursuant to a duly authorized Contract Change Order, the Contractor acknowledges and admits that damage will be sustained by the City. It is also agreed that it is and will be impracticable and extremely difficult to ascertain and determine the actual damage which the City will sustain in the event of and by reason of such delay. It is therefore agreed by the parties of this Contract that the Contractor will pay to the City, as fixed and liquidated damages and not as penalty, the sum set forth in the Special Provisions per calendar day for each and every calendar day's delay in finishing the work in excess of the number of working days prescribed. The Contractor agrees to pay said liquidated damages herein provided for. The Contractor further agrees that the City may deduct the amount thereof from any money due or that may become due the Contractor under the Contract. Both the Contractor and the Contractor's surety shall be liable for the total amount of liquidated damages.

It is further agreed that in case the work called for under the Contract is not finished and completed in all parts and requirements within the number of working days specified, the City Engineer shall have the right to increase the number of working days or not, as he may deem best to serve the interest of the City. If he decides to increase the said number of working days, he 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 he 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. The cost of final surveys and preparation of the final estimate shall not be included in such charges.

The Contractor will be granted an extension of time and will not be assessed with liquidated damages or the cost of engineering and inspection for any portion of the delay in completion of the work beyond the time named in the Special Provisions for the completion of the work caused by: acts of God or of the public enemy, fire, floods, tidal waves, earthquakes, epidemics, quarantine restrictions, strikes, labor disputes, shortage of materials and freight embargoes, provided, that the Contractor shall notify the City Engineer in writing of the causes of delay within 15 days from the beginning of any such delay. The City Engineer shall ascertain the facts and the extent of the delay, and his findings 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 City Engineer documentary proof that every effort has been made to obtain such 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 8-4, "Progress Schedule," that the inability to obtain such materials when originally planned, did in fact cause a delay in final completion of the entire work, which delay could not be compensated for by revising the sequence of the Contractor's operations. The term "shortage of materials," as used in this Section, 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 this provision as a cause for extension of time. Delays in obtaining materials due to priority in filling orders will not constitute a shortage of materials.

Except for the additional compensation provided for in Section 8-9, "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 intent 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 8-7.

Payment by the City of any progress payments, after the specified date of completion, shall not constitute a waiver by the City of its right to claim liquidated damages, in accordance with this Section.

## 8-8 TERMINATION OF CONTROL

The Contract may be canceled by the City without liability for damage when, in the opinion of the City, the Contractor is not complying in good faith, has become insolvent, or has assigned or subcontracted any part of the work without the City's consent. In the event of such cancellation, the Contractor will be paid the actual amount due based on unit prices or lump sums bid for the quantity of work completed at the time of cancellation, less damages caused to the City by acts of the Contractor causing the cancellation. The Contractor, in having tendered a bid, shall be deemed to have waived any and all claims for damages because of cancellation of the Contract for any such reason. If the City declares the Contract canceled for any of the above reasons, written notice to that effect shall be served upon the Surety. The Surety shall, within five days, assume control and perform the work as successor to the Contractor.

If the Contractor fails to begin delivery of material and equipment, to commence work within the time specified, to maintain an acceptable rate of delivery of material, to execute the work in the manner and at such locations as specified, or fails to maintain a work program which will insure the City's interest, or, if the Contractor is not carrying out the intent of the Contract, the City Engineer's written notice may be served upon the Contractor, and the Surety on its Faithful Performance Bond, demanding satisfactory compliance with the Contract.

If the Contractor or its Surety does not comply with such notice within five days after receiving it, or after starting to comply, fails to continue, the City may exclude it from the premises and take possession of all material and equipment, and complete the work, by City forces or by letting the unfinished work to another Contractor, or by a combination of such methods. In any event, the cost of completing the work shall be charged against the Contractor and its Surety, and may be deducted from any money due or becoming due from the City. If the sums under the Contract are insufficient for completion, the Contractor or Surety shall pay to the City within five days after completion, all costs in excess of the Contract price.

If the Surety assumes any part of the work, it shall take the Contractor's place in all respects for that part, and shall be paid by the City for all work performed by it in accordance with the Contract. If the

Surety assumes the entire contract, all money due the Contractor at the time of its default shall be payable to the Surety as the work progresses, subject to the terms of the Contract.

The provisions of this Section shall be in addition to all other rights and remedies available to the City under law. The City has the full right to pursue all of its legal and equitable remedies in regard to breach of this Contract.

#### 8-9 RIGHT-OF-WAY DELAYS

If, through an act of commission or omission by the City, the Contractor sustains loss which could not have been avoided by the judicious handling of forces, equipment and plant, the Contractor shall be entitled to reasonable compensation for such part of the Contractor's actual loss, which in the opinion of the City Engineer, was unavoidable.

Actual loss shall be understood to include no items of expense other than idle time of equipment and necessary payments for idle time of workers.

Compensation for idle time of equipment will be determined in the same manner as determinations are made for equipment used in the performance of extra work paid for on a force account basis, modified by application of the Delay Factor then current, as provided in the California Department of Transportation publication, "Labor Surcharge and Equipment Rental Rates," as required in Section 9-3.1.3, "Equipment Rental."

Compensation for idle time of workers will be determined as provided in Section 9-3.1.1, "Labor," and no markup will be added in either case for overhead and profit.

#### 8-10 TERMINATION OF CONTRACT

The Contract may be terminated by the Public Works Director when termination is authorized by Section 7-12, "Legal Actions Against the City," or by other provisions of the Contract which authorize termination. The City also reserves the right to terminate the Contract at any time upon a determination by the City that termination of the Contract is in the best interest of the City.

If the Public Works Director elects to terminate the Contract, the termination of the Contract and the total compensation payable to the Contract shall be governed by the following:

## 8-10.1 TERMINATION PROCEDURE

The City Engineer will issue the Contractor a written notice signed by the Public Works Director, specifying that the Contract is to be terminated. Upon receipt of said written notice, the Contractor will be relieved of further responsibility for damage to the work (excluding materials) as specified in Section 7-16, "Contractor's Responsibility for the Work and Materials," and, except as otherwise directed in writing by the City Engineer, the Contractor shall:

## 8-10.1.1 STOP WORK

Stop all work under the Contract except that specifically directed to be completed prior to acceptance.

## 8-10.1.2 PERFORM WORK AS DIRECTED.

Perform work the City Engineer deems necessary to secure the project for termination.

## 8-10.1.3 EQUIPMENT AND PLANT

Remove equipment and plant from the site of the work.

#### 8-10.1.4 PROTECT MATERIALS

Take such action as is necessary to protect materials from damage.

### 8-10.1.5 NOTIFY SUBCONTRACTORS AND SUPPLIERS

Notify all subcontractors and suppliers that the Contract is being terminated and that their contracts or orders are not to be further performed, unless otherwise authorized in writing by the City Engineer.

#### 8-10.1.6 INVENTORY LIST

Provide the City Engineer with an inventory list of all materials previously produced, purchased or ordered from suppliers for use in the work and not yet used in the work, including its storage location, and such other information as the City Engineer may request.

#### 8-10.1.7 UNUSED MATERIALS

Dispose of materials not yet used in the work as directed by the City Engineer. It shall be the Contractor's responsibility to provide the City with good title to all materials purchased by the City hereunder, including materials for which partial payment has been made as provided in Section 9-6, "Partial Payments," and to provide bills of sale or other documents of title for such materials.

#### 8-10.1.8 OUTSTANDING CLAIMS AND LIABILITIES

Subject to the prior written approval of the City Engineer, settle all outstanding liabilities and all claims arising out of subcontracts or orders for materials terminated hereunder. To the extent directed by the City Engineer, the Contractor shall assign to the City all the right, title and interest of the Contractor under subcontracts or orders for materials terminated hereunder.

#### 8-10.1.9 FURNISH DOCUMENTATION

Furnish the City Engineer with the documentation required to be furnished by the Contractor under the provisions of the Contract including: projects for which Federal funds are involved, all documentation required under the Federal requirements included in the contract.

#### 8-10.1.10 OTHER ACTIONS AS DIRECTED

Take such other actions as the City Engineer may direct.

## 8-10.2 RESPONSIBILITY FOR DAMAGE TO MATERIALS

Acceptance of the Contract as hereinafter specified shall not relieve the Contractor of responsibility for damage to materials. The Contractor shall continue to be responsible for damage to materials after issuance of the Notice of Termination, except as follows:

#### 8-10.2.1 RELIEF AFTER PARTIAL PAYMENT

The Contractor's responsibility for damage to materials for which partial payment has been made as provided in Section 9-6, "Partial Payments," and for unused materials furnished by the City for use in the work, shall terminate when the City Engineer certifies that such materials have been stored in the manner and at the desired locations as directed.

#### 8-10.2.2 RELIEF AFTER DELIVERY

The Contractor's responsibility for damage to materials purchased by the City, subsequent to the issuance of the notice that the Contract is to be terminated, shall terminate when title and delivery of such materials has been taken by the City.

## 8-10.2.3 RELIEF AFTER COMPLETION

After determining the Contractor has completed the work under the Contract, which work was directed to be completed prior to termination and such other work as may have been so ordered to secure the project for termination, the City Engineer will recommend that the City formally accept the Contract. Immediately upon and after such acceptance by the City, the Contractor will not be required to perform any further work thereon and shall be relieved of any contractual responsibilities for injury to persons or property which occurs after the formal acceptance of the project by the City.

#### 8-10.3 SURETY OBLIGATION

Termination of the Contract shall not relieve the surety of its obligation for any just claims arising out of the work performed.

### 8-10.4 TOTAL COMPENSATION

The total compensation to be paid to the Contractor shall be determined by the City Engineer on the basis of the following:

#### 8-10.4.1 REASONABLE COST

The reasonable cost to the Contractor, without profit, for all work performed under the Contract, including mobilization, demobilization and work performed to secure the project for termination. In determining the reasonable cost, deductions will be made for the cost of materials to be retained by the Contractor, amounts realized by the sale of materials, and for other appropriate credits against the cost of the work. Reasonable cost will include a reasonable allowance for project overhead and general administrative overhead not to exceed a total of seven percent of direct costs of such work.

When, in the opinion of the City Engineer, the cost of a Contract item of work is excessively high due to costs incurred to remedy or replace defective or rejected work, the reasonable cost to be allowed will be the estimated reasonable cost of performing such work, in compliance with the requirements of the Plans and Specifications. The excessive actual cost shall be disallowed.

#### 8-10.4.2 ALLOWANCE FOR PROFIT

A reasonable allowance for profit on the cost of the work performed as determined under Section 8-10.4.1, provided the Contractor establishes, to the satisfaction of the City Engineer, that it is reasonably probable that the Contractor would have made a profit, had the Contract been completed. The profit allowed shall in no event exceed four percent of cost.

## 8-10.4.3 VENDOR COSTS

The reasonable cost to the Contractor of handling material returned to the vendor, which material was delivered to the City or otherwise disposed of, as directed by the City Engineer.

## 8-10.4.4 ADMINISTRATIVE COSTS

A reasonable allowance for the Contractor's administrative costs in determining the amount payable due to termination of the Contract.

### **8-10.5 RECORDS**

All records, of the Contractor and subcontractors, necessary to determine compensation in accordance with the provisions of this Section 8-10, shall be open to inspection or audit by representatives of the City, at all times after issuance of the notice that the Contract is to be terminated. Such records shall be retained and kept open for inspection or audit for a period of three years.

#### 8-10.6 INTERIM PAYMENTS

After acceptance of the work by the City, the City Engineer may make payments on the basis of interim estimates, pending issuance of the Final Estimate, in accordance with Section 9-8.1, "Final Payment and Claims," provided that in the City Engineer's opinion, the amount thus paid, together with all amounts previously paid or allowed, will not result in total compensation in excess of that to which the Contractor will be entitled. All payments, including payment upon the Final Estimate shall be subject to deduction for prior payments and amounts, if any, to be kept or retained under the provisions of the Contract.

## 8-10.7 SUBCONTRACT REQUIREMENT

The provisions of this Section 8-10 shall be included in all subcontracts.

# 8-11 CITY'S RIGHT TO TAKE POSSESSION OF THE WORK IN WHOLE OR IN PART

It is agreed that the City of Davis has the right, at any time, to enter upon the premises of the work and perform work not covered by this Contract, either by day labor, or by direct contract with other contractors, or to occupy and use a portion of the premises prior to the date of the final acceptance of the work as a whole, without in any way relieving the Contractor of any obligations under this Contract.

Such use or occupation of the premises shall not be construed as an acceptance of any portion of the work under this Contract.

#### 8-12 COMPLETION

The effective date of completion of the Contract work is the date of acceptance of the work by the City Engineer. All guarantees, warranties, and securities securing said guarantees and warranties shall commence on said date.

# SECTION 9 MEASUREMENT AND PAYMENT

## 9-1 MEASUREMENT OF QUANTITIES

All work to be paid for at a Contract price per unit of measurement will be measured by the City Engineer in accordance with United States Standard Measures. A ton shall consist of 2,000 pounds avoirdupois.

The Contractor shall bear the expense of and make all arrangements for the measurement of materials paid for by weight.

All weighing, measuring and metering devices used to measure the quantity of materials, used in the work, shall be suitable for the purpose intended, and shall conform to the tolerances and specifications as outlined in Sections 12500 to 12517 inclusive of the Business and Professions Code, and these Specifications.

Whenever pay quantities of material are determined by weighing, the scales shall be operated by a weighmaster licensed in accordance with the provisions of Sections 12700 to 12736 inclusive of the California Business and Professions Code. Upon request by the City Engineer, the Contractor shall furnish a Public Weighmaster's Certificate, or a Private Weighmaster's Certificate, or certified daily summary weigh sheets. A representative of the City may, at the discretion of the City Engineer, be present to witness the weighing and to check and compile the daily record of such scale weights.

The operator of each vehicle weighed shall obtain a weight or load slip from the weigher and deliver said slip to the City Engineer at the point of delivery of the material.

Vehicles used to haul material being paid for by weight shall be weighed empty daily, and at such additional times as the City Engineer may direct. Each vehicle shall bear a plainly legible identification mark.

Quantities of material wasted, or disposed of, in a manner not called for under the Contract; or rejected loads of material, including material rejected after it has been placed by reason of failure of the Contractor to conform to the provisions of the Contract; or material not unloaded from the transporting vehicle; or material placed outside of the lines indicated on the plans or established by the City Engineer; or material remaining on hand after completion of the work, will not be paid for and such quantities will be deducted from the final total quantities. No compensation will be allowed for hauling and disposing of rejected material.

Full compensation for all expenses involved in conforming to the requirements specified in this Section 9-1, shall be considered as included in the unit prices paid for the materials being measured or weighed, and no additional compensation will be allowed therefor.

#### 9-2 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 and 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 acceptance by the City; and for all risks of every description connected with the prosecution of the work; and, for all 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 any obligation to make good any defective work or material.

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

## 9-3 FORCE ACCOUNT PAYMENT

When extra work is to be paid for on a force account basis, the labor, materials and equipment used in the performance of such work shall be subject to the approval of the City Engineer, and compensation being determined as follows:

### 9-3.1 WORK PERFORMED BY CONTRACTOR

The Contractor will be paid the direct costs for labor, materials and equipment used in performing the work determined as hereinafter provided in Sections 9-3.1.1, "Labor," 9-3.1.2, "Materials," and 9-3.1.3, "Equipment Rental."

To the total of the direct costs computed as provided in Sections 9-3.1.1, "Labor," 9-3.1.2, "Materials," and 9-3.1.3, "Equipment Rental," there will be added a markup of 33 percent to the cost of labor, 15 percent to the cost of materials, and 15 percent to the equipment rental. When extra work, to be paid for by force account methods, is performed by a subcontractor(s), an additional 5 percent markup will be added to the total cost of that extra work including all markups specified in this Section 9-3.1.

The above markups shall constitute full compensation for all overhead costs which shall be deemed to include all items of expense not specifically designated as cost or equipment rental in Sections 9-3.1.1, "Labor," 9-3.1.2, "Materials," and 9-3.1.3, "Equipment Rental." The total payment made as provided above shall be deemed to be the actual cost of such work and shall constitute full compensation therefor.

When extra work paid for on a force account basis is performed by forces other than the Contractor's organization, the Contractor shall reach agreement with such other forces as to the distribution of the payment made by the City for such work. No additional payment therefor will be made by the City by reason of the performance of the work by a subcontractor or other forces.

## 9-3.1.1 LABOR

The Contractor will be paid the cost of labor for the workers including foremen when authorized by the City Engineer, used in the actual and direct performance of the work. The cost of labor, whether the employer is the Contractor, subcontractor, or other forces, will be based on the following subsections 9-3.1.1.1 and 9-3.1.1.2.

#### **9-3.1.1.1 ACTUAL WAGES**

The actual wages paid shall include any employer payments to or on behalf of the workers for health and welfare, pension, vacation, and similar purposes.

#### 9-3.1.1.2 LABOR SURCHARGE

To the actual wages, as defined in Section 9-3.1.1.1, will be added a labor surcharge set forth in the California Department of Transportation publication, "Labor Surcharge and Equipment Rental Rates," which is in effect on the date upon which the work is accomplished and which is a part of the Contract. The labor surcharge shall constitute full compensation for all payments imposed by State and Federal laws and for all other payments made to, or on behalf of, the workers, other than actual wages as defined in Section 9-3.1.1.1.

## **9-3.1.2 MATERIALS**

The City reserves the right to furnish such materials as it deems advisable, and the Contractor shall have no claims for costs and markup on such materials.

Only materials furnished by the Contractor and necessarily used in the performance of the work will be paid for. The cost of such materials will be the cost to the purchaser, whether Contractor, subcontractor or other forces, from the supplier thereof, except when the following sub-sections 9-3.1.2.1 to 9-3.1.2.5, inclusive, are applicable.

#### 9-3.1.2.1 CASH OR TRADE DISCOUNT

If a cash or trade discount by the actual supplier is offered or available to the purchaser, it shall be credited to the City notwithstanding the fact that such discount may not have been taken.

### 9-3.1.2.2 INDIRECT PURCHASES

If materials are procured, by the purchaser, by any method which is not a direct purchase from and a direct billing by the actual supplier to such purchaser, the cost of such materials shall be deemed to be the price paid to the actual supplier as determined by the City Engineer, plus the actual costs, if any, incurred in the handling of such materials.

### 9-3.1.2.3 SUPPLIERS OWNED BY CONTRACTOR

If the materials are obtained from the supply or source owned wholly or in part by the purchaser, the cost of such materials, shall not exceed the price paid by the purchaser for similar materials furnished from said source on Contract items, or the current wholesale price for such materials delivered to the job site, whichever price is lower.

#### 9-3.1.2.4 COSTS AT WHOLESALE

If the cost of such materials is, in the opinion of the City Engineer, excessive, then the cost of such material shall be deemed to be the lowest current wholesale price at which such 'materials are available in the quantities concerned delivered to the job site, less any discounts as provided in the above subsection 9-3.1.2.1.

## 9-3.1.2.5 NO EVIDENCE OF COST

If the Contractor does not furnish satisfactory evidence of the cost of such materials from the actual supplier thereof, the cost shall then be determined in accordance with the above subsection 9-3.1.2.4.

## 9-3.1.3 EQUIPMENT RENTAL

The Contractor will be paid for the use of equipment at the rental rates listed for such• equipment in the edition of the California Department of Transportation publication, "Labor Surcharge and Equipment Rental Rates," which is in effect on the date upon which the work is accomplished and which is a part of the Contract, regardless of ownership and any rental or other agreement, if such may exist, for the use of such equipment entered into by the Contractor. If it is deemed necessary by the City Engineer to use equipment not listed in said publication, a suitable rental rate for such equipment will be established by the City Engineer. The Contractor may furnish any cost data which might assist the City Engineer in the establishment of such rental rate.

The rental rate paid as above provided shall include the cost of fuel, oil, lubrication, supplies, small tools, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance and all incidentals.

Operators of rented equipment will be paid for as provided in Section 9-3.1.1, "Labor."

All equipment shall, in the opinion of the City Engineer, be in good working condition and suitable for the purpose for which the equipment is to be used.

Unless otherwise specified, manufacturer's ratings and manufacturer approved modifications shall be used to classify equipment for the determination of applicable rental rates. Equipment which has no direct power unit shall be powered by a unit of at least the minimum rating recommended by the manufacturer. Individual pieces of equipment or tools not listed in said publication and having a replacement value of \$150 or less, whether or not consumed by use, shall be considered to be small tools and no payment will be made therefor.

#### 9-3.1.3.1 **RENTAL TIME**

The rental time to be paid for equipment on the work shall be the time the equipment is in operation on the extra work being performed.

The following shall be used in computing the rental time of equipment on the work:

1. When hourly rates are listed, less than 30 minutes of operation shall be considered to be 1/2 hour of operation;

2. When daily rates are listed, less than four hours of operation shall be considered to be 1/2 day of operation; and

3. Rental time will not be allowed while equipment is inoperative due to breakdowns.

# 9-3.1.3.2 TRANSPORTATION COST

For the use of equipment moved in on the work and used exclusively for extra work paid for on a force account basis, the Contractor will be paid for the cost of transporting the equipment to the location of the work and its return to its original location, all in accordance with the following provisions:

- 1. The original location of the equipment to be hauled to the location of the work shall be agreed to by the City Engineer in advance;
- 2. The City will pay the costs of loading and unloading such equipment;
- 3. The cost of transporting equipment in low bed trailers shall not exceed the hourly rates charged by established haulers;
- 4. The cost of transporting equipment shall not exceed the applicable minimum established rates of the Public Utilities Commission;
- 5. Should the Contractor desire the return of the equipment to a location other than its original location, the City will pay the cost of transportation in accordance with the above provisions, provided such payment shall not exceed the cost of moving the equipment to the work; and
- 6. Payment for transporting and loading and unloading equipment, as above provided, will not be made if the equipment is used on the work in any other way than upon extra work paid for on a force account basis.

# 9-3.2 RECORDS

The Contractor shall maintain project records in such a manner as to provide a clear distinction between the direct costs of extra work paid for on a force account basis and the costs of other operations.

From the above records, the Contractor shall furnish the City Engineer completed Daily Extra Work Reports, for each day's extra work to be paid for on a force account basis. The Daily Extra Work Reports shall itemize the materials used, and shall cover the direct cost of labor and the charges for equipment rental, whether furnished by the Contractor, subcontractor, or other forces. The Daily Extra Work Reports shall provide names or identifications and classifications of workers, the hourly rate of pay and hours worked, and the size, type and identification number of equipment, and hours operated.

Material charges shall be substantiated by valid copies of vendor's invoices. Such invoices shall be submitted with the Daily Extra Work Reports, or if not available, they shall be submitted with subsequent Daily Extra Work Reports. Should said vendor's invoices not be submitted within 60 days after the date of delivery of the material or within 15 days after completion of the Contract, whichever occurs first, the City reserves the right to establish the cost of such materials at the lowest current wholesale prices at which said materials are available, in the quantities concerned, delivered to the location of work, less any discounts provided in Section 9-3.1.1.1.

Said Daily Extra Work Reports shall be signed by the Contractor or an authorized representative.

The City Engineer will compare the City's records with the completed Daily Extra Work Reports furnished by the Contractor and make any necessary adjustments. When these Daily Extra Work Reports are agreed upon and signed by both parties, said reports shall become the basis of payment for the work performed, but shall not preclude subsequent adjustment based on a later audit by the City.

The Contractor's cost records, pertaining to work paid for on a force account basis, shall be open to inspection or audit by representatives of the City, during the life of the Contract, and for a period of not less than 3 years after the date of acceptance thereof, and the Contractor shall retain such records for that period. Where payment, for materials or labor, is based on the cost thereof to forces other than the Contractor, the Contractor shall make every reasonable effort to insure that the cost records of such other forces will be open to inspection and audit, by representatives of the City, on the same terms and conditions as the cost records of the Contractor. If an audit is to be commenced more than 60 days after the acceptance date of the Contract, the Contractor will be given a reasonable notice of the time when such audit is to be given.

#### **9-3.3 PAYMENT**

Payment as provided in Section 9-3.1, "Work Performed by Contractor," shall constitute full compensation to the Contractor, for performance of work paid for on a force account basis, and no additional compensation will be allowed therefor.

#### 9-4 NOTICE OF POTENTIAL CLAIM

The Contractor shall not be entitled to the payment of any additional compensation for any act, or failure to act, by the City Engineer, including failure or refusal to issue a Contract Change Order, or for the happening of any event, thing, occurrence, or other cause, unless, the Contractor shall have given the City Engineer due written notice of potential claim as hereinafter specified. Compliance with this Section 9-4 shall not be considered a prerequisite for matters within the scope of the protest provisions in Section 4-3, "Changes," or Section 8-6, "Time of Completion," or the notice provisions in Section 8-7, "Liquidated Damages," nor to any claim which is based on differences in measurements or errors of computation as to Contract quantities.

The written notice of potential claim shall set forth the reasons for which the Contractor believes additional compensation will or may be due, the nature of the costs involved, and, insofar as possible, the amount of the potential claim. The notice, as above required, must have been given to the City Engineer prior to the time that the Contractor shall have performed the work giving rise to the

potential claim for additional compensation, if based on an act or failure to act by the City Engineer, or in all other cases within 15 days after the happening of the event, thing, occurrence, or other cause, giving rise to the potential claim.

It is the intent of this Section 9-4 that differences between the parties arising, under and by virtue of the Contract be brought to the attention of the City Engineer, at the earliest possible time, in order that such matters may be settled, if possible, or other appropriate action promptly taken. The Contractor hereby acknowledges having no right to additional compensation for any claim that may be based on any such act, failure to act, event, thing or occurrence for which no written notice of potential claim was filed as herein required.

# 9-5 STOP NOTICES

The City, by and through the City Engineer or other appropriate City officer or officers, may at its option and at any time retain out of any amounts due the Contractor, sums sufficient to cover claims, filed pursuant to Sections 3179 to 3214 inclusive of the Civil Code.

#### 9-6 PARTIAL PAYMENTS

The City Council, once in each month, shall cause an estimate, in writing, to be made by the City Engineer. The estimate shall include the total amount of work done and acceptable materials incorporated into the work.

The City shall retain 10 percent of the estimated value of the work done and acceptable materials incorporated into the work as partial security for the fulfillment of the Contract by the Contractor.

The City Engineer shall show on the estimate the balance of the amount due the Contractor, at the time of the estimate, less all previous payments and all sums to be kept or retained under the provisions of the Contract.

The Contractor shall, upon receipt of the estimate, submit to the City Engineer, for payment, an invoice reflecting the balance shown on the estimate.

No such estimate or payment shall be required to be made when, in the judgment of the City Engineer, the work is not proceeding in accordance with the provisions of the Contract, or the total value of the work done since the last estimate amounts to less than \$300.

No such estimate or payment shall be construed to be an acceptance of any defective work or improper materials. Attention is directed to the express prohibition against payment to unlicensed contractors contained in Section 7040 of the Business and Professions Code, the provisions of which are set forth in Section 7-1.9, "Contractor's Licensing Law."

Once each month (or once each 4 weeks to coincide with City payment schedule), the Contractor shall submit an invoice for work completed indicating thereon work completed in the previous period, work completed to date, amounts billed, and retained earnings. The Invoice shall be itemized according to the items of work in the Contract. The City Engineer will review and approve this

invoice within 7 days of submittal. Any invoices returned to the Contractor for further correction will be accompanied by a written explanation.

The City of Davis will make payments for any progress payment, except retained amounts, within 30 days of approval of an Invoice. In the event that the City fails to make payment within the 30 day period, then interest will be paid on the amount owed less retention amounts. The interest rate shall be as determined in Section 685.010 of the Civil Code.

In the event that the City Engineer takes longer than 7 days to review a Contractor Invoice, then the 30 day period shall be shortened by the number of days in excess of 7 days required to review and respond or approve the payment request.

# 9-7 SUBSTITUTION OF SECURITIES FOR WITHHELD MONEY

Pursuant to Public Contract Code Section 22300, at the request and expense of the Contractor, securities equivalent to the amount withheld shall be deposited with the City, State Treasurer, or with a state or federally chartered bank in California as the escrow agent, who shall pay such moneys to the Contractor upon satisfactory completion of the contract

Alternatively, the Contractor may request, pursuant to Public Contract Code Section 22300, and the City shall make payment of retentions earned directly to the escrow agent The Contractor shall receive the interest earned on the investments upon the same terms provided for in this Section 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 City.

Securities eligible for investment under this Section shall include those listed in Government Code Section 16430 or 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 City.

The Contractor shall be the beneficial owner of any securities substituted for moneys withheld and shall receive any interest thereon.

Any escrow agreement entered into pursuant to this Section shall be substantially similar to the form provided by Public Contract Code Section 22300(f).

#### 9-8 PAYMENT AFTER ACCEPTANCE

After the work has been accepted by the City, as provided in Section 7-17, "Acceptance of Contract," payments will be made to the Contractor subject to the provisions in this Section.

#### 9-8.1 FINAL PAYMENT AND CLAIMS

After acceptance by the City, the City Engineer will prepare a proposed final estimate, in writing, of the total amount payable to the Contractor. This final estimate will include an itemization of the final Contract amount, segregated as to Contract item quantities, extra work and any other basis for

payment. It will show therein all deductions, made or to be made, for prior payments, and amounts to be kept or retained under the provisions of the Contract. All prior estimates and payments shall be subject to correction in the proposed final estimate.

The City shall file a Notice of Completion with the County Recorder's Office after acceptance of the Contract.

Within 30 days after recordation of the Notice of Completion, the Contractor shall submit to the City Engineer written approval of said proposed final estimate or a written statement of all claims arising under or by virtue of the Contract. No claim will be considered that was not included in said written statement of claims, nor will any claim be allowed for which a notice or protest is required by the provisions in Section 4-3, "Changes," 8-6, "Time of Completion," 8-7, "Liquidated Damages," and 9-4, "Notice of Potential Claim."

Upon the Contractor's approval, or failure to file a claim within said period of 30 days, the proposed final estimate submitted by the City Engineer shall become the final estimate, and within 30 days thereafter, the City will pay the entire sum so found to be due. Such final estimate and payment thereon shall be conclusive and binding against both parties to the Contract, on all questions relating to the amount of work done and the compensation payable therefor, except as otherwise provided in Sections 9-3.2, "Records," and 9-9, "Clerical Errors."

If the Contractor within said period of 30 days files claims, the City shall make payment based on the proposed final estimate, pending final determination, by the City Engineer, regarding said claims as provided in this Section 9-8.

The claims filed by the Contractor shall be in sufficient detail to enable the City Engineer to ascertain the basis and amount of said claims. The City Engineer will consider and determine the Contractor's claims. The Contractor must furnish within a reasonable time, such further information and details as may be required, by the City Engineer, to determine the facts or contentions involved in the claims. Failure to submit such information and details will be sufficient cause for denying the claims.

The City Engineer will make the final determination of any claims which remain in dispute after a completion of a claim's review. The Contractor may meet with the City Engineer to make a presentation in support of such claims.

Upon final determination of the claims, the City Engineer shall then make and issue a final estimate in writing. Within 30 days thereafter the City will pay the entire sum, if any, found due thereon. Such final estimate shall be conclusive and binding against both parties to the Contract, on all questions relating to the amount of work done and the compensation payable therefor, except as otherwise provided in Sections 9-3.2, "Records," and 9-9, "Clerical Errors."

# 9-9 CLERICAL ERRORS

Notwithstanding the provisions in Section 9-8, "Payment After Acceptance," for a period of 3 years after acceptance of the work, all estimates and payment made pursuant to said Section 9-8, including the final estimate, shall be subject to correction and adjustment for clerical errors in the calculations involved in the determination of quantities and payments. The Contractor and the City agree to pay to

the other any sum due under the provisions of this Section 9-9, provided, however, if the total sum to be paid is less than \$200, no such payment shall be made.

# 9-10 RESOLUTION OF CONSTRUCTION CLAIMS

Contractor claims up to and including the total amount of \$375,000 shall be subject to the provisions of this Section. Whenever the term claim or claims is used in this Section it shall mean all outstanding claims filed by a Contractor on a particular project, whether said claims are filed individually for single items of work or as one comprehensive claim for a variety of items. The dollar amount limits shall be applied based upon the sum of the value of all claimed amounts.

Article 1.5, Sections 20104- 20104.8, inclusive, of Chapter 1, Part 3, Division 2 of the Public Contract Code is the basis for this section on resolution of Contract claims.

This section shall not apply to any claims resulting from a contract where the City has required that disputes be resolved pursuant to the arbitration provisions of Article 7.1, "Resolution of Contract Claims," Chapter 1 of Part 2, Division 2 of the Public Contract Code.

#### 9-10.1 TIME LIMITS FOR FILING CLAIMS

All claims shall be filed in accordance with the provisions of Sections 4-3.1, "Procedure and protest," 9-4 "Notice of Potential Claim," and 9-8.1 "Final Payment and Claims." All claims must be filed on or before the date of final payment. The date of final payment shall be considered to be 30 days after recordation of the Notice of Completion.

# 9-10.2 WRITTEN FORM OF CLAIMS

All claims shall be prepared and submitted in a written form, complete with supporting documents and other evidence. Any subsequent responses to requests for clarification or for additional information shall be presented in a written form.

# 9-10.3 INITIAL CITY RESPONSE TO CLAIMS

The City Engineer shall review the claim and respond within the time limits specified below.

# 9-10.3.1 RESPONSE TIMES FOR CLAIMS OF LESS THAN \$50,000

The City will respond within 30 days of receipt of the claim with any requests for additional information or clarification. After receipt of any subsequent documents supporting the claim, the City will respond with a decision within 15 days, or the time period taken by the claimant to respond to the request, whichever is greater. If no additional supporting information is requested, then the City will respond within 45 days after receipt of the written claim.

# 9-10.3.2 RESPONSE TIME FOR CLAIMS OF \$50,000 TO \$375,000

The City will respond within 30 days of receipt of the claim with any requests for additional information or clarification. After receipt of any subsequent documents supporting the claim; the City will respond with a decision within 30 days, or the time period taken by the claimant to respond to the request, whichever is greater. If no additional supporting information is requested, then the City will respond within 60 days after receipt of the written claim.

# 9-10.4 CLAIMANT REJECTS INITIAL CITY DECISION

If the claimant disagrees with the City decision in regard to the written claim, or if the City fails to respond within the prescribed time limits, then the claimant may demand, in writing, an informal conference to meet and confer for settlement of the issues in dispute. This demand from the claimant shall be submitted within 15 days of receipt of the City decision or within 15 days of the City's failure to respond.

# 9-10.4.1 INFORMAL MEET AND CONFER CONFERENCE

The City shall schedule a meeting time and place within 30 days of the receipt of the claimant demand for an Informal Meet and Confer Conference.

# 9-10.5 CIVIL ACTION

For any claims or portions of claims remaining in dispute following the meet and confer process, the claimant may file a claim pursuant to Chapter 1 and Chapter 2 of Part 3 of Division 3.6 of Title 1 of the Government Code. The Contractor's attention is directed to the provisions of Public Contract Code Sections 20104.2(e), 20104.2(f) and 20104.4 which apply to the filing of civil actions by the claimant and provide for mediation and arbitration of the civil action.

#### 9-10.6 PAYMENT OF UNDISPUTED AMOUNTS

The City will pay in full, in accordance with the terms of the Standard Specifications, any undisputed Contract amounts not a part of this claims process.

#### 9-10.7 INTEREST ON CLAIM

The City will pay the legal rate of interest on any arbitration or judgment commencing on the date which the claim was filed in a court of law.

# PART TWO CONSTRUCTION MATERIALS

# SECTION 200 ROCK AND EARTH MATERIALS

#### 200-1 AGGREGATE BASE

Aggregate base shall conform to the grading and quality requirements of Section 26-1. 02A "Class 2 Aggregate Base" of the State Specifications, 3/4" maximum.

Recycled Class 2 Aggregate Base may be used after first submitting current gradation with certification that the recycled material can meet State Specifications for Class 2 Aggregate Base

#### 200-2 AGGREGATE SUBBASE

Aggregate Subbase shall conform to the grading and quality requirements of Class 2 Aggregate Subbase, 2-1/2" maximum, as specified in Section 25-1.02A, "Class 1, Class 2, and Class 3 Aggregate Subbases" of the State Specifications.

Asphalt concrete grindings that meet the above specifications may be used as aggregate subbase in street structural sections or as subbase backfill in trenches.

#### 200-3 CRUSHED ROCK

Crushed rock shall be the product of crushing rock or gravel. At least 50 percent of the material that will pass a 3/8-inch (9.5 mm) sieve shall consist of particles having three or more faces, which result from fracture due to mechanical crushing. Of the material passing said sieve, not more than five percent shall be pieces that show no such faces resulting from crushing. Of that portion which passes the 3/8-inch (9.5 mm) sieve but is retained on the No. 4 sieve, not more than ten percent shall be gravel particles. Crushed rock will be designated by nominal size and shall conform to the following gradations:

CRUSHED ROCK GRADATION REQUIREMENTS							
Nominal Size Specified	1"	3/4"	1/2"	3/8"	1/4"	3/16"	Rock Dust
Sieve Size		Percentage Passing Sieves					
1-1/2" (38.1mm)	100	n/a	n/a	n/a	n/a	n/a	n/a
1" (25.4mm)	90-100	100	n/a	n/a	n/a	n/a	n/a
3/4" (19.0mm)	30-60	90-100	100	n/a	n/a	n/a	n/a
1/2" (12.7mm)	0-20	30-60	90-100	100	n/a	n/a	n/a
3/8" (9.5mm)	n/a	0-20	20-60	90-100	n/a	n/a	100
1/4" (6.4mm)	n/a	n/a	n/a	n/a	100	n/a	n/a
No. 4 (4.8mm)	0-5	0-5	0-5	40-70	15-100	100	90-100
No. 8	n/a	n/a	n/a	0-10	0-25	40-75	n/a
No. 16	n/a	n/a	n/a	n/a	0-5	0-10	n/a
No. 30	n/a	n/a	n/a	n/a	n/a	n/a	20-60
No. 200	n/a	n/a	n/a	n/a	0-2	0-2	5-20
ASTM C131 Testing Grading	A	В	В	С	D	D	n/a

Table Note: "n/a" denotes not applicable

# 200-4 DECOMPOSED GRANITE

Decomposed Granite shall consist of quarry waste or other approved materials, free of adobe, vegetable matter, loam and other deleterious substances. It shall be of such quality so as to compact thoroughly, to form a firm walking surface, which displays a minimum of scuffing or dusting. The material shall conform to the following gradation of fines and aggregates:

DECOMPOSED GRANITE GRADATION			
Sieve Sizes Percentage Passing			
3/8"	100		
No. 3	95-100		
No. 8	50-90		
No. 200	10-20		

Color shall be TAN. A sample shall be submitted to the City Engineer for approval.

# 200-5 SELECT MATERIAL

Select material shall consist of clean earthen materials, ranging in size from silts and clays to sands and gravels. It may also include pulverized portions of asphalt concrete pavement or Portland cement concrete. There shall be no roots, rubbish, organic matter, or other deleterious substances. It shall have a sand equivalent value of not less than 20, and shall conform to the following gradation requirements:

SELECT MATERIAL GRADATION			
Sieve Sizes	Percentage Passing		
3"	100		
No. 4	35-100		
No. 30	20-100		

Material conforming to or exceeding the requirements for Class 2 aggregate subbase, as defined in Section 25, "Aggregate Subbases," of the State Specifications is an acceptable alternative.

# 200-6 SAND

Sand shall consist of natural or manufactured granular material, or a combination thereof. It shall not contain any roots, rubbish, organic matter, or other deleterious substances. Where clean washed sand is specified, the sand shall be washed by the supplier during manufacturing and/ or preparation process. Sand shall conform to the following gradation requirements.

SAND GRADATION REQUIREMENTS			
Sieve Sizes	Percentage Passing		
No. 4	100		
No. 8	65-100		
No. 16	45-75		
No. 30	30-50		
No. 50	10-30		
No. 100	0-10		
No. 200	0-5		

Sand conforming to the requirements for "Concrete Sand" per ASTM C33 is an acceptable alternate material.

# 200-7 PERMEABLE FILTER MATERIAL

Permeable filter material shall conform to the provisions of Class 2 Permeable Material, as described in Section 68-1.025, "Permeable Material," of the State Specifications.

Permeable Filter Material for street underdrains shall be nominal one-fourth inch pea gravel. Substitute material may be allowed provided that no more than five percent passes a #4 sieve and 100 percent passes a 3/4" sieve. The grading of the material shall be uniform. It shall conform in all other respects to Section 68-1.025 "Permeable Material" of the State Specifications. The use of substitute material shall be subject to review and approval of the City prior to its use on the job.

All Filter Fabric for use in street underdrains shall conform to Section 88, "Engineering Fabrics," of the State Specifications. The material shall meet the requirements for underdrains as described in said section.

# 200-8 SLURRY CEMENT BACKFILL

Slurry cement backfill shall conform to the provisions in Section 19-3.062, "Slurry Cement Backfill," of the State Specifications.

#### 200-9 SLURRY SEAL AGGREGATE

Aggregate shall consist of rock dust and plaster sand or other sands of similar nature, except that any aggregate or combination of aggregate used in the mixture shall contain not less than 50 percent of the product obtained by crushing rock. The material shall be free from vegetable matter and other deleterious substances.

The slurry seal shall be a Type I and the percentage composition by weight of the aggregate shall conform to the following gradation:

SLURRY SEAL TYPE I GRADATION			
Sieve Sizes	Percentage Passing		
No. 4	100		
No. 8	90-100		
No. 16	60-90		
No. 30	40-65		
No. 200	10-20		

The aggregate shall also conform to the following quality requirements:

AGGREGATE QUALITY REQUIREMENTS				
Sieve Sizes	California Test	Percentage Passing		
Sand Equivalent	217	45 Min.		
Film Stripping (test performed on the material passing the No. 8 sieve and retained on the No. 16 sieve)	302	25% Max.		
Durability Index	229	60 Min.		

# **200-10 BEDDING**

The following material shall be used for pipe bedding:

- Sanitary sewer lines, storm drain lines, manholes, and other structures with the exception of cast-in-place pipe shall use 1/2-inch crushed rock per Section 200-3.
- Water mains including service lateral lines shall use clean, washed sand per Section 200-6.

# SECTION 201 CONCRETE AND RELATED MATERIALS

# 201-1 PORTLAND CEMENT CONCRETE

Portland cement concrete shall conform to the requirements of Section 90-1.01, "Description" (Portland Cement Concrete) of the State Specifications. Unless otherwise specified in the contract documents, all Portland Cement Concrete shall be Class A (six sack mix). The minimum compressive strength shall be 3,000 psi, measured 28 days after placement, in accordance with standard testing procedures. The maximum allowable slump, measured at the placement end of the final delivery device, shall be five inches, unless otherwise permitted or directed by the City Engineer.

#### 201-1.1 PORTLAND CEMENT

Portland Cement shall conform to the requirements of Section 90-2.01, "Cement" of the State Specifications.

#### 201-1.2 AGGREGATES

Aggregates shall conform to the requirements of Section 90-2.02, "Aggregates" and Section 90-3, "Aggregate Gradings," of the State Specifications. Unless otherwise specified in the Special Provisions, the one-inch maximum combined aggregate grading shall be used.

#### 201-1.3 WATER

Water used for mixing and curing concrete shall conform to the requirements of Section 90-2.03, "Water" of the State Specifications.

# 201-1.4 MIXING OF CONCRETE

Mixing of concrete shall conform to Section 303, "Portland Cement Concrete Construction," of these Specifications.

#### **201-1.5 ADMIXTURES**

Chemical admixtures shall conform to the requirements of Section 90-4, "Admixtures," of the State Specifications.

#### 201-1.6 POLYPROPYLENE FIBERS

When specified in these Standards or Special Provisions, synthetic fibers to be added to concrete shall be fibrillated polypropylene olefin fibers such as Fibermesh by Propex Concrete Systems, or the equivalent.

# 201-2 REINFORCEMENT FOR CONCRETE

Reinforcement for concrete shall conform to Section 52, "Reinforcement" of the State Specifications.

#### 201-3 EXPANSION JOINT FILLER

Expansion joint filler shall be a pre-molded joint filler, consisting of asphalt felt and asphalt fiber material, three-eighths inch thick and precut to conform accurately to the finished concrete section. The pre-molded joint filler shall conform to the specifications of ASTM D1751.

# 201-4 CONCRETE CURING COMPOUND

Concrete curing compound shall be a white-pigmented curing compound conforming to the requirements of Section 90-7.01B, "Curing Compound Method" of the State Specifications, for curing compound (B): Pigmented Curing Compound, conforming to ASTM C309, Type 2, Class B.

All compounds shall be furnished by the Contractor and shall be delivered in sealed original containers bearing the manufacturer's name and product identification.

#### 201-5 CEMENT MORTAR

#### **201-5.1 GENERAL**

General cement mortar shall consist of a mixture of Portland cement, sand, and water. Cement mortar shall be such that it will adhere readily to concrete pipe or maintenance hole barrels and can be easily squeezed out at the joints. The cement mortar shall be composed of one part Portland cement and two parts sand. Admixtures of hydrated lime, fire clay, or other approved inert material may be used in the mortar to improve workability if the Contractor elects, but the amount of admixture to be added must be approved in advance by the City Engineer.

#### 201-5.2 SAND FOR CEMENT MORTAR

Sand for cement mortar shall be well graded, with 100 percent passing a No. 8 sieve. It shall have a mortar strength, when tested in accordance with California Test 515, of at least 90 percent that of Ottawa sand.

#### **201-5.3 CEMENT**

Cement shall be Type 2 conforming to ASTM C150.

#### 201-5.4 WATER

Water used for mixing mortar shall conform to the requirements of Section 90-2.03, "Water" of the State Specifications.

# 201-6 PORTLAND CEMENT CONCRETE ADHESIVE

The adhesive shall consist of two components which shall be mixed together at the site of the work. The epoxy shall conform to the requirements in Section 95-2.03, "Epoxy Resin Adhesive for Bonding New Concrete to Old Concrete," of the State Specifications.

# SECTION 202 BITUMINOUS MATERIALS

# 202-1 ASPHALT CONCRETE

Asphalt concrete shall be Type "A." The aggregate for Type "A" asphalt concrete shall be 1/2-inch maximum, medium grading as specified in Section 39, "Aggregate" of the State Standard Specifications.

Asphalt concrete to be used on bikepaths, only, shall be Type "A" and shall be 3/8-inch maximum aggregate.

Asphalt binder shall conform to the provisions in the following section and shall be PG 64-10 unless otherwise specified.

The Contractor shall furnish asphalt in conformance with the Caltrans "Certification Program for Suppliers of Asphalt." The program requirements, procedures, and a list of approved suppliers are located at:

http://www.dot.ca.gov/hq/esc/Translab/ofpm/fpmcoc.htm (Note: website link is case-sensitive)

#### **202-1.1 MIX DESIGN**

Hot mix asphalt (HMA) shall be produced in conformance with the requirements of a job-mix formula. The job-mix formula will take into consideration the quality of the aggregate, the type of asphalt binder material, the immersion compression retention index, the void relationships and other criteria, and said job-mix formula shall be the responsibility of the Contractor. The amount of asphalt binder material, as a percentage of the total weight of the mixture shall be determined by California Test 367 using samples of aggregates furnished by the Contractor in conformance with the provisions of State Specification Section 39-3.03, "Proportioning."

The Contractor shall be responsible for designing a job-mix formula through an approved testing laboratory, and shall submit it to the City Engineer for approval ten (10) working days prior to any mixing and/or placing of HMA.

Said job-mix formula shall be determined using the specifications set forth herein and shall conform to the requirements of Section 39-2.02 of the State Specifications. If the Contractor elects to use any material, including blending material, other than those materials utilized in the job-mix formula, he shall so inform the City Engineer in advance of the production of asphaltic concrete and shall document the request through an approved testing laboratory.

During the production of either mineral aggregate or asphaltic concrete, the Contractor may request that adjustments be made in the job-mix formula. Such request shall be in writing and substantiated through an approved testing laboratory. Consideration will be given promptly to such request.

# 202-1.2 ASPHALT GRADES

Performance graded (PG) asphalt binder shall conform to the following:

PERFORMANCE GRADED ASPHALT BINDER						
Dronouty	AASHTO Test			Specification Grade		
Property	Method	PG 58-22 <sup>a</sup>	PG 64-10	PG 64-16	PG 64-28	PG 70-10
Original Binder						
Flash Point, Minimum °C	T48	230	230	230	230	230
Solubility, Minimum % <sup>b</sup>	T44	99	99	99	99	99
Viscosity at 135°C, c	T316					
Maximum, Pa·s		3.0	3.0	3.0	3.0	3.0
Dynamic Shear,	T315					
Test Temp. at 10 rad/s, °C		58	64	64	64	70
Minimum G*/sin(delta), kPa		1.00	1.00	1.00	1.00	1.00
RTFO Test <sup>e</sup> ,	T240					
Mass Loss, Maximum, %		1.00	1.00	1.00	1.00	1.00
	RTFO Test Aged Binder					
Dynamic Shear,	T315					
Test Temp. at 10 rad/s, °C		58	64	64	64	70
Minimum G*/sin(delta), kPa		2.20	2.20	2.20	2.20	2.20
Ductility at 25°C	T51					
Minimum, cm		75	75	75	75	75
PAV f Aging,	R28					
Temperature, °C		100	100	100	100	110
RTFO Test and PAV Aged Binder						
Dynamic Shear,	T315				_	
Test Temp. at 10 rad/s, °C		22 <sup>d</sup>	31 <sup>d</sup>	28 <sup>d</sup>	22 <sup>d</sup>	34 <sup>d</sup>
Minimum G*sin(delta), kPa		5000	5000	5000	5000	5000
Creep Stiffness,	T313					
Test Temperature, °C		-12	0	-6	-18	0
Maximum S-value, MPa		300	300	300	300	300
Minimum M-value		0.300	0.300	0.300	0.300	0.300
Notes:						

#### Notes:

- a. For use as asphalt rubber base stock for high mountain and high desert area.
- b. The City Engineer will waive this specification if the supplier is a Quality Supplier as defined by the Cal Trans "Certification Program for Suppliers of Asphalt."
- c. The City Engineer will waive this specification if the supplier certifies the asphalt binder can be adequately pumped and mixed at temperatures meeting applicable safety standards.
- d. Test the sample at  $3^{\circ}$ C higher if it fails at the specified test temperature. G\*sin(delta) shall remain 5000 kPa maximum.
- e. "RTFO Test" means the asphaltic residue obtained using the Rolling Thin Film Oven Test, AASHTO Test Method T240 or ASTM Designation: D 2872.
- f. "PAV" means Pressurized Aging Vessel.

Performance based asphalt (PBA) binder shall conform to the following:

Property solute Viscosity (60°C), Pa·s(x10 <sup>-1</sup> ) a	AASHTO Test Method	PBA						
solute Viscosity (60°C), Pa·s(x10 <sup>-1</sup> ) a		DD A		ade	Specification Grade			
		6a	PBA 6a(mod)	PBA 6b	PBA 7			
	T202							
Original Binder, Minimum		2000	2000	2000	1100			
RTFO Test Aged Residue <sup>b</sup> , Minimum		5000	5000	5000	3000			
nematic Viscosity (135°C), m <sup>2</sup> /s(x10 <sup>-6</sup> )	T201							
Original Binder, Maximum		2000	2000	2000	2000			
RTFO Test Aged Residue, Minimum		275	275	275	275			
solute Viscosity Ratio (60°C), Maximum	_							
RTFO Test Visc./Orig. Visc.		4.0	4.0	4.0	4.0			
sh Point, Cleveland Open Cup, °C	T48							
Original Binder, Minimum		232	232	232	232			
ass Loss After RTFO Test, %	T240	0.60	0.60	0.60	0.60			
lubility in Trichloroethylene, % c	T44							
Original Binder, Minimum		Report	Report	Report	Report			
ctility (25°C, 5 cm/min), cm	T51							
RTFO Test Aged Residue b, Minimum		60	60	60	75			
RTFO Test Aged Residue, °C	f							
1 to 10 rad/sec: SSD <sup>e</sup> ≥ 0 and Phase Angle								
$(at 1 rad/sec) < 72^{\circ}$		_	35	_	_			
Residue from:	R28							
PAV <sup>g</sup> at temp., °C		100	100	100	110			
Or Residue from Tilt Oven <sup>f</sup> (@113°C), hours		36	36	36	72			
SD ≥ -115(SSV)-50.6, °C	f	_	_	_	25			
ffness,	T313							
Test Temperature, °C		-24	-24	-30	-6			
Maximum S-value, MPa		300	300	300	300			
Minimum M-value		0.300	0.300	0.300	0.300			

#### Notes:

- a. Absolute viscosity (60°C) will be determined at one sec<sup>-1</sup> using ASTM Designation: D 4957 with Asphalt Institute vacuum capillary viscometers.
- b. "RTFO Test Aged Residue" means the asphaltic residue obtained using the Rolling Thin Film Oven Test (RTFO Test), AASHTO Test Method T240 or ASTM Designation: D 2827.
- c. There is no requirement; however results of the test shall be part of the copy of test results furnished with the Certificate of Compliance.
- d. "Residue from Tilt Oven" means the asphalt obtained using California Test 374, Method B, "Method for Determining Asphalt Durability Using the California Tilt-Oven Durability Test."
- e. "SSD" means Shear Susceptibility of Delta; "SSV" means Shear Susceptibility of Viscosity.
- f. California Test 381.
- g. "PAV" means Pressurized Aging Vessel.

#### 202-2 EMULSIFIED ASPHALT

Emulsified asphalts shall conform to the requirements of Section 94, "Asphaltic Emulsions," of the State Specifications and shall be of the type(s) shown for the following uses:

Fog Seals: SS1h or CSS1h

Tack Coats and Paint Binder: PG 64-10 or SS1h or PG 64-16 or CSS1h

Slurry Seals: CSS1h

Test reports and certification shall be made available upon request by the City Engineer. Fog seals and tack coats shall be emulsified asphalt, proportioned 50 percent asphalt and 50 percent water.

Bikepath seal coat shall be a cold applied composition of a refined petroleum asphalt emulsion, mineral fibers and inert fillers. Asphalt emulsion shall not be the clay type. An acceptable product is "OVER KOTE," as manufactured by Reed & Graham, Inc., or approved equal.

# 202-3 JOINT SEALANT FOR CONCRETE PIPE

Rubber-based joint sealant shall conform to the provisions of ASTM C990, rope form. The joint sealant shall be such that pre-heating of the sealant or surfaces will not be required during cold weather application. A compatible joint primer adhesive shall be supplied by the joint sealant manufacturer; when required. An approved joint sealant material is Kent Seal No. 2.

# SECTION 203 PIPE AND RELATED MATERIAL

# 203-1 PVC UNDERDRAIN PIPE

All pipe and pipe fittings for street underdrains shall be slotted PVC pipe (smooth wall) conforming to State Specification Section 68-1.02K "Perforated Plastic Pipe." Corrugated plastic pipe will not be allowed.

#### 203-2 STORM DRAIN PIPE

#### 203-2.1 NON-REINFORCED CONCRETE PIPE

Non-reinforced concrete pipe shall be Class III concrete pipe conforming to ASTM C14. Storm drain pipe, which is 12 inches in inside diameter or smaller, may be non-reinforced.

#### 203-2.2 REINFORCED CONCRETE PIPE

Reinforced concrete drainage pipe shall conform to ASTM C76. All storm drain pipes, which are 15 inches in inside diameter or larger shall be reinforced concrete pipe. Any storm drain pipe which is 24 inches in inside diameter or larger, may be cast-in-place concrete pipe. The Class (i.e., I, II, III, IV, or V) of reinforced concrete pipe shall be as specified in the Special Provisions or as shown on the Project Plans.

# 203-2.3 CONCRETE FOR CAST-IN-PLACE CONCRETE PIPE

Concrete for cast-in-place concrete pipe shall be Class "A" conforming to the provisions of Section 90, "Portland Cement Concrete," of the State Specifications, except as herein modified. Concrete mixes shall be designed to attain a strength at 28 days of at least 3,000 psi. The slump shall be between one and three inches. The maximum aggregate size shall not exceed one-third the minimum wall thickness. At the option of the Contractor, an air-entraining admixture may be used, conforming to the provisions of Section 303-1.3, "Admixtures."

#### 203-2.4 PVC STORM DRAIN PIPE

PVC storm drain pipe is only allowed in publicly owned or dedicated non-roadway areas of parks, greenbelts and other open spaces areas.

All pipe and fittings for PVC (polyvinyl chloride) pipe shall meet the requirements of ASTM D3034, minimum SDR 35, either gasket or solvent welded joints.

#### 203-2.5 CLAY STORM DRAIN PIPE

Vitrified clay pipe (VCP) for use in storm drain applications shall comply with Section 203-3.1 herein.

# 203-2.6 ASBESTOS CEMENT STORM DRAINAGE PIPE

Asbestos cement storm drainage pipe shall not be used.

Procedures for removal of asbestos cement pipe shall comply with all local, national, and federal regulations pertaining to asbestos-containing products.

#### 203-3 SEWER PIPE

Unless noted on the Plans, all sewer lines shall be vitrified clay pipe (VCP).

# 203-3.1 VITRIFIED CLAY PIPE

Vitrified clay sewer pipe shall conform to ASTM C700. Unless otherwise specified or approved by the City Engineer, extra strength bell and spigot pipe shall be used. Requests to use other than bell and spigot pipe shall be submitted to the City Engineer for approval, prior to the beginning of work. The clay pipe shall not be dipped in a solution to enhance air pressure tests.

Each spigot shall have a reference mark to facilitate pipe assembly. The gasket shall be contained in a machined groove on the pipe spigot such that when compressed the gasket will not displace and will form a positive seal. All rubber gaskets shall be stored in a cool, well ventilated place and not be exposed to oils, fuels, petroleum, solvents, or direct sunlight .The gasket shall meet all requirements of ASTM F477. Pipe lubricant shall be listed with the National Sanitation Foundation. Solvent cement joins are strictly prohibited.

Fittings shall conform to ASTM C700.

#### 203-3.1.1 COMPRESSION JOINTS

Compression joints for vitrified clay pipe shall conform to ASTM C425. Lubricant shall be as recommended by the manufacturer.

Compression joints will be allowed only in those sizes (i.e., six inches inside diameter through 12" inside diameter) for which all of the required elements are available. The compression joint requirements contained herein apply to mains and laterals.

Compression joints for plain-end pipe shall consist of an elastomeric sleeve incorporating stainless steel take-up clamps. The joint shall have a stainless steel shear ring, with stop ring or tabs to properly position the pipe with respect to the joint. The joint shall be factory attached on one end of the pipe.

The use of compression joints will be allowed only as approved by the City Engineer on a case-by-case basis.

#### 203-3.1.2 REPAIR OR SLEEVE COUPLINGS

Repair or sleeve couplings shall be the compression joint type and shall conform to ASTM C425. Lubricant shall be as recommended by the manufacturer. The coupling shall have a stainless steel shear ring, and all take up clamps shall be stainless steel.

Reinforced concrete collars, per Standard Plan 401-2, shall be used when stainless steel sleeves are not otherwise available (for pipes larger than 12 inches in nominal inside diameter).

#### 203-3.2 DUCTILE IRON PIPE SEWER LATERALS

Where the joint trench is located beyond the sidewalk (see Standard Plan 201-6), ductile iron pipe (DIP) shall be used for sewer laterals. All other use of DIP for sewer lines shall be on a case-by-case basis as approved by the City Engineer.

Ductile iron pipe for sewer laterals shall comply with Section 203-4.2 herein.

#### 203-3.3 PVC SEWER FORCE MAINS

PVC pipe for sewer force mains shall comply with Section 203-4.1 herein except pipe shall be green in color.

#### 203-4 WATER PIPE

Unless noted on the Plans, all water line 4 inches in diameter and larger shall be polyvinyl chloride (PVC). Ductile iron pipe (DIP) may be used on a case-by-case basis as approved by the City Engineer.

All underground metal (ductile iron, valves, fittings, copper, brass, etc.) shall be wrapped in 8-mils minimum thickness polyethylene encasement per AWWA C105 with ends taped off with vinyl pipe wrap tape. Damaged or scratched surfaces with epoxy coating shall be repaired with an epoxy kit per manufacturer's recommendations and to the satisfaction of the City Engineer prior to wrapping. Otherwise, the damaged item shall be replaced.

Insulating kits shall be installed at transitions between dissimilar metal pipe and as required by the City Engineer. Insulating flange gaskets shall be ASME B16.21 insulation flange kits, Type E Full Face Gasket with two-side insulation as manufactured by Calpico, Inc. or approved equal.

All pipe, valves, and fittings shall be certified as suitable for contact with drinking water by an ANSI accredited organization in accordance with ANSI/NSF Standard 61, Drinking Water Systems Components – Health Effects

# 203-4.1 POLYVINYL CHLORIDE (PVC) PIPE

All PVC water pipe and fittings shall be manufactured in accordance with AWWA C900 or AWWA C905 with cast-iron-pipe equivalent (CI) outside diameter (OD) dimensions.

Thickness shall be a minimum of DR18 (Class 150) for AWWA C900 pipe and DR25 (Class 165) for AWWA C905 pipe.

Minimum thickness through the pipe bell and ring seating areas shall be as specified in AWWA C900 or C905.

Pipe shall be furnished in 20-foot sections. PVC water pipe shall be shall be blue in color with black stencil and shall have been manufactured within 18 months of installation.

The name of manufacturer, year in which the pipe was produced, size, class or nominal thickness, spigot insertion depth, and National Sanitation Foundation (NSF) seal shall be shown on each pipe. When PVC pipe is to be connected to a valve or fitting with an elastomeric gasket joint, a new insertion line must be marked on the pipe prior to installation.

Prior to delivery, manufacturer/supplier shall submit a written "Certificate of Compliance" that pipe to be supplied meets all applicable AWWA and ASTM standards.

Pipe may be rejected for failure to comply with any requirement of this specification, including damage from heat or sun exposure.

Approved PVC Pressure Pipe manufacturers include: CertainTeed Certa Lock, Diamond Plastics Corporation, J-M Eagle, Pacific Western Pipe, Vinyl Tech-White Knight, Pressure – Flex Pipe, or approved equals.

#### 203-4.1.1 PVC PIPE JOINTS

Pipe joints shall be gasketed, push-on type with an integral bell end. The bell ends shall be integral thickened bell end or integral sleeve-reinforced bell end. The bell end joints shall have a minimum wall thickness of the bell or sleeve-reinforced bell equal at all points to the standard dimension ratio requirements for the pipe. The minimum wall thickness in the ring groove and bell-entry sections shall be equal to or exceed the minimum wall thickness of the pipe barrel.

Gaskets shall meet the requirements of ASTM F477 and be part of a complete pipe section and purchased as such. Lubricant and its application shall be as recommended by the pipe or fitting manufacturer and shall not adversely affect the potable qualities of the water to be transported. Spray-on lubricants shall not be permitted. The gasketed joint shall meet the laboratory performance requirements specified in ASTM D3139. Gaskets shall be of the rieber style.

Pipe restraint shall be achieved through the use of thrust blocks. Use of other PVC pressure pipe restraint systems shall be approved by the City Engineer on a case-by-case basis and shall be Romac 611 Restrainer, EBAA Series 1500, or approved equal.

#### 203-4.1.2 PVC TO DUCTILE IRON TRANSITION

Transitions between PVC and ductile iron shall be made by inserting a PVC pipe spigot into a ductile iron pipe bell. The PVC bevel on the spigot shall be cut off, leaving no more than a 1/2-inch taper. A City inspector shall be present to witness this process.

# 203-4.2 DUCTILE IRON

Ductile iron pipe shall be manufactured in accordance with AWWA C151. Pipe wall thickness shall be determined in accordance with AWWA C150, using working pressure of 200 psi.

All ductile iron water pipe and fittings shall have a standard thickness cement lining, applied in accordance with the requirements of AWWA C104. The weight, class or nominal thickness, spigot insertion depth, and casting period shall be shown on each pipe. The manufacturer's mark, the year in which the pipe was produced, and the letters "D.I." or "DUCTILE" shall be cast or stamped on the pipe.

Pipe shall be encased with polyethylene bags conforming to AWWA C105. Polyethylene-encased pipe shall be bedded and backfilled with sand to 12 inches above the crown of pipe.

At the direction of the City Engineer, the Contractor shall repair damages to the polyethylene encasement as described within AWWA C105 or shall replace all damaged polyethylene film sections.

Cathodic protection shall be designed by a qualified corrosion protection engineer.

DIP cuts shall be coated with an approved bituminous material.

Minimum length of pipe for installation shall be 2 feet.

#### 203-4.2.1 DUCTILE IRON PIPE JOINTS

Joints shall be push-on or mechanical type with rubber gaskets unless otherwise specified. All ductile iron pipe joints shall be manufactured in accordance with the requirements of AWWA C111. The lubricant and its application shall be as recommended by the pipe manufacturer and shall not adversely affect the potable qualities of the water to be transported. Spray-on lubricants shall not be permitted.

Pipe restraint shall be achieved through the use of thrust blocks. Use of other restraint systems shall be approved by the City Engineer on a case-by-case basis and shall be as follows. Restrained joints for ductile iron pipe and ductile iron fittings shall be externally restrained mechanical joints (such as EBAA Megalug or approved equal), manufacturer's push-on restrained joints (such as Field Lock Gaskets (3 inches through 12 inches diameter only) American FlexRing, TR Flex by U.S. Pipe, or approved equal), or mechanical rodding.

All fittings, glands, etc shall be made in USA.

#### 203-4.3 PIPE FITTINGS

All bends, tees, crosses, and other fittings for use with either ductile iron or PVC pipe shall be ductile iron. Flanged fittings shall be manufactured in accordance with AWWA C110. Mechanical joint fittings shall be manufactured in accordance with AWWA C153. All fittings except tapping sleeves shall either be factory fusion bonded epoxy lined and coated in accordance with AWWA C116 or double cement-lined and coated with an asphaltic seal coat in accordance with AWWA C104. Fittings shall have push-on, mechanical joints or flanged ends. Fittings shall be wrapped and sealed in accordance with these Construction Standards. All fittings shall be made in USA.

Fittings and accessories for push-on or mechanical type joints shall conform to AWWA C153. All cross and tee fittings shall have flanged ends.

The Contractor may use a ductile iron mechanical joint flange adapter designed for AWWA C900 pipe with connecting PVC Pressure Pipe to flanged fittings or flanged valves. Pipe ends must be cut smooth and square with no bevel. The joint shall be restrained to the PVC pipe using an approved restraint method.

Fittings shall be rated for a minimum 250 psi working pressure.

All bolts, nuts, and washers installed below grade shall be Type 304 stainless steel. Teflon antiseize compound shall be used on all bolt and tie rod threads.

# 203-4.4 CORROSION RESISTANT FASTENINGS

All nuts, bolts and washers for underground valves, fittings and appurtenances except T-bolts shall be Type 304 stainless steel. Teflon anti-seize compound shall be used on all bolt and tie rod threads.

#### 203-4.5 LOCATING WIRE

A continuous number 10 insulated locating wire shall be attached to non-metallic mains, service lines and appurtenances per the Standard Plans and the following:

- 1. Locating wire shall be continuous between mainline valve boxes and fire hydrants. It shall be attached to the top of the pipe with 10-mil vinyl tape every 5 feet.
- 2. Locating wires through valve boxes shall be placed outside of riser, but inside the box. Locating wire shall loop within the valve box with 18 inches of slack wire.
- 3. Locating wire in manholes and vaults shall be attached inside the facility within one foot of the rim.
- 4. Wire splices shall be located above ground and inside of valve boxes and made per Standard Plan 101-3.

5. Insulation color shall be white for water, green for sewer, or purple for reclaimed water.

#### 203-4.6 MARKING TAPE

A 12-inch wide, blue plastic non-detectable water pipe marking tape, marked "Buried Water Main Below," shall be placed in all main line and large diameter (4" and larger) service line trenches, 18 to 24 inches above the pipe.

Where a water main and recycled water main intersect, the plastic marking tape shall also be attached to the top of the pipe with nylon tie-wrap banded around the warning tape and the pipe every five feet on center. The warning tape shall extend to the nearest valves located on each side of said intersection.

Mains in unpaved areas shall be marked every 150 lineal feet with a blue composite utility marker having a decal stating: "Caution Water Pipeline." Appurtenances (valves, ARVs, test stations, etc.) and angle points shall also be marked. Mains in landscaped areas shall be delineated with a brass marker set in an 8-inch concrete cylinder 4 inches above finished grade. The brass marker shall state "City of Davis Water Main."

Approved manufacturers and materials include: Calpico Inc. (Tracer Tape-Non-Detectable 12" width), Reef Industries Inc., Terra Tape Extra Stretch 450 Material, or approved equal.

#### **203-5 VALVES**

All valves shall be gate type, resilient seat, unless otherwise specified in the Special Provisions or the Project Plans. All bolts used in the body of the valve or an integral part of the valve shall be stainless steel, except T-bolts. Teflon anti-seize compound shall be used on all bolt threads.

Restraint shall be provided on both sides of all mid-block valves (those valves not flanged to a tee or cross). In addition, short sections of pipe shall not be allowed adjacent to mid-block valves; a full length of pipe shall be connected to each side of each mid-block valve.

#### 203-5.1 BUTTERFLY VALVES

Butterfly Valves shall be used only when specifically approved by the City Engineer.

Butterfly Valves shall be manufactured in accordance with the requirements of AWWA C504, latest revision. All valves shall open left (counterclockwise) with a 2" square cast iron operating nut. All valves shall be coated on the inside and the outside surfaces with a factory applied fusion bonded epoxy. When installed in the street, the operating nut shall be installed toward the centerline of the street.

All bolts used in the body of the valve or an integral part of the valve shall be stainless steel, except T-bolts.

#### 203-5.2 GATE VALVES

Gate valves shall be installed on all water mains, services, or fire hydrant leaders, four inches in inside diameter or larger.

Gate valves shall be manufactured in accordance with the requirements of AWWA C509 or AWWA C515, for resilient-seated gate valves. All valves shall be non-rising stem (NRS), open left (counter-clockwise) and have a standard 2" square cast iron operating nut. All valves shall be coated on the inside and the outside surfaces with a factory applied fusion bonded epoxy.

All bolts used in the body of the valve or an integral part of the valve shall be stainless steel, except for T-bolts.

# 203-5.2.1 RESILIENT SEATED TAPPING VALVES

The valve shall be manufactured in accordance with the requirements of AWWA C509 and include the following details: All inside ferrous surfaces of the valve are to be protected by a factory applied fusion bonded epoxy coating. The tapping valves shall have a raised pilot on one end of the valve to assure proper alignment.

#### 203-5.2.2 STAINLESS STEEL TAPPING SLEEVES

All tapping sleeves shall be 304 stainless steel with flange gasket made of SBR (silicon based rubber), glued onto the face of the flange. Nuts and bolts shall be 5/8" NC (national coarse) threads, 304 stainless steel with Teflon coated threads.

# 203-5.3 VALVE EXTENSION

If distance from top of valve to finish grade is more than 48 inches, extension of valve riser shall be required to meet a minimum distance of 48 inches.

#### 203-6 FIRE HYDRANTS

Fire hydrants shall be "steamer," traffic type, dry barrel and supplied with factory applied bright yellow paint. They shall conform to the provisions of AWWA C502. The internal elements shall be all bronze.

See Standard Plan #101-1, "Fire Hydrant," for other installation details.

# 203-6.1 MAIN VALVE AND BODY

The fire hydrants shall have a valve opening of 4-1/2" diameter. The valve shall open left (counterclockwise) and shall have a standard 1-1/2" pentagon operating nut.

The bury shall be 4' in length and shall connect to the lateral using a mechanical joint. The drain hole shall be tapped and plugged with a threaded brass plug.

#### 203-6.2 OUTLET CONNECTIONS

The outlets shall consist of one each 4-1/2" in diameter pumper connection and two each 2-1/2" diameter hose connections. The cap nuts shall be the same size and shape as the operating nut. All outlet connection threads shall conform to National Standard hose coupling specifications. Chains shall be provided to attach the outlet caps to the hydrant body.

#### 203-6.3 APPROVED MANUFACTURERS MODELS

Fire hydrants shall be one of the following approved models:

APPROVED FIRE HYDRANTS			
Manufacturer	Model		
American-Darling	B-84-B-5		
Mueller	Centurion A-423		
Kennedy	Guardian K81D		

# 203-6.4 PAVEMENT MARKERS

Pavement markers for fire hydrants shall be blue two-way reflectorized, conforming to the requirements of Section 85, "Pavement Markers," of the State Specifications. Adhesive shall be Rapid Set Type.

#### 203-6.5 PAINT

All new fire hydrants shall be supplied with a factory applied bright yellow paint. When a fire hydrant needs to be repainted, the paint shall be Gloss Enamel, Break Through 70-46 low VOC "Safety Yellow", as manufactured by Vanex, Inc., or approved equal.

#### 203-7 WATER VALVE BOXES

All valve boxes in streets and other traffic areas shall be designed to H-20 loading conditions and shall be of precast concrete with a cast iron face and cast iron traffic lid marked "WATER." Water valve boxes shall be "Brooks" #3RT, "Christy" #G5, "Bes" #G-5, or approved equal.

#### 203-8 WATER SERVICES

Water services, fittings and valves shall conform to the requirements of AWWA C800, and as described below. Services shall be continuous from the main line to the service box.

All service fittings shall be certified as suitable for contact with drinking water by an ANSI accredited organization in accordance with ANSI/NSF Standard 61, Drinking Water Systems Components – Health Effects.

#### 203-8.1 SIZES AND PIPE TYPES

The minimum size of water service shall be 1" in diameter. The minimum size of water service for a single family dwelling unit with fire sprinklers shall be 1-1/2" in diameter. The minimum size of common service serving more than one single family dwelling unit shall be 2" in diameter. Larger size services may be required by the City Engineer based on the intended type of user and the number of dwelling units or other users.

Two and one-half inches in diameter, 3" in diameter and 3-1/2" in diameter services are not allowed. When the demand constraints require a service larger than 2" in diameter and smaller than 4" in diameter, then a 4" in diameter service will be the minimum required size.

All services 4" in diameter and larger shall be PVC water pipe as specified in Section 203-4.

All underground metal services shall be protected from corrosion by wrapping or sleeving in eight (8) mil polyethylene.

#### 203-8.1.1 COPPER SERVICES

Copper water services shall be Type K seamless, annealed copper water tubing. All copper tubing shall conform to ASTM B88.

Copper shall be grade UNS-C12200. For diameters ranging from 3/4" to 1", use Type K Roll Soft Copper. For diameters ranging from 1.5" to 2", use Type K Soft 20' Sticks.

Approved manufacturers include: Cambridge-Lee, Mueller Industries, or approved equal.

#### **203-8.2 SADDLES**

Saddles shall be installed on water mains for service connections between 1" in diameter and 2" in diameter, inclusive. Service connections 4" or larger shall consist of a tee, gate valve (R/S type) and other appropriate fittings.

Saddles for PVC pipe shall be all bronze with Iron Pipe threads.

PVC PRESSURE PIPE SADDLES				
Pipe Size	Manufacturer	Part No.		
4" – 12"	Jones	J-996		
4"	Mueller	H-13490		
6"	Mueller	H-13491		
8"	Mueller	H-13492		
10"	Mueller	H-13493		
12"	Mueller	H-13494		

Saddles for ductile iron pipe shall be a full circumference stainless steel clamp with an integral stainless steel service outlet, stainless steel bolts, and a full pipe circumference neoprene gasket as shown in Standard Plan 101-5.

#### **203-8.3 BRAZING**

Brazing compound (solder) for use with copper water services shall be SILVALOY-15 BRAZING ROD (80 percent Copper, 15 percent Silver, five percent Phosphor), as manufactured by Wolverine Joining Technologies, or approved equal. It shall have not more than 0.2 percent (by weight) of lead.

#### 203-8.4 BACKFLOW PREVENTION

A backflow prevention assembly shall be provided on each water service, when required by the provisions of the Davis Municipal Code, 1971, as amended. The required type of backflow preventer shall be provided in accordance with the requirements of said Ordinance and in accordance with the Rules and Regulations adopted pursuant thereto. A copy of the Rules and Regulations can be obtained at the Office of the Public Works Department.

When a backflow device is required to be installed, after the installation and prior to the approval and acceptance by the Public Works Department, an inspection must be performed by a City of Davis Certified Backflow Tester.

#### 203-8.5 CORPORATION STOPS

Corporation Stops shall be ball valve type for use in potable water systems. They shall consist of a bronze body, bronze tee-head and stem, spherical fluorocarbon coated brass ball with molded Buna-N rubber seats, double Buna-N o-rings on stem, bronze ring to lock stem to body, and integral ends for fastening to pipe. The valve shall be watertight at all pressures, shall be easy turning, non-binding, and shall have minimal pressure loss at operating pressures and flow.

APPROVED CORPORATION STOPS				
Manufacturer	1" Class on Ductile Iron Mains	1" Class on PVC Mains	1-1/2" and 2" Class on All Mains	
McDonald	74701BT	74704BT	74704BT	
Ford	FB1000-4-Q	FB1100-4-Q	FB1100-6-Q FB1100-7-Q	
Jones	J1937SG	J1935SG	J1935SG	
Mueller	B-25008-1	B-25028-1	B-25028-12 B-25028-2	

Direct service taps will not be allowed; taps 2-inches and smaller shall use a saddle. All 1-1/2" and 2" corporation stops shall be Iron Pipe thread by compression.

#### 203-8.6 ANGLE METER STOPS

Angle Meter Stops shall be full port ball valve type for use in potable water systems. They shall consist of a bronze body, bronze lockable tee-head and stem, spherical fluorocarbon coated brass ball with molded Buna-N rubber seats, double Buna-N o-rings on stem, bronze ring to lock stem to body, and integral ends for fastening to pipe. The valve shall be watertight at all pressures, shall be easy turning, non-binding, and shall have minimal pressure loss at operating pressure and flow. The angle between the pipe connection and the meter connection shall be 90°. See Standard Plan 101-6 for approved makes and model numbers.

The 1" stops shall be compression on the pipe side and meter coupling on the meter side, or if alignment between couplings is straight, IPT (iron pipe thread) may be used. The 1-1/2" and 2" stops shall be female iron pipe thread on the pipe side and bolted flange on the meter side. A male iron pipe thread by compression joint adapter shall be provided for use on the service side of the 1-1/2" and 2" stops. The use of connections on the pipe side, other than compression joint, requires advance approval of the City Engineer.

Meter adapters and connectors as manufactured by the manufacturer of the angle meter stop shall be used when necessary to connect meters, angle stops and pipes of dissimilar sizes.

# 203-8.7 WATER METERS

All Water Meters for 3/4", 1", and 1-1/2" diameter services shall conform to the requirements of AWWA C700, for cold water displacement type water meters. Meter type for 2" and larger water meters will be determined by the City Engineer and may be displacement, turbine or compound. All meters shall be designed and constructed for measuring potable water, similar to the chemical makeup of water typically supplied through the City of Davis system.

All meters supplied to the City shall accurately record and display  $100 \pm 1.5$  percent of the actual flow.

#### **203-8.7.1 CONSTRUCTION**

All materials used in the meter construction shall be designed to resist the aggressive properties of Davis water. The meter maincase and cover plate (top or bottom) shall be constructed of bronze. The measuring chamber, piston and/or rotor shall be constructed of or lined with corrosion resistant thermoplastic material. Bolt holes shall be integrally cast with the maincase. Flange make up bolts, nuts and washers, casing bolts and miscellaneous trim shall be stainless steel.

#### **203-8.7.2 REGISTER**

The meter register shall be a Sensus Metering Systems Touch Read Pit Lid (TR/PL) model or approved equal. It shall be a hermetically sealed, tamperproof unit. It shall be permanently sealed against the intrusion of dirt and moisture. There shall be no penetrations of the exterior enclosure of the unit. The sealed register unit shall be provided with a manufacturer's guarantee of 10 years for the register and 25 years for the main case.

The gear mechanism shall accurately reduce the movement of the magnetic drive unit into the appropriate units of measure. The dial shall display water flow in units of cubic feet or multiples thereof. The sweep shall display in cubic feet per revolution or multiples thereof and shall be evenly divided into 10 increments.

#### 203-8.7.3 MAGNETIC DRIVE

All meters shall use a magnetic drive mechanism to transfer the action of the measuring piston or rotor into the resister. The drive magnet shall be attached to the measuring piston or rotor. The driven magnet shall be inside of the sealed register. The only moving parts exposed to water shall be the measuring piston or rotor and the drive magnet.

#### 203-8.7.4 STRAIGHTENING VANES

Straightening vanes shall be provided on all turbine type meters. They shall be placed upstream of the rotor and shall eliminate or minimize the turbulence caused by piping arrangements. An adjusting vane shall also be provided for calibration purposes.

#### 203-8.7.5 APPROVED MANUFACTURERS MODELS

Displacement type water meters shall be as manufactured by Sensus Metering Systems or approved equal. Turbine type water meters shall be Series "W" Turbo Meters, as manufactured by Sensus Metering Systems or approved equal. Compound meters shall be Sensus SRH or approved equal.

#### 203-8.8 BOXES FOR WATER METERS

Boxes for Water Meters shall be reinforced concrete or plastic, as specified herein and on Standard Plan 101-6. Boxes which will be located in an area where vehicles will travel (e.g. driveways) shall be reinforced concrete.

#### 203-8.9 WATER METER LABELS

Labels shall be provided for water meters when more than one meter is installed to serve one parcel. Label materials shall be stainless steel, brass or other non-corrodible metal. "Building," "Landscape," or other appropriate wording shall be stamped or engraved in 1/4" high letters. The label shall be attached to the meter or piping with plastic ties commonly used for bundling electrical wires.

#### 203-9 BLOWOFF VALVES

End of main blowoffs shall be constructed at the end of all temporary dead end runs.

Valves used on waterline blowoffs per Standard Plan 101-4 shall be ball valve type, 2" size or inside diameter, and shall be one of the following:

BLOWOFF VALVES			
Manufacturer Model			
Ford	B11-777		
Jones	J-1900		

Eccentric reducer shall be installed such that 2" FIPT is located along the invert of the pipeline. Eccentric Reducer shall be Tyler Union or approved equal.

# 203-10 MAINTENANCE HOLES

# 203-10.1 STANDARD MAINTENANCE HOLES (SANITARY AND STORM DRAIN)

Except as otherwise required by the contract documents, all maintenance hole sections (barrels, cones, flat-tops, etc.) shall be precast reinforced concrete sections conforming to ASTM C478. All flat-top maintenance holes shall also be designed to withstand the imposed loading due to an AASHTO H20-S16 highway load. All other details shall conform to Standard Drawing No. 201-2, "Maintenance Hole Details."

# 203-10,2 LINED SANITARY SEWER MAINTENANCE HOLES

When required by the City Engineer, sanitary sewer maintenance holes shall be constructed of materials impervious to hydrogen sulfide attack.

# SECTION 204 MISCELLANEOUS METAL AND CASTINGS

# 204-1 METAL RAILINGS AND BARRIERS

Metal railings and barriers shall conform to the requirements of Section 83 entitled, "Railings and Barriers" of the State Specifications.

# 204-2 CHAIN LINK FENCE

Chain link fence shall conform to the requirements of Section 80, "Fences" of the State Specifications.

# 204-3 MAINTENANCE HOLE LIDS AND CASTINGS

Maintenance hole lids and castings shall conform to City of Davis Standard Plan 201-2, "Maintenance Hole Details."

# 204-4 MONUMENT LIDS AND CASTINGS

Monument lids and castings shall conform to City of Davis Standard Plan 301-5, "Monument Box."

# SECTION 205 STRIPING AND TRAFFIC SIGNING MATERIALS

# 205-1 TRAFFIC PAINT AND RELATED MATERIALS

Unless otherwise specified herein, all materials shall conform to the provisions of the various Sections of the State Specifications.

#### 205-2 TRAFFIC PAINT

# **205-2.1 GENERAL**

Paint shall be homogeneous, free of contaminants, and of a consistency suitable for the use for which it is specified. The pigment shall be finely ground and properly dispersed in the vehicle according to the requirements of the paint. This dispersion shall be of such nature that the pigment does not settle appreciably, does not cake or thicken in the container, or become granular or curdled.

Paint and paint materials shall be delivered to the job site in new, unopened, air-tight containers, appropriately identified with the manufacturer's name, date of manufacture, type of paint or paint material, State Specification number, and lot or batch number. The containers and labeling shall meet all applicable U.S. Department of Transportation and Interstate Commerce Commission regulations. Concerning the contents, each container shall be labeled with such warnings or precautions as are required by State and Federal laws and regulations.

Precautions in the handling and the application of paints shall be in accordance with all applicable occupational safety and health standards, rules, regulations and orders established by the State of California.

Paints shall be furnished formulated ready for application and no thinning will be allowed. Paints shall be water borne only, solvent borne paints are not allowed.

# 205-2.2 WHITE, YELLOW, AND BLACK PAINT

White, yellow, and black paint shall conform to the provisions of State Specification No. PTWB-01, Water Borne.

#### 205-2.3 GLASS BEADS

Glass beads shall conform to the provisions of State Specification No. 8010-004, Type II.

#### 205-2.4 PAVEMENT MESSAGES

Stencils used for pavement messages shall be furnished by the City of Davis. All stencils shall be cleaned and returned in good condition.

#### 205-3 TRAFFIC SIGNS

#### **205-3.1 GENERAL**

All traffic signs specified by a letter and number code combination shall conform to the Traffic Manual, State Department of Transportation. The design details of the various signs shall conform to the California Manual on Uniform Traffic Control Devices.

Where more than one size of sign is available, the Contractor shall verify the size with the City Engineer, prior to ordering.

All speed limit signs (R2) shall be 30 inches in height and 24 inches in width.

#### 205-3.2 METAL POSTS

All metal pipe shall be minimum two inches nominal size, galvanized iron, Schedule 40, conforming to the provisions of ASTM A53.

#### **205-3.3 WOOD POSTS**

All wood posts shall be minimum four inches by four inches, nominal size, and shall be construction grade redwood, all-heart.

#### 205-3.4 MISCELLANEOUS FASTENING HARDWARE

All miscellaneous fastening hardware and fittings shall be standard commercial quality, hot-dip galvanized after fabrication. Straps and saddle brackets for mounting signs on electroliers and traffic signal standards shall be stainless steel.

### SECTION 206 STREETLIGHT MATERIALS

#### 206-1 GENERAL

#### 206-1.1 REGULATIONS AND CODES

All electrical equipment shall conform to the standards of the National Electrical Manufacturers Association (NEMA), the Underwriters' Laboratories, Inc. (UL), or the Electronic Industries Association (EIA), wherever applicable. In addition to the requirements of the Plans, these Specifications, and the Special Provisions, all materials and workmanship shall conform to the requirements of the National Electrical Code, hereinafter referred to as the Code; California Administrative Code, Title 8, Subchapter 5, Electrical Safety Orders; Rules and Overhead Electrical Line Construction, General Order No. 95 and Rules for Construction of Underground Electrical Supply and Communication Systems, General Order No. 128, of the Public Utilities Commission; Standards of the American Society for Testing and Materials (ASTM); American National Standards Institute (ANSI), and any local ordinances which may apply.

All separate electrical components shall be UL approved. Major control assemblies shall also be UL approved as required by the Project Specifications.

#### 206-1.2 **DEFINITIONS**

STANDARD STREETLIGHT shall mean a tapered steel pole and an arm extending from the pole, to which the luminaire is mounted.

POST MOUNTED OR POST TOP STREETLIGHT shall mean a tapered steel pole with the luminaire mounted on top of the pole.

ELECTROLIER OR STREETLIGHT shall mean the entire pole, mounting arm, luminaire, wiring, foundation and miscellaneous appurtenances, complete in place.

LUMINAIRE shall mean the lighting fixture, supplied as a complete unit, which is attached to the streetlight pole, consisting of a housing, reflector, refractor, integral ballast, terminal strip and mounting device. The distribution type shall be as shown on the Plans.

#### 206-1.3 STANDARD PLANS

The following Standard Plans show additional details of required materials and approved manufacturer's products:

STANDARD PLANS		
Standard Plan	Title	
301-11	Service Box Installation and Location Details for Street Lights	
301-12	Streetlight Luminaires	
301-13	Standard Streetlight	
301-14	Post Top Streetlight	

#### 206-2 HIGH PRESSURE SODIUM LUMINAIRES

All streetlight luminaires shall be high pressure sodium of the sizes and types indicated on the Plans and as provided in these Specifications. The luminaires shall be 120 volt, AC, and mayor may not have photo-electrical receptacle.

All standard fixture luminaires of 70 watt size may have a reactor type ballast. All standard fixture luminaires of 100 watt size or larger and all sizes of post top mounted luminaires shall have a regulator type ballast.

All standard fixtures shall be General Electric M250R2, or approved equal. All standard light fixtures (luminaires, lens, shield, etc.) shall be full-cutoff. All post top fixtures shall be General Electric PM17 Series with Lexan refractor, or approved equal.

Photo-electric controls, when required, shall be General Electric 402G660, or approved equal.

#### **206-3 POLES**

All poles shall be tapered steel, fabricated from weldable grade hot rolled commercial quality carbon steel and hot-dip galvanized after fabrication per ASTM A123. The thickness shall be United States standard 11 gauge or 10 gauge, depending on material strength. Each pole shall be one-piece construction, cylindrical in cross-section, with a uniform taper from base to top.

The poles shall be supplied with a shop fabricated and welded anchor base plate. The baseplate shall have shop drilled holes for the anchor bolts. The anchor bolt holes shall provide for a plus or minus bolt adjustment of 1/2".

All poles shall have a shop fabricated handhole. The minimum size of opening for 'standard streetlight poles shall be 4" by 6-1/2". The minimum size of opening for post top streetlight poles shall be 2" by 4". The handhole opening shall be reinforced with a shop fabricated and welded steel lip. The handhole shall be provided with a removable raintight cover. The pole shall be provided with a grounding terminal, which shall be accessible from the handhole.

The standard streetlight poles shall have an arm to which the luminaire shall be attached. The luminaire arm attachment device shall be such that gravity will hold the arm in place, prior to permanently fastening with an appropriately sized bolt.

The pole manufacturer shall supply all anchor bolts, anchor bolt covers, anchor base cover, pole top cap, grounding terminal, conductor support device, and any other miscellaneous, mounting or fastening hardware.

Each pole shall be hot-dip galvanized after completion of all welding.

#### **206-4 CONDUIT**

All conduit and fittings shall be Underwriters' Laboratory (UL) listed and shall be one of the following:

#### 206-4.1 METAL CONDUIT

Metal conduit shall be rigid steel tubing, and shall be hot-dip galvanized after fabrication. It shall not have any rough spots, blisters, scale, rust, or chipped or damaged galvanized coating. Each complete length shall bear the manufacturer's name and UL label.

#### 206-4.2 PLASTIC CONDUIT

Plastic conduit and fittings shall be rigid polyvinyl chloride (PVC) pipe and shall be Schedule 40. Each complete length shall bear the manufacturer's name and UL label. The type of PVC cement shall conform to the manufacturer's recommendations.

#### 206-5 WIRING (CONDUCTORS)

All wires shall be copper and shall have a moisture and heat resistant type of thermoplastic insulation (Type THW or THWN). All wires #8 American Wire gauge (AWG) and larger shall be stranded. Bonding (ground) wires may be uninsulated and shall be stranded when they are #8 AWG or larger. The City Engineer will approve all wiring materials prior to their incorporation into the work.

The minimum size for wires installed in conduits and within the light pole up to the in line fuse shall be #8 AWG. The minimum size for wires installed from the in line fuse to the luminaire shall be #12 AWG.

All conductors shall have clear, distinctive and permanent markings on the outer surface throughout the entire length, which indicate the manufacturer's name or trademark, insulation type letter designation, conductor size, and voltage rating. Conductor insulation shall be a solid color.

Ground rods shall be a minimum one-half inch in diameter and eight feet in length. Ground rod material shall be copper -clad steel.

#### 206-6 PULL BOXES

All pull boxes, pull box extensions, and pull box covers, shall be precast reinforced concrete conforming to the State Specification 86-2.06, "Pull Boxes," #3-1/2 pull box. Boxes may be larger in size depending on the application.

Box covers shall be provided with two 3/8-inch brass hold down bolts with brass washers and nuts. Nuts shall be recessed below surface of the cover. The cover shall be marked "Streetlights." Where pull boxes are to be placed in areas subject to traffic loads, a steel cover of suitable design to withstand traffic loads shall be provided instead of the concrete cover.

Approved boxes are Christy N9 and Brooks #36.

# PART THREE CONSTRUCTION METHODS

# SECTION 300 REMOVALS, EXCAVATION AND EARTHWORK

#### 300-1 CLEARING AND GRUBBING

#### **300-1.1 GENERAL**

This work shall consist of removing all natural and artificial objectionable material from the right-of-way, construction areas, road approaches and material sites within the right-of-way. Clearing and grubbing shall be performed in advance of grading operations and in accordance with the requirements herein specified, subject to erosion control requirements. Demolition of buildings and structures, other than foundations or slabs, shall be as specified in the Special Provisions or on the plans.

#### 300-1.2 CLEARING AND GRUBBING OPERATION

Unless otherwise specified, the entire area of the project, to the widths specified below, shall be cleared and grubbed.

The area above the natural ground surface shall be cleared of all vegetable growth, such as trees, logs, upturned stumps, roots of downed trees, brush, grass, weeds, and all other objectionable material, within the following limits:

- 1. For streets, road and highway construction areas, including structures, frontage roads or streets, ramps, approaches, ditches and channels, and all other accessory roads and connections to be constructed, the clearing and grubbing shall extend to the outside excavation and embankment slope lines, except that where slopes are to be rounded, the areas shall extend to the outside limits of slope rounding.
- 2. Within the limits of clearing, all stumps, large roots, buried logs, and all other objectionable material shall be removed three feet below the existing ground surface or six feet below finished ground, whichever is deeper.

Trees and plants that are not to be removed shall be fully protected from injury by the Contractor at his expense.

#### 300-1.3 REMOVAL AND DISPOSAL OF MATERIALS

All materials removed shall be disposed of outside of the right-of-way. The roadway and adjacent areas shall be left with a neat and finished appearance.

The removal of existing improvements shall conform to the following requirements:

1. BITUMINOUS PAVEMENT shall be removed to clean straight lines. Saw cutting shall be required to a minimum depth of one inch.

- 2. CONCRETE PAVEMENT shall be removed to neatly sawed edges. Saw cuts shall be made to a minimum depth of one and one-half inches. If a saw cut in concrete pavement falls within three feet of a construction joint, cold joint, expansion joint, or edge, the concrete shall be removed to the joint edge.
- 3. 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, such removal and disposal will be paid for at the Contract item price for the type of excavation in which such object is encountered. However, if the presence of the object is not indicated on the Plans, or in the Special Provisions, and its presence could not have been ascertained by visual inspection, the removal and disposal of such object will be paid for as extra work, as provided in Section 4-3.4, "Extra Work, instead of at the applicable Contract item price, if the Contractor so requests in writing. Such request shall be made prior to removal.

#### 300-1.4 WATER WELL ABANDONMENT AND DESTRUCTION

All water wells to be abandoned shall be destroyed in accordance with Bulletin 74-81, "Water Well Standards: State of California," of the State Department of Water Resources, and in accordance with the requirements of any permit required therefore. The work shall be performed by a water well drilling contractor licensed to perform such work. The proposed methods and procedures shall be approved by the City Engineer prior to commencement of work.

#### 300-2 ROADWAY EXCAVATION

#### **300-2.1 GENERAL**

Roadway excavation shall consist of all excavation involved in the grading and construction of the roadway except structure excavation, trench excavation, and any other excavation separately designated.

#### 300-2.2 UNSUITABLE MATERIAL

Material that is unsuitable for the planned use shall be excavated and disposed of as directed by the City Engineer.

Unsuitable material is defined as material the City Engineer determines to be:

- 1. Of such unstable nature as to be incapable of being compacted to specified density using ordinary methods at optimum moisture content; or
- 2. Too wet to be properly compacted and circumstances prevent suitable in-place drying prior to incorporation into the work; or

3. 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.

When unsuitable material is removed and disposed of, the resulting space shall be filled with material suitable for the planned use. Such suitable material shall be placed and compacted in layers as hereinafter specified for earth fill construction.

#### **300-2.3 SLOPES**

Excavation slopes shall be finished in conformance with the lines and grades shown on the plans. All debris and loose material shall be removed. When completed, the average plane of the slopes shall conform to the slopes indicated on the plans. No point on the completed slopes shall vary from the designated plane by more than six inches, measured at right angles to the slope. In no case shall any portion of the slope encroach on the roadbed.

Embankment slopes shall be finished 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. No point on the completed slopes shall vary from the designated plane by more than six inches, measured at right angles to the slope.

#### 300-3 EARTH FILL CONSTRUCTION

#### **300-3.1 GENERAL**

Earth fill construction shall consist of constructing embankments, including the preparation of the areas upon which they are to be placed, buttress fills, dikes, the placing and compacting of approved material within areas where unsuitable material has been removed, and the placing and compacting of material in holes, pits and other depressions.

The native ground shall be cleared and scarified to a minimum depth of six inches, prior to placing any fill material. This scarified ground shall then be thoroughly wetted to optimum moisture content, mixed and compacted to the required density. When fills are to be placed over existing surface improvements which are to remain in place, such clearing and scarifying will not be required. Whenever a fill is constructed upon an existing structure or pavement, the pavement shall be broken by stomping in a grid pattern of five feet each way.

Rocks, broken concrete, or other solid materials, which are larger than four inches in greatest dimension, shall not be placed in fill areas.

All materials used for backfill must be free from roots, rubbish, decayed vegetable or other organic matter.

#### 300-3.2 COMPACTION REQUIREMENTS

All embankment and fill material shall be placed in successive horizontal layers of not more than eight inches in depth of loose material. Each layer shall be spread uniformly, wetted to optimum moisture content, and compacted to the required density. The Contractor shall use equipment, which in the opinion of the City Engineer, is capable of producing the required compaction.

The upper twenty four inches of all areas under street pavement, shall be compacted so as to achieve a relative compaction of not less than 95 percent.

All embankment and fill material, in the absence of any other requirements, shall be compacted so as to achieve a relative compaction of not less than 90 percent.

#### 300-3.3 COMPACTION TESTING

Determination of relative compaction shall be performed in accordance with the provisions of ASTM D1557. The field density of soil shall be determined by any method which will accurately and consistently indicate the density and moisture content of the soil.

The words "relative compaction" or "relative density" shall mean the ratio of the field dry density to the laboratory dry density, expressed as a percentage.

#### 300-4 STRUCTURE EXCAVATION AND BACKFILL

#### **300-4.1 GENERAL**

Structure excavation shall consist of the removal of material for the construction of foundations for bridges, retaining walls, head walls for culverts, or other structures. It shall also include other excavation designated on the Plans, in these Specifications, or in the Special Provisions, as structure excavation.

Structure backfill shall consist of furnishing material meeting these Specifications and placing and compacting it around structures. It shall be placed to the lines designated on the Plans, or in the Specifications, or as directed by the City Engineer.

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

#### 300-4.2 FOUNDATION MATERIAL TREATMENT

When footing concrete or masonry is to rest on an excavated surface other than rock, care shall be taken not to disturb the bottom of the excavation. Final removal of the foundation material to grade shall not be made until just before the concrete or masonry is placed. Except when overexcavation is directed by the City Engineer, excavation below grade shall be replaced at the Contractor's expense. It shall be placed at the same time and with the same class of concrete specified for the structure.

#### 300-4.3 INSPECTION

The City Engineer will inspect and approve all excavations prior to starting the next phase of work. The Contractor shall give notice to the City Engineer upon completion of the excavation.

#### 300-4.4 STRUCTURE BACKFILL

Material used for structure backfill shall conform to the provisions of Section 200-5, "Select Material." Structure backfill shall not be placed until the structure footings or other portions of the structure or facility have been inspected by the City Engineer and approved for backfill placement. No backfill material shall be deposited against the back of concrete abutments, concrete retaining walls, or the outside walls of cast-in-place concrete culverts until the concrete has developed a compressive strength of not less than 3,000 psi.

Suitable tests shall be performed prior to placing structure backfill to verify compressive strength of the concrete, as required by the City Engineer.

Structure backfill shall be placed in horizontal, uniform layers not exceeding eight inches in thickness before compaction. It shall be brought up uniformly on all sides of the structure or facility. Each layer of backfill shall be compacted to a relative compaction of not less than 95 percent.

Consolidation of structure backfill by ponding and jetting shall not be permitted. Material for use as structure backfill shall be placed and compacted in layers not exceeding one foot in thickness. The work shall be performed without damage to the structure or softening of the embankment and in such a manner that excess water will not be impounded. Vibratory or other compaction equipment shall be used when necessary to obtain the required compaction.

#### 300-4.5 MATERIAL SUBSTITUTIONS

A slurry cement backfill may be substituted for structure backfill, when requested by the Contractor in writing, and approved by the City Engineer.

Material used for slurry cement backfill shall conform to the provisions of Section 200-8, "Slurry Cement Backfill."

# SECTION 301 SUBGRADE PREPARATION AND PLACEMENT OF BASE MATERIALS

#### 301-1 SUBGRADE PREPARATION

This Section shall govern the preparation of natural, filled, or excavated roadbed material prior to the placement of subbase or base material. All independent material testing and inspection called for by the City shall be furnished and paid for by the developer or contractor.

#### 301-1.1 CONSTRUCTION TIMING

The roadbed subgrade may be completely tested and checked prior to placement of the contiguous concrete structures, such as curb, gutter, and sidewalk. The Contractor may also place as much of the Road Base material as is essential for completion of the contiguous structure. The Road Base material will not be tested for final acceptance prior to placement of the contiguous structures.

#### 301-1.2 CONSTRUCTION STAKING FOR SUBGRADE INSPECTION

All Construction Stakes for the use of the Contractor and the City Engineer shall set by or under the direction of a duly licensed Engineer or Surveyor. Construction stakes shall be provided for the use of the Inspector in verifying subgrade construction.

Stakes to be used for subgrade inspection and construction shall be set at intervals not to exceed 50 feet, and at all changes in grade, beginning of curves, end of curves, all property corners, and at such additional locations as deemed necessary by the City Engineer. A cut/fill and offset distance shall be indicated on each stake for the plan elevation of the back edge of walk, lip of gutter, 1/4 point when the pavement is wider than 31 feet, and the centerline of the street.

The Engineer or Surveyor setting the stakes shall furnish three copies of a written record (cut sheets) of the staking to the City Engineer. These cut sheets shall indicate the plan station of the stake, stake elevation, plan elevation(s) for which there is a cut/fill and offset and all cut/fill and offset distances marked on each stake.

#### 301-1.3 SUBGRADE PREPARATION

When the roadbed has been constructed to the required grade and cross-section and is in a smooth and even condition, it will be ready for preparation of subgrade.

The roadbed shall be scarified to a depth of at least six inches. The loosened material shall then be worked to a finely divided condition. The moisture content shall be brought to optimum by the addition of water, by the addition and blending of dry suitable material or by the drying of existing material. The material shall then be compacted by approved equipment to the specified relative compaction.

#### 301-1.4 COMPACTION

The existing native earth, after removal of trash, vegetation, roots, and other unstable material shall be excavated to rough subgrade. The top six inches of subgrade material shall be ripped, scarified, and re-compacted to a relative compaction of 95 percent. The test method, location and number of tests shall be determined by the City Engineer. In addition to the compaction test, the grade shall be rolled with a three axle water truck carrying 3,000 gallons of water.

No appreciable indentation shall be made by the tires and no "pumping" shall occur in the subgrade. Any spots in the subgrade which show appreciable settlement or "pumping" shall be removed, dried out, re-compacted and retested until satisfactory. If the existing material cannot be made to pass the above described inspection, it shall be removed and suitable material placed, compacted, and tested. Laboratory fees for retesting shall be paid by the Contractor.

#### 301-1.5 TOLERANCES

The finished subgrade shall not vary more than 0.04 feet from the specified grade and cross-section. Variations within the above specified tolerances shall be compensating so that the average grade and cross-section are equal to that which is specified. Defective areas shall be corrected, including removal and replacement of material at the Contractor's expense. Any additional re-testing required will be at the Contractor's expense.

#### **301-1.6 INSPECTION**

The City Engineer will inspect and test all compacted subgrade and must approve it prior to placing aggregate subbase or aggregate base. Any aggregate base or subbase placed prior to approval of subgrade shall be removed at the expense of the Contractor, and the affected section compacted, tested and approved by the City Engineer.

The City Engineer shall have the discretion to require the Contractor to have an Engineer or Surveyor provide written evidence of the as-built subgrade elevations. Any as-built grade information shall be provided at the sole expense of the Contractor.

#### 301-2 AGGREGATE SUBBASE AND AGGREGATE BASE

#### 301-2.1 SPREADING

Imported aggregate bases shall be delivered to the roadbed as uniform mixtures and each layer shall be spread in one operation. Segregation shall be avoided and the base shall be free from pockets of coarse or fine material.

Aggregate bases shall be deposited on the roadbed at a uniform quantity per linear foot, which quantity will provide the required compacted thickness within the tolerances specified herein without resorting to spotting, picking up or otherwise shifting the aggregate base material. At the time aggregate base is spread, it shall have a moisture content sufficient to obtain the required compaction. Such moisture shall be uniformly distributed throughout the material.

Where the required thickness is 0.50 foot or less, the base material may be spread and compacted in one layer. Where the required thickness is more than 0.50 foot, the base material shall be spread and compacted in two or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed 0.50 foot. Each layer shall be spread and compacted in a similar manner.

#### 301-2.2 COMPACTION AND TOLERANCES

The relative compaction of each layer of base material shall not be less than 95 %.

The surface of the completed aggregate base shall not vary more than 0.04 foot from the specified grade and cross-section. Variations within the above specified tolerances shall be compensating so that the average grade and cross-section are equal to that which is specified. Final checking and testing of the Aggregate Base or Aggregate Subbase for acceptance will not be performed until the adjacent curb and gutter has been satisfactorily completed.

Aggregate bases that do not conform to the above requirements shall be reshaped or reworked, watered and re-compacted to conform to the specified requirements.

#### 301-2.3 PROTECTION OF AGGREGATE BASE

Untreated base once inspected and approved must be protected from raveling and segregation by traffic. Areas once approved, but which are torn up by traffic must be re-compacted and retested prior to surfacing.

The Contractor shall be responsible for protecting the Aggregate Base or Subbase from the detrimental effects of adverse weather conditions, such as rain. Prior to commencement of work, after a work shut down due to weather, the City Engineer will verify whether or not previously completed work is still acceptable. Any work deemed to be no longer acceptable shall be reworked to the satisfaction of the City Engineer.

The Contractor may apply a penetration treatment at his own expense, to protect the untreated base, when approved by the City Engineer.

## SECTION 302 ROADWAY SURFACING

#### 302-1 ASPHALT CONCRETE PAVEMENT

#### **302-1.1 GENERAL**

Asphaltic concrete pavement shall consist of one or more courses of a mixture of paving asphalt and graded aggregate as specified, placed upon a prepared roadbed or base, or over existing pavement. The courses shall be of the mixture type and the dimensions shown on the plans or project specifications.

#### 302-1.2 DISTRIBUTION AND SPREADING

At the time of delivery to the site of work, the temperature of the mixture shall not be lower than 260°F nor higher than 320°F, the lower limit to be approached in warm weather and the higher limit in cold weather. The temperature of the asphalt concrete shall be not less than 250°F immediately following placement by the paving machine. All initial breakdown rolling shall be accomplished before the temperature drops below 200°F.

Asphaltic concrete shall not be placed when the atmospheric temperature is below 50°F. Asphalt concrete shall not be placed when the underlying layer or surface is frozen, or when, in the opinion of the City Engineer, weather conditions will prevent the proper handling, finishing, or compaction of mixtures.

The asphalt concrete shall be evenly spread upon the subgrade or base to such a depth that, after rolling, it will be of the specified cross-section and grade of the course being constructed.

The thickness of the asphalt concrete shown on the plans, or as specified shall be considered the minimum thickness to be applied at any point.

The depositing, distributing, and spreading of the asphalt concrete shall be accomplished in a single, continuous operation by means of a self-propelled mechanical spreading and finishing machine designed especially for that purpose. It shall be equipped with a vibrating or tamper bar screed capable of being accurately regulated and adjusted to distribute a layer of the material to a definite pre-determined thickness. The machine shall be in good mechanical working condition.

In those instances when the City Engineer determines that a paving machine would be impracticable, asphalt concrete may be spread by tractor, blade, spreader box or hand. The method shall be approved by the City Engineer.

Where asphalt concrete is placed as an overlay on existing surfaces, the edges of the applied surface adjacent to existing concrete gutters must be raked back toward the center of the street in such a way as to provide a taper approximately 18 inches wide, satisfactory to the City Engineer.

Unless otherwise noted on the plans or in the Special Provisions, the maximum course placed shall be three inches compacted.

#### **302-1.3 JOINTS**

Joints between successive runs shall be vertical and at right angles to the line of the improvement. Care shall be exercised in connection with the construction of all joints to insure that the surface of the pavement is true to grade and cross-section.

When the asphalt concrete is placed in more than one lift, the edge joints shall be offset a minimum of six inches in each successive course.

#### **302-1.4** TACK COAT

A tack coat shall be applied to any surface that is to be paved with asphalt concrete (except unprimed aggregate base or compacted native earth subgrade) including all vertical surfaces of existing pavement, curbs, gutters, and construction joints in the surfacing against which additional material is to be placed, and to other surfaces designated by the City Engineer.

Where asphalt concrete is to be placed as an overlay blanket on top of existing asphaltic surfaces, the Contractor shall prepare the surface as herein specified. The Contractor shall remove weeds and undesirable matter in cracks in the existing pavement. The street shall be swept thoroughly to remove all dirt and debris. The Contractor must notify the City Engineer at least three working days prior to beginning work in order to coordinate removal of trash and clippings.

Asphalt concrete shall be placed after the asphaltic emulsion (tack coat) has cured. If the tack coat has been damaged, additional tack coat shall be applied to those areas in advance of placing asphalt concrete or asphalt concrete base, as directed by the City Engineer. Tack coat shall conform to the provisions of Section 202-2, "Emulsified Asphalt," and shall be applied at a rate of 0.07 to 0.10 gallon per square yard.

#### 302-1.5 PLACING ASPHALT

The surface course (final lift) of asphalt concrete shall not be placed on any roadbed until all utility construction beneath the roadbed has been completed, tested, and chlorinated for sanitation, as applicable, and final utility connections have been made.

Each layer (lift) of asphalt concrete shall be a minimum of 0.12-foot compacted thickness and a maximum up to 0.24-foot compacted thickness. Sections 0.25-foot or thicker shall be placed in equal lifts.

Finished asphalt concrete surface shall be 1/8-inch (0.01-foot) above finished Portland Cement Concrete surfaces at points of contact (e.g. lip of gutter, manhole and valve box encasements, and monument box encasements). The exception to this is curb ramps which shall conform to Standard Plan 301-3.

#### **302-1.5.1 ROLLING**

Asphalt concrete shall be thoroughly compacted by rolling. The number of rollers used with each paving operation shall not be less than specified below.

ROLLERS REQUIRED		
Tons Placed Per Hour	Compacted Thickness 1-1/2" or less	Compacted Thickness More Than 1-1/2"
Less Than 100	1	1
100 to 200	2	2
201 to 300	3	2
More Than 300	4	3

Self-propelled compacting rollers shall meet the following criteria:

- 1. Three-axle tandems, two-axle tandems and three-wheeled rollers used for breakdown rolling shall be of such weight that the compression load on the drive is at least 325 pounds per inch wheel width.
- 2. Vibratory rollers used for breakdown or intermediate rolling shall have a compactive effort of not less than a dynamic force of 21,000 pounds.
- 3. Two-axle tandem rollers used for intermediate and finish rolling shall weigh not less than eight tons.
- 4. Pneumatic-tired rollers used for intermediate rolling shall be the oscillating type having a width of not less than four feet and equipped with pneumatic tires of equal size and diameter, having treads satisfactory to the City Engineer. Wobble-wheel rollers will not be permitted. The tires shall be so spaced that the gap between adjacent tires will be covered by the tread of the following tire. The tires shall be inflated to 90 pounds per square inch.
- 5. A two-axle tandem roller, weighing at least five tons may be used when the areas to be paved are not to be subjected to vehicular traffic and when the asphalt is placed in these areas at a rate less than 100 tons per hour.
- 6. Other rollers may be used subject to prior approval by the City Engineer.

As soon as the layer of asphalt concrete has been placed, it shall be thoroughly compacted by rolling. Rolling shall be commenced along the lower edge of the area to be rolled and continued until the edge is thoroughly compacted, after which the roller shall be gradually advanced to the crown point, both sides being rolled in like manner. Rolling shall be continued until the pavement layer has become thoroughly compacted throughout and is true to grade and cross-section.

All rollers must be maintained in good mechanical condition, and those that cannot be driven along a straight path or operated without jerking, shall not be used. No leakage of petroleum products from any roller shall be allowed to come in contact with pavement being constructed, nor shall any roller be permitted to stand motionless on any portion of the work. The surfaces of all roller wheels shall be treated with sufficient water to prevent the pickup of bituminous materials, but under no circumstances shall the quantity of water used be detrimental to the surface of the pavement being rolled.

#### **302-1.5.2 ADJUSTMENTS**

Manholes, valve boxes, monument, boxes, etc. shall be brought to grade in accordance with City of Davis Standard Plans after final pavement lift has been placed. All adjustments of iron shall be made using new iron, boxes, etc., unless approved by the City Engineer. All manhole frames, lids or gates, valve boxes, monument boxes, and any other style of box or lid shall be reused where possible. Where required, new equipment shall be supplied by the Contractor at no expense to the City.

# 302-1.5.3 ACCEPTANCE SAMPLING AND TESTING OF ASPHALTIC CONCRETE

Prior to the use of materials, the Contractor shall submit to the City Engineer values from the tests required in Section 39 of the State Specifications.

Values from such tests shall meet the requirements in Section 39-2.02 of the State Specifications.

The City Engineer shall approve core locations for sampling to accomplish post-installation tests. Cores shall be a minimum of four inches (4") in diameter. The City reserves the right to require additional cores in the event that insufficient data was obtained from the original cores. At the direction of the City Engineer, the Contractor shall core and verify the asphalt concrete section.

During construction, sufficient testing shall be arranged to ensure that the following requirements are attained. Certified copies of all results shall be delivered to the City Engineer within 48 hours or work shall be suspended.

• Asphalt Content (California Test 310) or similar method as approved by the City Engineer

#### 302-1.5.4 DENSITY AND SMOOTHNESS

Upon completion, the pavement shall be true to grade and cross-section. When a ten foot long straightedge is laid on the furnished surface parallel to the centerline of the roadway, the surface shall not vary from the edge of the straightedge more than one-eighth inch, except at intersections or a change of grade. Any areas that are not within this tolerance shall be brought to grade immediately following the initial rolling.

The completed surfacing shall be thoroughly compacted, smooth, and free from ruts, humps, depressions, or irregularities. Any ridges, indentations or other objectionable marks left in the surface of the asphalt concrete by blading or other equipment shall be eliminated by rolling or other means. The use of any equipment that leaves ridges, indentations, or other objectionable marks in the asphalt concrete shall be discontinued, and acceptable equipment shall be furnished by the Contractor.

The compaction after rolling shall be 95 percent of the density obtained with the California Kneading Compactor per California Test Method #304. The field density of compacted asphalt concrete shall be determined by:

1. A properly calibrated nuclear asphalt testing device in the field, or

2. ASTM D1188 when slabs or cores are taken for laboratory testing. Zinc stearate may be substituted for paraffin.

In case of dispute, method (b), California Test #304, shall be used.

#### **302-1.7 FOG SEAL**

All paving, except bikepaths, shall receive a fog seal on the top course as soon after paving as is practical. It shall be the Contractor's responsibility to protect new paving from dirt and other objectionable material prior to fog sealing. If the pavement does become dirty prior to sealing, the Contractor shall clean it to the satisfaction of the City Engineer, prior to sealing. The Contractor shall take care to protect gutters, curbs, sidewalks, etc. during the fog sealing operation.

Fog seal shall conform to the provisions of Section 202-2, "Emulsified Asphalt," and shall be applied at a rate of 0.07 to 0.10 gallon per square yard.

#### 302-1.8 BIKEPATH SEAL COAT

All bikepath paving shall receive a seal coat on the top course as soon after paving as is practical. The seal coat material shall be as specified in Section 202-2, "Emulsified Asphalt." Fog seal will not be allowed. Seal coat shall be applied in two coatings. The second coat shall not be applied until the first coat has cured sufficiently in accordance with manufacturer's recommendations.

#### 302-1.8.1 WEATHER AND TEMPERATURE

The seal coat shall be applied only when the air temperature is at least 50°F and rising. Seal coat shall not be applied during or immediately after rainfall.

#### 302-1.8.2 SURFACE CLEANING

Prior to application, the pavement surface shall be thoroughly cleaned of all dirt, sand, and other foreign material using appropriate methods. All weeds and other vegetation shall be removed. All cracks shall be thoroughly cleaned of any foreign matter. Cracks wider than one-eighth inch shall be filled with a suitable crack filler.

#### **302-1.8.3 MIXING**

The sealer shall be mixed to a uniform free-flowing consistency. Water may be added, not to exceed 20 percent by volume, to obtain a semi-fluid consistency.

#### 302-1.8.4 APPLICATION PROCEDURE

In exceptionally hot weather, the surface shall be dampened with water, prior to application of the first coat of sealer. All excess water shall be removed so as to leave the surface only slightly damp.

The sealer shall be applied in continuous parallel lines. It shall be spread using rubber faced squeegees and/or mechanized spreading equipment. The second coat may be applied as soon as the first coat is dry to touch and will not scuff under normal walking. The finish surface shall be fully cured prior to opening the bikepath to traffic.

#### 302-1.8.5 RATE OF APPLICATION

The minimum rate of application shall be 30 gallons per 1,000 square feet (0.27 gallons per square yard), applied in two coats. The finish surface shall be smooth, uniform and free of ridges, bumps or coarse texture. The Contractor shall supply scale tags to the City showing material and quantity of gallons used on the project.

#### 302-2 SLURRY SEAL

#### **302-2.1 GENERAL**

Immediately prior to applying slurry seal, the street surface shall be cleaned of all loose material, silt, vegetation, and other objectionable material.

The Contractor shall protect existing concrete curb and gutters, maintenance hole covers, monuments, valves and cleanout covers and keep them clean and free of slurry seal mixture. They shall be protected by placing a covering of Kraft paper or equivalent prior to the slurry application. A film of solvent or diesel fuel is not acceptable. The Contractor shall be responsible for cleaning or replacing such utilities if they are not adequately protected from the slurry seal.

The Contractor shall make all arrangements for the temporary storage of materials. A written release shall be obtained from the property owner providing the facilities for such temporary storage. The release shall absolve and release the City of all responsibility resulting from the use of said storage site. A written copy of this release shall be delivered to the City Engineer.

#### 302-2.2 MIXING EQUIPMENT

The slurry seal shall be mixed and spread by a machine specifically designed and manufactured for this purpose. The machine shall be maintained in a good mechanical working condition for the duration of the Contract.

The Contractor shall provide evidence of calibration of all measuring devices, when requested by the City Engineer.

The machine shall be equipped to deliver accurate volumetric proportions of emulsion, water, and aggregate to the mixer. The machine shall be equipped with a pugmill mixer, capable of thoroughly blending all ingredients. The emulsion shall be delivered into the mixer by means of a positive displacement pump. The aggregate feeding device shall be connected directly to the drive for the emulsion pump. The machine shall pre-wet the aggregate immediately prior to mixing it with emulsion.

The mixing machine shall be equipped with a water pressure system and fog-type spray bar, adequate for complete fogging of the surface preceding spreading equipment. The minimum application rate shall be 0.05 gallon per square yard.

#### 302-2.3 SPREADING EQUIPMENT

The slurry mixture shall be uniformly spread by means of a controlled spreader box capable of spreading a traffic lane width. The spreader box shall have strips of flexible rubber belting or similar material on each side and in contact with the pavement to prevent loss of slurry from the box. The box shall have baffles, or other suitable means, to ensure uniform application on super-elevated sections and shoulder slopes.

The spreader box shall have a rear flexible strike-off blade which shall make close contact with the pavement. It shall be adjustable to match the various crown shapes so as to apply a uniform coating of slurry seal.

In areas inaccessible to the controlled spreader box, slurry mixture may be spread by other approved methods.

#### 302-2.4 PROPORTIONING

Asphaltic emulsion, as defined in Section 202-2, shall be added at a rate of 15 to 25 percent, by weight, of dry aggregate. If necessary for workability, a retarding agent may be used, provided that it does not affect the slurry seal. The quantities of water and retarder added, if any, shall be adjusted to insure proper workability. The amounts shall be adjusted such that bleeding, raveling, separating, or other distress will not occur when uncontrolled traffic is permitted on the slurry seal. Uncontrolled traffic will be permitted to return to the sealed street three hours after placement.

#### 302-2.5 PLACEMENT

The slurry seal shall not be placed when, in the opinion of the City Engineer, weather conditions will prevent the proper completion of the work. The slurry seal shall not be placed when the atmospheric temperature is below 65°F.

The slurry shall be applied at a rate of 8 to 12 pounds of dry aggregate per square yard. Before placing the slurry seal, the pavement surface shall be cleaned by sweeping, flushing or other means necessary to remove all loose particles of paving, all dirt and all other extraneous material.

Hand tools shall be available in order to remove spillage. Ridges or bumps in the finished surface will not be permitted.

The mixture shall be uniform and homogeneous after spreading on the road and shall not show separation of the emulsion and aggregate after setting.

Adequate means shall be provided to protect the slurry seal from damage by traffic until such time that the mixture has cured sufficiently.

# SECTION 303 PORTLAND CEMENT CONCRETE CONSTRUCTION

# 303-1 CONCRETE CURB, GUTTER, SIDEWALK AND DRIVEWAY CONSTRUCTION

#### **303-1.1 GENERAL**

The construction of curb, gutter, sidewalks, and driveways shall conform to the applicable Standard Plans. Unless otherwise specified, all curb, gutter, and sidewalk shall be placed monolithically.

Concrete shall conform to Section 201, "Concrete and Related Materials," and shall be Class A (six sack mix, 3,000 psi minimum). Concrete for all sidewalk and adjacent curb and gutter, whether or not placed monolithically, shall contain polypropylene fibers at a rate of 1.5 pounds per cubic yard of concrete.

#### 303-1.2 MIXING AND DELIVERY OF CONCRETE

Mixing of concrete shall conform to the provisions of Section 90-6, "Mixing and Transporting," of the State Specifications, except as modified herein.

Concrete shall be delivered to the jobsite in transit mix trucks for batches equal to or exceeding one cubic yard in size. Concrete shall be delivered in transit mix trucks or may be mixed in portable mechanical mixers for quantities between one cubic yard and 1/3 cubic yard. Concrete shall be mixed by one of the above methods or shall be mixed onsite in accordance with Section 90-6.05, "Hand Mixing," of the State Specifications, for batches less than 1/3 cubic yard. The City reserves the right to require concrete cylinders for all methods of mixing concrete.

The concrete shall be mixed continuously after batching and shall be thoroughly mixed prior to placement. Adequate provision shall be made to minimize delays in the delivery and placement of the concrete. A delay of over 90 minutes between batching and placing concrete in the forms shall be considered as reasonable cause for rejection of the work. Concrete so rejected shall be removed from the forms, disposed of and replaced with new concrete, all at the Contractor's expense.

Each batch of transit-mixed concrete delivered to the job site shall be accompanied by a Weighmaster's Certificate showing the volume of concrete, the weight of each ingredient, in pounds, and the date and time of batching. A copy of each Certificate shall be presented to the City Engineer.

The amount of water to be added and the regulation of water control equipment shall be subject to the approval of the City Engineer.

#### **303-1.3 ADMIXTURES**

The use of admixtures, except as specified herein, shall require approval of the City Engineer prior to their use. The Contractor shall submit a written request for the City Engineer's consideration. The request shall contain information about the proposed mix design and reasons for the use of the

admixture. All admixtures shall conform to the provisions of Section 90-4, "Admixtures," of the State Specifications.

The Contractor may use an air-entraining admixture to facilitate the use of any construction procedure or equipment. Air-entraining Admixtures shall conform to the requirements of ASTM Designation C260. The entrained air content, when tested in accordance with California Test Method 504, shall not be less than three percent nor more than five and one-half percent.

#### 303-1.4 POLYPROPYLENE FIBERS IN CONCRETE

All curb, gutter, and sidewalk and extruded median curb construction shall use concrete containing polypropylene fibers. The ticket for each load shall state the quantity of fibers added to the load.

#### 303-1.5 SUBGRADE PREPARATION

Subgrade shall be prepared in accordance with Section 301, "Subgrade Preparation and Placement of Base Materials." Upon completion and approval of the subgrade and alter the forms have been placed, a two inch thick layer of 3/4" aggregate base (A.B.) shall be placed. The A.B. shall be wetted and compacted to the satisfaction of the City Engineer.

#### **303-1.6** FORMS

Lumber used for forms shall have a true, smooth upper edge, shall be surfaced on the side to which concrete will be placed, and shall not be warped. Form lumber shall be not less than one and one-half inches in surfaced thickness. Benders or thin planks, half-inch minimum thickness, may be used on curves, grade changes, or at curb returns, if rigidly placed.

All forms shall be clean and shall be lightly coated with a form release oil which will prevent concrete from adhering to the forms.

All forms shall be carefully set to proper alignment and grade. Forms shall not vary from horizontal alignment by more than 0.05 feet nor from vertical grade by more than 0.02 feet.

Forms shall be held rigidly in place by the use of steel or wooden stakes set a maximum of five feet apart. Clamps, spreaders and braces shall be used as required to ensure rigidity. A dirt windrow shall be placed against the forms to stabilize them from bulging. Forms shall have smooth, even lines in both the horizontal and vertical planes.

Forms on the face of vertical curbs shall remain in place for over two hours, but less than six hours after the concrete has been placed. All other forms shall remain in place for at least 12 hours after concrete placement.

#### 303-1.7 SLIP FORM EQUIPMENT

Slip form equipment shall be provided with traveling side and top forms of suitable dimensions, shapes, and strength to support the concrete for a sufficient length of time during placement to

produce the required cross-section. The equipment shall spread, consolidate and screed the freshly placed concrete in such a manner as to provide a dense and homogeneous product.

The slip form equipment shall have automatic sensor controls which operate from an offset control line. The line and grade of the slip form equipment shall be automatically controlled.

#### 303-1.8 CONSTRUCTION JOINTS

A construction joint shall be placed at the end of curb returns and where concrete placed using slip form equipment joins with concrete placed using other methods. A construction joint shall also be used when fresh concrete joins with concrete that has been in place for 90 minutes or longer. The joint shall extend for the full depth through the curb, gutter and sidewalk at each location. The joints shall be at right angles to the face of curb.

A full depth expansion joint is an acceptable construction joint. Expansion joint material shall conform to Section 201-3, "Expansion Joint Filler."

An expansion joint shall be used when so required by the Plans or Specifications.

#### 303-1.9 DEEP TOOL JOINTS

Deep tool joints shall be placed at intervals of twelve feet in all curb, gutter and sidewalk construction. The joint shall extend for the full width of the curb, gutter and sidewalk at each location. The joints shall be constructed at right angles to the face of curb.

The joints shall be constructed a minimum depth of 25 percent of the thickness of the concrete, or minimum of one inch in depth, whichever is greater. The width of such joints shall not be less than one-eighth inch or more than one-fourth inch. Joints shall be made using an appropriate deep jointing tool or shall be made using removable strip forms.

Deep tool joints at back of curb or back of roll shall be a minimum of one and one-half inches deep.

#### 303-1.10 PLACING OF CONCRETE AND FINISHING

No concrete shall be placed or finished in the rain. It shall be the Contractor's responsibility to schedule the work accordingly.

Concrete shall be placed in such a manner as to prevent segregation of the aggregate and prevent the formation of voids or rock pockets. Freshly poured concrete shall be spaded and tamped or vibrated until thoroughly compacted. If for any reason, including the end of a day's work, work is terminated, a vertical, square-ended expansion joint shall be made. If a delay of 30 minutes or more occurs between batches, the new concrete shall be worked in to the old to ensure a uniform joint.

Particular care shall be taken to ensure that the final cross-section conforms to the Standard Plans. Prior to final finishing, all gutter slopes shall be checked by flowing a small quantity of water in the gutter. This check shall be made in the presence of the City Engineer. Any high spots or depressions

detected during this check shall be corrected during finishing so that water does not stand on the finished section.

All concrete surfaces shall be finished with steel trowels to the satisfaction of the City Engineer. Finishing shall be performed when the concrete is sufficiently plastic. After trowelling, the surface shall be given a light broom finish. All exposed edges shall be rounded and scoremarks placed as required by the City Engineer.

#### 303-1.11 MARKINGS FOR SERVICES

Water and sewer service locations shall be stamped on the top of vertical curb or the upper part of the roll on rolled curb. "S or "W" marks, as appropriate, shall be three inches high and one-fourth inch deep. Location of the marking shall be accurate within one-half foot.

#### 303-1.12 CURING OF CONCRETE

Immediately after the concrete has been finished, a curing compound shall be evenly applied to all exposed surfaces. Application shall conform to the requirements of Section 90-7.01B, "Curing Compound Method" of the State Specifications. The compound shall be applied so that it forms a uniform, water-impervious film, free from pinholes or other imperfections and shall not crack, peel, or disintegrate.

#### 303-1.13 REPAIRS AND REPLACEMENT OF CONCRETE

Existing concrete shall be sawcut to existing scoremarks or expansion joints prior to removal. Minimum depth of sawcuts shall be one and one-half inches or 25 percent, of the concrete thickness, whichever is greater. The edges remaining after removal shall be square, uniform, and with no chips or spalling. Replaced portions of concrete shall be finished to match existing surfaces.

Minor depressions or high spots may be repaired by application of epoxy or grinding, respectively, if prior approval is given by the City Engineer.

#### 303-1.14 EXTRUDED BARRIER CURB

Extruded concrete curb shall be anchored to existing pavement by an adhesive. The existing surface of the pavement shall be thoroughly cleaned prior to the application of the adhesive. The pavement shall be cleaned either by wire brushing or by blast cleaning, and as directed by the City Engineer. The cleaned surface shall be free from dust, moisture, loose material, and oil.

#### 303-2 CONCRETE STRUCTURES

Concrete structures shall conform to the provisions of Section 51, "Concrete Structures," and Section 90, "Portland Cement Concrete," of the State Specifications.

### SECTION 304 UNDERGROUND PIPELINE CONSTRUCTION

#### 304-1 **DEFINITIONS**

#### 304-1.1 TRENCH DEFINITION

For the purposes of these Specifications, a trench is defined as an excavation in which the total depth is greater than the width of the bottom of the excavation. All other types of excavation and earthwork operations shall comply with the provisions of Section 300, "Removals, Excavation and Earthwork."

#### 304-1.2 APPURTENANT EXCAVATION

Excavations for appurtenant structures including, but not limited to, maintenance holes, pipelines, transition structures, junction structures, vaults, valve boxes, catch basins, thrust blocks and boring pits shall, for the purposes of these Specifications, be deemed to be in the category of trench excavation.

#### 304-1.3 ADDITIONAL DEFINITIONS

For the purposes of these Specifications, the following definitions shall apply:

BACKFILL means either initial backfill or final backfill

BEDDING means all material supporting the pipe from the bottom of the excavation to the bottom of the pipe or conduit. Bedding shall be a minimum of four (4) inches in depth for all pipe materials.

FINAL BACKFILL means all material placed between the initial backfill and to the bottom of the subgrade in paved or gravel surfaced areas or to the top of the finished grade in unsurfaced areas.

IMPROVEMENT AREA means any area within the City's right-of-way.

INITIAL BACKFILL means all material placed above the bedding to 12 inches above the top of the pipe.

SPECIAL IMPROVEMENT AREA means any area identified as a Special Improvement Area on the Plans or in the Special Provisions for which all requirements for an Improvement Area shall apply.

#### 304-2 GENERAL REQUIREMENTS

Excavation for all underground pipelines and conduits shall be by open trench, unless otherwise specified or shown on the plans. Excavation by any other method requires the prior approval of the City Engineer.

Trenching shall be accomplished by approved trenching machinery, capable of maintaining the designed grade. Methods used in excavation shall not cause damage to surrounding property or

damage pavement and other existing improvements that are to remain. Outriggers for excavation and other heavy equipment shall be fitted with street pads to prevent pavement damage.

All trenches shall be excavated vertically wherever possible, but in no case shall the walls deviate from vertical between the bottom of the trench and approximately one foot above the top of the pipe. Additional requirements for trenching are shown on the various City Standard Plans included in Part 4 of these Specifications or may be included in the project Plans or Special Provisions.

Attention is directed to the provisions of Section 7-9, "Preservation of Property." Permission to use any particular method of excavating and backfilling, including specific equipment shall not be construed as guaranteeing or implying that the use of such equipment will be appropriate for the situation. The Contractor shall conduct backfill and compaction operations such that existing improvements are saved from damage, and such that the adjacent ground does not shift or settle so as to cause damage to existing improvements, whether or not said improvements are a part of the work.

#### **304-3 SAFETY**

#### **304-3.1 GENERAL**

Attention is directed to the provisions of Section 5-2.1, "Trench Excavation Safety Plans," and Section 7-1.10, "Trench Safety."

Prior to the excavation of a trench five feet in depth or greater, and into which a person will be required to descend, the Contractor shall first obtain a permit from the State Division of Industrial Safety. Upon request, the Contractor shall provide the City Engineer with a copy of the permit. In the event that the permit expires, is revoked, or is otherwise invalidated, the Contractor shall notify the City Engineer immediately, in writing.

#### 304-3.2 SHORING AND BRACING

The minimum requirement for the manner of shoring and bracing excavations shall be as set forth in the Rules, Orders, and Regulations of the Division of Industrial Safety of the State of California.

Contractors may be required, at the discretion of the City Engineer, to provide drawings or calculations by a registered engineer five (5) working days prior to beginning construction for specially designed bracing and shoring of an excavation where standard pre-manufactured bracing or shoring cannot be used.

Contractors shall submit a copy of their current Annual Excavation Permit issued by the State of California Division of Industrial Safety (Cal-OSHA) with the Contractor's Trench Safety Plan prior to the start of construction.

After the pipeline has been installed and sufficiently backfilled to protect the pipe, all shoring, bracing, and sheeting shall be removed. All voids left by the removal of such bracing shall be carefully filled with material used for backfill compacted in place.

#### 304-3.3 ACCESS TO TRENCHES

Safe and suitable ladders shall be provided for all trenches four feet or greater in depth. Ladders shall project three (3) feet above the top of the trench excavation and shall be secured in place. One ladder shall be provided for each 50 feet of open trench, or fraction thereof and shall be located so that workers in the trench need not move more than 25 feet to a ladder.

#### 304-4 HORIZONTAL AND VERTICAL ALIGNMENT

All pipe lines shall be laid true to plan line and grade, within the tolerances specified for the various types of facility. Laser equipment shall be used to provide horizontal and vertical control. Approval for any other method of maintaining control shall be obtained from the City Engineer prior to start of construction.

The laser equipment used shall be of a type compatible for the use intended and shall be used only by properly trained workers. The laser equipment shall be in good working condition, and shall be properly adjusted and calibrated.

Control markers used for setup of the laser equipment shall consist of good sound construction stakes. Control markers shall be nominal "two-by-two" (2"x2"), six inches long, wood stakes set in firm, stable ground. The stakes shall be driven flush with the ground surface. Alternate methods of providing control markers, which are substantially the equivalent to the above, may be used depending on ground conditions.

Construction stakes shall also be provided at intervals not to exceed 50 feet on straight runs. On curved runs, both horizontal and vertical, stakes shall also be provided at intervals not to exceed 25 feet. Each stake location shall consist of a hub, driven flush with the ground surface, and a long lath, appropriately marked and flagged. A nail and shiner and painted messages shall be used on pavement surfaces. Such staking shall provide the station and offset to the sewer main as well as the cut to eh nearest one-tenth foot (0.10').

#### 304-5 EXCAVATION

Placement of spoil materials on the paved street shall not be allowed.

#### 304-5.1 MAXIMUM LENGTH OF OPEN TRENCH

The maximum length of open trench, where prefabricated pipe or other structure are to be placed, shall be 200 feet, or the distance necessary to accommodate the amount of pipe installed in a single day, whichever is greater, unless otherwise permitted by the City Engineer. The length of open trench includes open excavation, pipe laying and appurtenant construction, and backfill which has not been temporarily resurfaced.

The maximum length of open trench for cast-in-place concrete pipe shall be that length for 2-1/2 days work (trench in which pipe was placed during the previous 24 hours plus the trench required for the next day's work plus additional trench one half the length of the trench required for the next day's work).

All trenches or excavations within a sidewalk area or driveway shall be covered with steel plates. The use of plywood for open trench or excavation cover shall not be allowed within or adjacent to City right-of-way.

The remainder of the trench shall be backfilled and compacted, and when in streets, opened to traffic as soon as possible.

Failure by the Contractor to comply with the above limitations may result in an order to halt the work until such time as compliance has been achieved.

#### 304-5.2 TRENCH WIDTH

Trenches shall be excavated to a width that will provide adequate working space and will permit the proper placement of bedding and initial backfill. The maximum width of trench shall be as shown on the Plans, as specified in the Special Provisions, or as shown on Standard Plan 201-1.

Additional width may be required to permit placement of shoring, bracing, and appurtenances in accordance with trench safety requirements. In the event that, due to adverse soil or other conditions, a vertical wall cannot be maintained to approximately one foot above the top of pipe, or if the trench width exceeds the maximum width as specified above, special bedding or backfill methods, a higher strength pipe, or any other additional work as required or approved by the City Engineer to adequately install and protect the pipe equal to the original design, shall be employed at no additional cost to the City.

#### 304-5.3 OVEREXCAVATION

Whenever, in the opinion of the City Engineer, the bottom of the trench is soft, spongy, unstable, rocky, or otherwise unsuitable as a foundation for pipe bedding, the unsuitable material shall be removed to a minimum depth of six (6) inches or to a depth designated by the City Engineer.

If material more than twelve (12) inches below the trench bottom is ordered removed by the City Engineer, the excavation below that point and the imported material required to backfill the trench to that elevation will be paid for as extra work as provided in Section 4-3.4 unless otherwise specified in the Special Provisions.

If any trench is excavated below the bottom grade as shown on the plans, it shall be refilled to grade with the bedding material appropriate to the system under construction, and compacted to a relative compaction of 90 percent. If such overexcavation is due to the neglect or error of the Contractor, all labor and material shall be at the Contractor's expense.

#### 304-6 BACKFILL AND COMPACTION

#### **304-6.1 GENERAL**

Bedding for the various types of pipe and conduit shall be installed as required in these Specifications and as shown on the appropriate City Standard Plans.

The Contractor shall proceed with backfilling operations as soon as possible after pipe installation, except as otherwise required. Care shall be exercised so that the pipe will not be damaged or displaced during backfilling and compacting operations.

Backfill shall not be dropped directly upon pipe. To prevent longitudinal movement of the pipe, dumping backfill material into the trench and then spreading will not be permitted until material has been placed and compacted to a level 1-ft over the pipe.

Except for drain rock materials being placed in overexcavated wet areas, backfill shall not be placed until after all water is removed from the excavation

Any portion of the trench that exceeds six feet in width shall be considered earth fill and shall be backfilled in conformance with the provisions of Section 300-3, "Earth Fill Construction."

#### **304-6.2 BEDDING**

Bedding shall provide uniform and continuous support along the barrel of the pipe. Blocking of the pipe is not permitted.

Bell holes shall be excavated per the manufacturer's recommendations. The minimum depth of bedding material shall be placed under the bell. Care shall be taken to ensure that the bell hole is no larger than necessary to accomplish proper joint assembly.

#### 304-6.3 INITIAL BACKFILL

Extreme care shall be taken when consolidating the backfill around the pipe. For pipe 12 inches in diameter and smaller, no more than one-half of the pipe shall be covered prior to shovel slicing the haunches of the pipe. For pipe greater than 12 inches in diameter, no more than 6 inches shall be covered prior to shovel slicing. Sufficient care shall be taken to prevent movement of the pipe and damage to the polyethylene encasement during shovel slicing. Shovel slicing shall be witnessed by the City inspector.

Compaction equipment shall not make direct contact with the pipe.

Initial backfill shall be of the same material that was placed for the bedding. Initial backfill shall be compacted under the haunches of the pipe.

When groundwater is encountered or where the pipe is to be installed below historic groundwater levels, the trench shall be kept dry until the bedding material is placed and compacted, pipe placed, initial backfill is placed and final backfilling of the trench or excavated area is at least fifty percent (50%) complete. A geotextile fabric barrier shall be placed around the initial backfill and between the initial backfill and final backfill.

#### 304-6.4 FINAL BACKFILL

Final backfilling shall take place after the initial backfill has been inspected and accepted.

Trenches less than or equal to six inches in width (i.e. narrow trenches) shall be backfilled and compacted in accordance with Standard Plan 201-1, "Trench Details."

For trenching within City streets, all of the backfill material above the initial backfill to subgrade shall conform to the requirements for Class 2 Aggregate Base. The backfill shall be compacted so as to achieve a minimum relative compaction of 95 percent. Upon approval of the City Engineer, slurry cement backfill in accordance with Section 200-8 may be substituted as backfill. No backfill, equipment, or other loads may be placed atop slurry cement backfill until it has attained sufficient strength in accordance with ASTM D6024.

For trenches that are not within City streets, native material providing that the native material is free of rocks, rubbish, debris, and other unsuitable material. The backfill shall be compacted so as to achieve a minimum relative compaction of 90 percent, and the top lift shall be thoroughly wheel-rolled with equipment to the satisfaction of the City Engineer. When the required compaction cannot be achieved using native material, aggregate base material shall be required at no additional expense to the City.

Where not otherwise required, the final backfill material shall be finely divided so that no rocks or clods shall exceed two and one-half inches in greatest dimension. Native material, broken concrete or asphalt concrete obtained from excavation on the project will be permitted, subject to the maximum particle size requirement. In the event that broken concrete or A.C. is included in the backfill, it shall be adequately mixed with other material so as to eliminate voids. Organic material or other deleterious substances shall not be included in the backfill.

#### 304-6.5 COMPACTION

All backfill shall be mechanically compacted. Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will achieve the required compaction results or will not result in damage to adjacent structures, existing improvements, surrounding ground or improvements being installed. The Contractor shall be completely responsible for obtaining the required compaction. The Contractor is required for notifying the City Engineer when compaction testing is to be completed.

The maximum lift thickness allowed will be determined by the method used to compact and densify the backfill, but shall never exceed 1 foot. After the placing of backfill has been started, the Contractor shall proceed with compaction as soon as practicable.

All trench backfill shall be tested for compaction after every two (2) vertical feet of backfill. Trench backfill that is not tested shall be considered as backfill that has failed compaction. All backfill that has failed compaction test shall be removed and the trench backfill recompacted.

The Contractor shall be responsible for all costs to retest any previously failed compaction tests along with any additional staff time.

#### 304-6.5.1 BACKFILL COMPACTION BY MECHANICAL METHODS

Backfill shall be mechanically compacted by means of tamping rollers, sheepsfoot rollers, or other mechanical tampers. All such equipment shall be of a size and type satisfactory to the City Engineer.

Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will achieve the required compaction results or will not result in damage to adjacent structures, existing improvements, surrounding ground or improvements being installed. The Contractor shall be completely responsible for obtaining the required compaction. The Contractor is required to notify the City Engineer when compaction testing is to be completed.

Impact-type pavement breakers (stompers) will not be permitted over any pipe material unless there is a minimum of five feet of cover over said pipe.

Material for mechanically compacted backfill shall be placed in horizontal lifts which, prior to compaction, shall not exceed the depths specified below for the type of equipment used:

- a) Impact, free-fall or "stomping" equipment; shall not be used as a means of compaction;
- b) Self-propelled vibratory equipment, including vibratory smooth-wheel rollers and vibratory pneumatic-tired rollers; maximum lift depth of two feet;
- c) Portable engine driven jumping-type compactors and backhoe boom-mounted vibratory type compactors; maximum lift depth of one and one-half (1½') feet;
- d) Self-propelled rolling equipment, including vibratory and static sheepsfoot, grid, static smooth-wheel, static pneumatic-tired, and segmented wheeled; maximum depth of one foot; and
- e) Hand directed pneumatic tampers and portable vibratory plates; maximum lift depth of four inches (0.33 feet).

Each layer shall be evenly spread, moistened (or dried if necessary), and then compacted so as to attain a minimum relative compaction of 95 percent.

All trench backfill shall be tested for compaction after every two-(2) vertical feet of backfill. Trench backfill that is not tested shall be considered as backfill that has failed compaction. All backfill that has failed compaction test shall be removed and the trench backfill recompacted.

The Contractor shall be responsible for all costs to retest any previously failed compaction tests along with any additional staff time.

#### 304-6.5.2 BACKFILL COMPACTION BY WATER-JETTING

Compaction by jetting or excess moisture conditioning will not be permitted except by written permission of the City Engineer.

The purpose of jetting shall be to accomplish consolidation and compaction of the backfill material by using water. All air pockets and voids shall be removed during the jetting operations. Jetting will

also include removal of excess water from the backfilled trench. Any liquid substance, chemical or other additive, other than water, shall not be added to the water or used on the backfill material during jetting operations.

Jetting will only be allowed when the backfill material is a suitable granular, free draining soil. The adjacent soils shall also be free draining such that the water rapidly drains out of the trench backfill. If the adjacent soils are not free draining (i.e., predominantly clays and silts), then the Contractor shall provide a means of rapidly removing the water from the trench. This may be accomplished by providing weep holes in the bottom of maintenance holes and using a pump to evacuate the water. The weep holes shall be filled with grout after completion of backfill operations.

Jetting shall be accomplished by the use of a steel pipe at least two inches in diameter. The pipe shall be long enough to reach to the bottom of the trench. A hose shall be attached which carries a continuous supply of water under pressure.

The Contractor shall apply water in a manner, quantity and rate sufficient to thoroughly saturate the thickness of the lift being jetted. In no case shall the lift thickness exceed five feet of loose material. The jetting pipe shall be shoved down into the trench at four foot maximum intervals along the trench. The trench shall be jetted until, after five minutes, water shall show on the surface.

When the required compaction or consolidation cannot be attained by jetting alone, the Contractor shall employ additional methods to achieve the required results.

#### 304-7 TEMPORARY AND PERMANENT RESURFACING

Initial cut in street pavement shall be equal to the width of the trench with the option of being jack hammered or saw cut. Drop hammer shall not be used to cut pavement. Final cut in street pavement shall be 12" wider than the trench width (6" each side) and shall be saw cut in neat, parallel lines.

Temporary resurfacing shall be placed and maintained wherever excavation is made through existing pavement. The temporary resurfacing shall be maintained in such a way as to provide for the safety and convenience of the public.

Temporary resurfacing shall be placed as soon as the condition of the backfill is considered by the City Engineer to be suitable to receive such resurfacing. It shall remain in place until the City Engineer determines that the condition of the backfill is suitable for permanent resurfacing.

When ordered by the City Engineer, the Contractor shall immediately proceed to place any temporary resurfacing. Upon the Contractor's failure to comply in a timely manner with such an order, the City Engineer may cause such work to be performed by other forces. Payment for such work performed by other forces will be deducted from money which may become due to the Contractor, or the City Engineer will require that payment for such costs be paid to the City prior to final acceptance of the Contract.

Final paving above the trench section shall be placed within 14 days of its backfill and compaction. Extension may be granted by the City Engineer due to weather conditions. In the event paving is not done within 14 days, the City will consider this as incomplete work and will take necessary action in accordance with the prevailing City ordinances and policies.

Temporary surfacing shall be removed before placement of final surface. Final surfacing shall be placed on undisturbed, previously inspected and compacted aggregate base or approved slurry cement backfill. Re-compaction shall be required for any disturbed base or surface. Edges of permanent patches shall be crack sealed with rubberized crack sealer (Crafco or approved equal) in accordance with manufacturer instructions prior to acceptance.

All temporary and permanent resurfacing shall conform to the applicable City of Davis Standard Plans.

### SECTION 305 WATER SYSTEMS

#### 305-1 TRENCH EXCAVATION AND BACKFILL

All trench excavation and backfill shall be performed in accordance with the provisions of Section 304, "Underground Pipeline Construction."

#### 305-2 HANDLING OF MATERIALS

All pipe and appurtenances shall be handled as per manufacturer's recommendations. Material identified as not meeting specifications shall be removed from the work site immediately.

All pipes, valves, fittings, and appurtenances shall be lowered into the trench in such a manner as to prevent any damage, particularly to the lining and coating. If such damage should occur, the coating shall be repaired to the satisfaction of the City Engineer. When required by the City Engineer, approved slings shall be used to lower the pipe. Under no circumstances shall pipe or accessories be dropped into the trench.

Pipe loaded on trucks or stacked one upon another shall be supported on wooden blocking. Pipe handled on skidways shall not be skidded or rolled against pipe already on the ground.

#### 305-3 LINE AND GRADE

Line and grade shall be maintained in accordance with the provisions of Section 304-4, "Horizontal and Vertical Alignment."

Water mains shall not vary from plan grade by more than 0.2 feet, nor from plan alignment by more than 0.2 feet.

#### 305-4 TRENCH BOTTOM

Before individual sections of pipe are lowered into the trench, bell-holes shall be hand dug for the pipe joints.

When the pipe material or field conditions require bedding, the trench shall be over-excavated in accordance with the Standard Plans and approved bedding material shall be placed and appropriately compacted.

If the bottom of the excavation is found to consist of rock, or any hard pan material that by reason of its hardness cannot be excavated to give a uniform bearing surface, said rock and other material shall be removed to at least four inches (4") below the bottom of the pipe and be refilled to grade. This shall be performed at the Contractor's expense for all labor and material, with clean sand thoroughly tamped into place.

#### 305-5 PIPE LAYING

Any earth or other rubbish which may have lodged inside any sections of pipe, valves or fittings, must be carefully wiped out so that the sections are clean as they are laid.

All open sections of pipes or fittings in the trench shall be capped, plugged or sacked and tied in an acceptable manner if left unattended for any period of time including at the end of each day. Buckets, pieces of wood or rags are not acceptable methods of plugging or capping.

Each pipe section must be given a solid uniform bearing in the bottom of the trench. Blocking or placing pipe on mounds of soil will not be permitted. Bell holes must be dug so that none of the pipe weight will rest on the bell. Bell holes must not be longer than necessary to accommodate the bell and necessary working space.

When necessary to use a short length of pipe between fittings or valves, the minimum length of pipe shall be 32" or as approved by the City Engineer. Whenever it is found necessary to cut pipe, said cut shall be made with an approved pipe cutter. The use of hammer and chisel for pipe cutting will not be permitted.

In addition, ductile iron water pipe shall be installed in accordance with AWWA M41 and PVC water pipe shall be installed in accordance with AWWA C605 and M23 except as modified herein.

#### 305-5.1 PVC PIPE INSTALLATION

PVC pipe shall be installed in accordance with AWWA C 605 and M23 except as provided as follows:

The trench shall be excavated to a minimum of four inches below the bottom of the pipe until foundation soils are found to be firm and non-yielding. The trench will then be backfilled with sand conforming to Section 200-6. The bedding shall be graded so that the barrel of the pipe rests uniformly on the bedding throughout its entire length. Bell holes shall be hand excavated.

After the pipe has been laid and checked for proper grade, additional sand will be placed under the haunches of the pipe and to the level of the spring-line of the pipe.

- Pipe and gaskets shall be kept clean and protected against sunlight and heat damage.
- Pipe showing signs of physical damage or excessive ultraviolet exposure will be rejected and shall be immediately removed from the job site.
- The pipe shall be installed with the manufacturing label showing on the top.
- A ¼-inch gap shall remain between the end of the pipe and full insertion depth. The reference mark or stab line on the spigot end must be flush with the bell end and visible for inspection.
- Pipe ends shall be cut square, deburred, beveled, and cleaned.

• The beveled end of the pipe shall be cut off before placement into a mechanical joint.

- Minimum length of pipe for installation shall be 5 feet.
- The weight of metallic fittings and valves shall not be carried by the PVC pipe. For pipe sizes 4" through 12", the weight of such appurtenances shall be supported either by redwood blocks, precast concrete slab or blocks, or by a cast-in-place concrete cradle.

## 305-6 JOINT ASSEMBLY

All push-on type joints shall be assembled by cleaning the groove, installing the gasket in the correct direction and making sure that the gasket is fully seated. Then all soil shall be removed from the socket and the recommended lubricant applied. Lubricant shall be non-toxic and NSF-approved. The lubricant shall be supplied in sterile containers and work conditions shall be such that the container is kept as clean as possible.

If the plain end of the pipe section was field cut, then the cut edges shall be beveled so that gasket is not damaged or dislodged during assembly. Deflections in the completed main shall only be made after each joint is assembled. In no case shall the deflection exceed the maximum as set forth by the manufacturer for the type of pipe used.

For mechanical type joints, the outside of the spigot and the inside of the pipe bell shall be thoroughly cleaned of foreign matter. The gland and gasket shall then be slipped on the spigot end of the pipe. The gasket shall be pressed evenly into the bell only after the spigot is seated in the bell. The gland shall be brought up evenly by tightening alternately the nuts spaced 180 degrees apart.

On flanged joints, the bolts shall meet the requirements of AWWA C207. The bolts shall be uniformly tightened.

## 305-7 POLYETHYLENE ENCASEMENT

All ductile iron pipe shall be encased in loose polyethylene wrap in accordance with the provisions of AWWA C105.

## 305-8 VALVES AND HYDRANTS

Valves and hydrants shall be set in a vertical position. Fire hydrant installation shall conform to the City of Davis Standard Plan No. 101-1, "Fire Hydrant."

The Contractor shall install the blue, two-way reflectorized pavement marker after completion of paving operations. Except as modified herein, placement shall conform to the requirements of Section 85, "Pavement Markers," of the State Specifications. The marker shall be placed one foot off of street centerline, toward the fire hydrant. When the hydrant is on a corner, a marker shall be placed on each street.

## 305-9 THRUST BLOCKS

Thrust blocks shall be poured against undisturbed soil. They shall be poured so bolts on mechanical joint and flange fittings shall be exposed. The minimum size and location of thrust blocks shall conform to City of Davis Standard Plan No. 101-2, "Thrust Block Bearing Area."

## 305-10 INSTALLATION OF SERVICES

Water services, including water meters, shall be installed in accordance with applicable City of Davis Standard Plans. Where services are to be installed in existing improved streets, the service shall be bored unless otherwise indicated in the Special Provisions.

The water service line shall be considered part of the main for the purpose of hydrostatic testing.

## **305-10.1 SERVICE TAPS**

The water main shall be tapped at a position perpendicular to the axis of the main and from 0 to 45 degrees above the horizontal at a location as nearly opposite of the meter location as possible.

Service taps on water mains shall be spaced a minimum of two feet apart. Where water services connect to both sides of the water main, connections shall be alternated. Service taps shall not be made within two feet of the back of the bell or from the spigot insertion line.

The main shall be tapped with an approved type combination drilling and tapping machine equipped with a (Mueller) thread tap. The drill and tap shall be properly lubricated during the drilling and tapping process to ensure true, clean-cut threads. No direct tapped connections will be allowed on PVC or ductile iron pipe.

PVC water mains shall be tapped with a shell cutter only; hole saws shall not be used. Shell cutter shall be suitable for thick-walled PVC pipe. Shell cutter shall have a minimum of two slots and shall retain the coupon. Cutter shall direct the shavings into the throat of the shell cutter.

Saddles shall be installed on all service connections on PVC and ductile iron water mains per Section 203-8.2.

#### 305-10.2 SERVICE SADDLE INSTALLATION

All services shall be attached to PVC and ductile iron water mains with saddles. Where saddles are to be installed, the tap opening shall have a diameter equivalent to the size of service to be installed.

Service saddles shall be wrapped and sealed in 8-mil minimum thickness polyethylene and backfilled with sand. Use pipe wrap tape to secure and seal the polyethylene wrap.

## 305-10.3 CORPORATION STOP INSTALLATION

Prior to threading the corporation stop into the main, the threads of the stop shall be thoroughly coated with an approved type thread lubricant.

During the threading operation, care should be taken not to thread excessively. After corporation stops are installed, 1/4" of threads on the stops shall be left exposed above the surface of the water main.

The corporation stop shall be turned to a final position which will prevent any leakage or weeping and which will allow operation of the operating key from the top, unless otherwise directed by the City Engineer.

## 305-10.4 SERVICE LINE INSTALLATION

The copper or polyethylene service tubing shall be installed as shown on Standard Plan 10 1-5.

Copper tubing will be rejected if it is kinked, flattened, or otherwise damaged, whether before, during or after installation.

Metallic service lines shall be encased in 8-mil minimum thickness poly tubing and backfilled with sand. Use pipe wrap tape to secure and seal the polyethylene wrap.

Metallic service lines shall also require anode installation per Standard Plan 101-12. Anodes shall be installed in a vertical position and shall be saturated with 20 gallons of water prior to backfilling.

When boring is used, the diameter of the drill to be used shall be no larger than is necessary to provide sufficient clearance for the copper tubing, without causing damage to the structural section of the street. Prior to inserting the copper tubing, the end shall be plugged in a manner that will prevent any material from entering the pipe.

Between the water main and the angle meter stop, an "S" type curve shall be introduced into the tubing in order to provide flexibility between the service and the water main. Whenever a splice is made on 1-1/2" and 2" diameter copper services, it shall be made with an approved compression connector or made with an approved brazing compound. Splicing of 1" diameter copper services will not be allowed.

When the angle meter stop has been connected, the operating key shall be upright and the axis through the stop shall be perpendicular to the top edge of the sidewalk.

No water shall be drawn through a service prior to installation of the water meter and testing of the backflow assembly.

The curb in front of residential water services shall be stamped with a "W."

## 305-10.5 WATER METER INSTALLATION

Water meters shall be installed in accordance with the details shown in the Standard Plans. Contractor shall install a meter box with a water meter.

Special care shall be exercised to insure proper compaction shall be made under and around the meter box so the meter remains level.

When multiple meters are installed to serve one parcel, labels shall be attached to the meter per Section 203-8.9.

## 305-10.6 TIE-IN LARGE DIAMETER WATER MAINS OR SERVICE MAINS

All tie-ins shall be accomplished by cutting the existing main and using tees or crosses. Solid body, ductile iron sleeves shall be used to reconnect the main. Any shut-downs of the existing mains shall be as directed by the City Engineer.

Hot taps will be acceptable only if permitted by the City Engineer.

#### **305-11 BLOWOFFS**

Dead-end lines, permanent and temporary, shall have a blow-off constructed per City of Davis Standard Drawing No. 101-4, Blowoff Installation, and marked with a Carsonite marker.

## 305-12 DISINFECTION AND FLUSHING

Disinfection inspections shall begin only after passing the pressure test.

The Contractor shall not connect any new water main installation to the existing City mains, before making arrangements with the City Engineer for the testing and disinfection of the new installation. Disinfection shall be accomplished by the Contractor. The method by which such disinfection is accomplished shall be subject to the approval of the City Engineer. The procedures used for disinfection and flushing shall conform to the requirements of the AWWA C651, except where modified herein. Water from the existing distribution system or other source of supply shall be controlled so as to flow slowly into the newly laid pipe line during the application. The temporary connection to the existing system shall be isolated by installation of an approved and tested Reduced Pressure Principal (RP) backflow assembly. The method by which the chlorine is introduced into the system shall be the responsibility of the Contractor.

Sufficient chlorine shall be added to achieve 100 ppm after 3 hours of contact (slug method).

Following chlorination, all treated water shall be thoroughly flushed from the water main. All water mains shall be adequately flushed to the satisfaction of the City Engineer. Upon completion of flushing, water sample(s) will be drawn for bacteriological examination. Two consecutive sets of samples shall be taken at least 24 hours apart. Should the initial treatment fail to produce satisfactory disinfection of the piping and the pipelines as determined by the bacteriological tests, the chlorination procedure shall be repeated at the Contractor's expense until acceptable results are obtained. The initial sample cannot be taken on a Friday unless authorized by the City Engineer. The final connection to the existing City water system shall be performed within five working days of receipt of notice of satisfactory bacteriological testing.

## 305-13 PRESSURE TEST AND LEAK TEST

Initial backfill and all reaction blocking shall be installed prior to making a hydrostatic test.

The Contractor shall leave all joints, corporation stops, curb stops and other fittings uncovered until testing has been completed.

Water for testing may be obtained at existing fire hydrants at no cost to the Contractor for water used. However, a Fire Hydrant Encroachment Permit must be obtained from the Public Works Department and the appropriate fee paid prior to such use. Backflow prevention devices shall be used at all times to isolate the new construction from the existing City water system. City will assume no responsibility for the water tightness of any water valves during the test.

The Contractor shall satisfactorily ascertain that the system is ready for hydrostatic and leakage testing prior to performance of such tests. The tests shall be performed as directed and as witnessed by the City Engineer, tested as follows:

- 1. Each valved section of pipe shall be slowly filled with water. An approved test pump shall be connected to the pipe in a manner satisfactory to the City Engineer. Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants or blowoffs are not available at high points, taps at points of highest elevation shall be made before the test and brass plugs inserted after completion of the test.
- 2. The pipe shall be subjected to a hydrostatic test pressure of not less than 150 psi.
- 3. All pipe, fittings, valves, hydrants and joints will be carefully examined during the test. Any cracked or defective pipe, fitting, valve, hydrant or joint discovered as a consequence of this pressure test shall be removed and replaced with sound material and the test shall be repeated until satisfactory results are obtained, as determined by the City Engineer.
- 4. In conjunction with the foregoing test, a leakage test shall be conducted at 150 psi. as per AWWA C600 or AWWA C605 as appropriate for the pipe material. The maximum permissible leakage during the 2 hour test shall be determined by the appropriate formula:
  - a. Formula for ductile iron pipe:

$$Q = \frac{L * D * \sqrt{P}}{133,200}$$

where

Q = allowable leakage (gallons per hour, gph)

L = length of test pipe (ft)

D = nominal diameter (in)

P = test pressure (150 psi)

Allowable leakage, gallons per hour per 1,000 feet						
Diameter	4"	6"	8"	10"	12"	14"
Gallons per Hour	0.4	0.6	0.7	0.9	1.1	1.3

b. Formula for PVC pipe:

$$Q = \frac{L * D * \sqrt{P}}{148,000}$$

where Q = allowable leakage (gallons per hour, gph)

L = length of test pipe (ft) D = nominal diameter (in)

P = test pressure (150 psi)

Allowable leakage, gallons per hour per 1,000 feet						
Diameter	4"	6"	8"	10"	12"	14"
Gallons per Hour	0.3	0.5	0.7	0.8	1.0	1.2

## 305-14 CONNECTIONS

Shut downs of and connections to existing City mains shall only be made in the presence and under the supervision of the City Engineer. The developer or contractor shall pay the appropriate fees prior to being connected.

Where shut downs affect water users on the existing mains, the Contractor shall schedule his shut downs to cause as little inconvenience to the users as possible. Shut down times shall be subject to prior approval by the City Engineer. The Contractor shall notify all affected users in writing at least 24 hours in advance of service interruption. The Contractor shall also request the City Engineer to notify the City Water Division personnel at least 24 hours in advance to schedule valve closing for service interruption.

Manipulation of existing valves shall only be done by or under the direction of City Water Division personnel.

## 305-15 INSTALLATION OF VALVE BOXES

Installation of valve boxes shall conform to the City of Davis Standard Drawing No. 101-3, Water Valve Box.

#### 305-16 ABANDONMENT OF SERVICES

An Encroachment Permit shall be obtained by the Contractor from the Public Works Department prior to commencing work to abandon an existing water service. The work to abandon the service shall be performed in the following order:

1. Locate and expose the valve and/or corporation stop at the water main (usually in the street). Turn the valve and/or corporation stop to the closed position and secure it. Disconnect service from the valve, cap service and solder in place.

- 2. Locate and expose the service side end of the service to be abandoned. Remove a minimum 2' in length segment of service line to the back edge of sidewalk, curb or paved bikepath. Cut, cap and plug both ends of the service. After inspection, encase in concrete the end of the service under the back edge of the sidewalk, curb or bikepath.
- 3. Notify the City Engineer at least 24 hours in advance of backfill placement for inspection.
- 4. Backfill, compact and replace any concrete or pavement in accordance with other sections of these Specifications.

## 305-17 REPAIRING INSTALLED IMPROVEMENTS

All PVC and DIP water mains shall be repaired per the following procedures:

- Damaged or failed pipe sections shall be removed and replaced with new pipe in the presence of the City Engineer. Replacement can be accomplished by the use of City approved ductile iron mechanical joint repair sleeves. Pipe restraints will be required.
- After the repair has been completed, the excavation shall be backfilled and compacted to grade as specified. The repairs shall then be retested per these Standards.
- At the direction of the City, the Contractor shall repair damage to the polyethylene encasement as described within AWWA C105 or shall replace all damaged polyethylene film sections.

# SECTION 306 SEWER SYSTEMS

## 306-1 TRENCH EXCAVATION AND BACKFILL

All trench excavation and backfill shall be performed in accordance with the provisions of Section 304, "Underground Pipeline Construction."

#### 306-2 GENERAL

Unless otherwise specified in the Plans or Special Provisions, all pipe used for sanitary sewer lines shall be extra-strength vitrified clay pipe.

Except as noted in these Specifications, the Plans and Special Provisions, the installation of clay pipe lines shall conform to the provisions of ASTM C12.

## 306-3 LINE AND GRADE

Line and grade shall be maintained in accordance with the provisions of Section 304-4, "Horizontal and Vertical Alignment." Sewer pipe lines shall be laid true to plan line and grade.

If field conditions exist such that the pipe may not be laid to the specified grade, the approved plans will require revisions prior to proceeding with construction.

## **306-4 BEDDING**

The trench shall be excavated to a minimum of four inches below the bottom of the pipe until foundation soils are found to be firm and non-yielding. The trench will then be backfilled with crushed rock (1/2 inch size maximum) conforming to Section 200-3. The bedding shall be graded so that the barrel of the pipe rests uniformly on the bedding throughout its entire length. Bell holes shall be hand excavated.

After the pipe has been laid and checked for proper grade, additional crushed rock will be placed under the haunches of the pipe and to the level of the spring-line of the pipe.

## 306-5 PIPE LAYING

Pipe will be carefully inspected in the field before and after laying. Spigot ends shall be examined with particular care as the area most vulnerable to damage from handling. Pipe and other materials shall not be stored on rocks or gravel or other hard material which might damage the pipe. If any cause for rejection is discovered in a pipe, it shall be removed. Any corrective work shall be approved by the City Engineer and shall be performed at no cost to the City.

Care shall be taken when lowering pipe into the trench to protect the pipe from damage. Chains or cables are not permitted.

The interior of pipes shall be kept clean of foreign material before sections of pipe are installed and shall be protected to prevent entry of foreign materials after installation. Groundwater shall not be allowed to enter the pipe.

When connections are to be made to any existing pipe, conduit, or other appurtenances, the actual elevation or position of which cannot be determined without excavation, the Contractor shall excavate for, and expose, the existing pipe or conduit before laying any pipe or conduit. The City Engineer shall be given the opportunity to inspect the existing pipe or conduit before connection is made. Any adjustments in line or grade which may be necessary to accomplish the intent of the plans shall be made.

Pipe shall be laid continuously, without grade break, upgrade from structure to structure, with bell end upgrade.

Immediately prior to joining, the bell surface shall be wiped clean and an approved lubricant applied to both the bell and the spigot.

Suitable excavation shall be made to receive the bell end of the pipe, the joint shall not bear upon the subgrade and the bottom segment of the barrel shall be uniformly supported by direct contact with firm bedding.

Where cutting is necessary, pipe shall be cut neatly and true, with an approved cutting tool. If a piece of pipe has been cut, the Contractor shall clearly mark the usable end to show the proper amount of installation distance. Field cuts and connections shall be in accordance with the pipe manufacturer's published instructions.

Pipe shall be laid true to line and grade. Any pipe which is not in true alignment or shows any undue settlement after laying shall be taken up and laid again at the Contractor's expense.

After the joints have been made, the pipe shall not be disturbed in any manner. When a movable trench box is used, the installed pipe shall be secured to prevent it from moving when the box is moved.

At the close of the work each day, or whenever the work ceases for any reason, the end of the pipe shall be securely closed with water tight plugs or other approved means to prevent entry of foreign material or creep of the gasket joints.

Pipe joints shall be installed where lines enter and leave maintenance holes.

All pipe lines shall be approved by the City Engineer prior to placing any backfill. If backfill is placed prior to inspection, pipe shall be exposed to allow for inspection at the Contractor's expense.

The Contractor shall take all precautions necessary to prevent the "uplift" or floating of the line prior to the completion of the backfilling operation.

Sewer pipe on straight-through manholes shall be laid continuously through the manhole. Lateral lines entering the main sewer shall butt tightly against the main sewer. Pipes which are stubbed off for manhole construction or for connection by others shall be plugged or closed off with temporary

plugs. Where pipe is connected to manholes or concrete structures without using a flexible connector, connections shall be made so that the standard pipe joint is located not more than two (2') feet from the outside edge of the structure unless otherwise shown.

#### **306-5.1 MARKING**

A 12-inch wide metallic backfill tape with the warning "Buried Sewer Main" shall be placed in the trench lines of all mains and services, within 12 to 24 inches of the subgrade.

Mains in unpaved areas shall be marked every 125 lineal feet with a green composite utility marker with a decal stating "Caution Buried Sewer Pipeline." Appurtenances (such as manholes, valves, ARVs, test stations, etc.) and angle points shall also be marked. Mains in landscaped areas shall be delineated with a brass marker set in an 8- inch diameter concrete cylinder.

Approved manufacturers and materials include: Calpico Inc. (Tracer Tape-Non-Detectable 12" width), Reef Industries Inc., Terra Tape Extra Stretch 450 Material, or approved equal.

## 306-6 JOINTING OF PIPE

Pipe sections shall be closely jointed to form a smooth flowline.

Pipe joint contact surfaces shall be cleaned immediately prior to jointing. Joint lubricants and joining methods shall be performed according to the pipe manufacturer's recommendations.

For polyurethane compression joints, the spigot end shall be positioned and pressed into the bell until the pipe lengths snap together and lock to form a water-tight seal.

Jointing of plain-end pipe using rubber sleeve compression couplings with shear rings shall be made by pressing the pipe into the coupling until it butts against the stop ring or tabs. The stainless steel compressing bands shall be torqued to 70 inch-pounds minimum and shall provide uniform tension. The use of compression couplings is subject to the specific approval of the City Engineer, prior to installation.

## 306-7 SEWER SERVICES

Installation of sewer services shall conform to the applicable Standard Plans.

## 306-8 FLUSHER BRANCHES

Installation of flusher branches shall conform to Standard Plan No. 201-3.

## 306-9 MAINTENANCE HOLES

Material for maintenance holes shall conform to the provisions of Section 203-10, "Maintenance Holes." Construction and placement of maintenance holes shall conform to City Standard Plan No. 201-2, "Maintenance Hole Details." Drop maintenance holes shall be used only when specifically

approved by the City Engineer. Precast maintenance hole sections shall be set level and vertical and in proper alignment with adjacent sections.

#### **306-10 REPAIRS**

Necessary repairs to a sewer line shall be made by cutting out the damaged section with an approved cutting tool. The damaged section shall be replaced with like material. The ends of all pipe sections shall be cut straight and clean. Repair couplings shall be used at each connection and shall be thoroughly tightened Reasonable care shall be exercised during repairs so as not to disturb the bedding. In any case, the repaired section shall be properly bedded prior to backfilling. Where an excavation is made in excess of one foot below the damaged section, the repair shall be made in conformance to Standard Plan No. 201-8, "Side Sewer Repair."

All repairs shall be tested in accordance with Section 306-13 prior to acceptance.

#### 306-11 INSTALLATION OF SEWER TAPS

City forces will perform all taps on existing live City mains. The Contractor shall pay for such work on a time and materials basis. The Contractor will perform all excavation, shoring, backfilling, traffic control, and other associated work. The Contractor shall obtain the appropriate permit for a utility connection from the City, prior to performing any work.

Sewer taps shall conform to Standard Plan No. 201-5, "Sewer Line Taps."

## 306-12 CLEANING AND FLUSHING

Prior to acceptance, sewer lines shall be hydraulically cleaned to remove debris and detect obstructions.

A high velocity hydraulic cleaner shall be used to clean all pipe segments.

Prior to starting the cleaning operation, a fine mesh wire screen shall be placed at the extreme downstream maintenance hole to prevent debris from entering the existing City sewer system. In addition, standard pipe line debris trap shall be placed at the maintenance hole immediately downstream of the portion of line to be cleaned.

The cleaning nozzle shall be introduced into the sewer at the downstream maintenance hole. All debris from the cleaning operation shall be removed by the Contractor.

Where the nozzle will not pass through the sewer, the nozzle will be retrieved, the obstruction removed, and the process will be repeated.

## 306-13 TESTING AND ACCEPTANCE

All testing required by this section will be performed and paid for by the Contractor. Testing of services shall be conducted after installation of joint trench utility crossings.

## 306-13.1 AIR PRESSURE TEST

All sewers shall be air tested according to ASTM C828. Air testing shall take place upon completion of subgrade preparation and/or not before completion of all concrete work, or as directed by the City Engineer. The line will be cleaned and flushed in accordance with Section 306-12 prior to air testing.

Air testing equipment shall be set up so that test gauges are at ground level during the air test. The test gauge shall read and measure from 0 psi to 10 psi (full range) and be in good working order. The minimum test time, for a 1.0 psi pressure drop from 3.5 to 2.5 psi, for 100 feet of pipe is as follows:

MINIMUM AIR TEST TIMES		
Nominal Pipe Size	Time (Minutes / 100 feet)	
4"	0.3	
6"	0.7	
8"	1.2	
10"	1.5	
12"	1.8	
15"	2.1	
18"	2.4	

See the Test Method for other diameters and Test Procedures.

## 306-13.2 CLOSED CIRCUIT TELEVISION INSPECTION

After successful completion of the air test, all sanitary sewer mains will be inspected with closed-circuit television equipment. The logs shall be reviewed and approved by the City prior to final acceptance.

Defective work shall be repaired by the Contractor in a method approved by the City prior to final acceptance.

Defective work includes:

- 1. Breaks in the pipe;
- 2. Joints offset more than three-eighths inch or one percent of the inside diameter, whichever is greater;
- 3. Standing water or sags exceeding one-half inch in depth;

Pipe Diameter	Allowable Depth After Construction	Allowable Depth at Warranty Inspection
6"	1/2"	3/4"
8"	1/2"	3/4"
10"	1/2"	3/4"
12"	3/4"	1"
15"	3/4"	1"
18"	3/4"	1"

## 4. Damaged pipe.

All repairs of defective work shall be made at no cost to the City.

Subsequent inspections due to repair of defective work discovered during the initial CCTV inspection, will be paid for by the Contractor.

## 306-14 ABANDONMENT OF SERVICES

An Encroachment Permit shall be obtained by the Contractor from the Public Works Department prior to commencing work to abandon an. existing sewer service. The work to abandon the service shall be performed in the following order:

- 1. Locate and remove the City cleanout, including the wye. Remove a minimum 2 feet in length segment of service line to the back edge of sidewalk, curb or paved bikepath.
- 2. Plug both ends of the service. After inspection, encase in concrete the end of the service under the back edge of the sidewalk, curb or bikepath.
- 3. Notify the City Engineer at least 24 hours in advance of backfill placement for inspection.
- 4. Backfill, compact and replace any concrete or pavement in accordance with other sections of these Specifications.

# SECTION 307 STORM DRAINAGE SYSTEMS

## 307-1 TRENCH EXCAVATION AND BACKFILL

All trench excavation and backfill shall be performed in accordance with the provisions of Section 304, "Underground Pipeline Construction."

#### 307-2 PRECAST MANUFACTURED PIPE

### 307-2.1 LINE AND GRADE

Line and grade shall be maintained in accordance with the provisions of Section 304-4, "Horizontal and Vertical Alignment." Storm drainage lines shall not vary from plan grade by more than 0.03 feet, nor from plan alignment by more than 0.2 feet.

## **307-2.2 PLACEMENT**

The bottom of the trench shall be graded in such a manner that the pipe barrel bears uniformly on solid material throughout its entire length.

Pipe will be carefully inspected in the field before and after laying. If any cause for rejection is discovered in a pipe, it shall be removed. Any corrective work shall be approved by the City Engineer and shall be at no cost to the City. Any pipe which is not in true alignment or shows any undue settlement after laying shall be taken up and laid again at the Contractors expense.

When connections are to be made to any existing pipe, conduit, or other appurtenances, the actual elevation or position of which cannot be determined without excavation, the Contractor shall excavate, and expose the existing pipe or conduit before connection is made. Any adjustments in line or grade which may be necessary to accomplish the intent of the Plans shall be made.

Pipe shall be laid upgrade with the bell or collar ends of the pipe upgrade, unless otherwise authorized by the City Engineer.

Where field cutting of pipe is necessary, pipe shall be cut neatly and true.

Subsequent inspections due to repair of defective work discovered during the initial CCTV inspection will be paid for by the Contractor.

After joints have been made, the pipe shall not be disturbed in any manner.

At the close of work each day, or whenever the work ceases for any reason, the end of the pipe shall be securely closed, unless otherwise permitted by the City Engineer.

All pipelines shall be approved by the City Engineer prior to placing any backfill.

The interior of the pipe shall be kept free of all dirt, excess mortar, or other foreign material as the pipe laying progresses, and shall be left clean at the completion of the work.

## 307-2.3 JOINTS, CONCRETE TONGUE AND GROOVE PIPE

Concrete tongue and groove pipe shall be jointed using one of the two following methods.

## **307-2.3.1 MORTAR JOINTS**

Cement mortar shall conform to Section 201-5. Cement mortar shall be used within thirty (30) minutes after water has been added. The groove of the downstream pipe shall be thoroughly cleaned and then wetted with a wet brush to ensure a proper bond. A layer of mortar shall be uniformly applied to the lower half of the groove. A small excavation shall be made below the joint and filled with mortar. The tongue end of the pipe being laid shall be thoroughly cleaned and then wetted. While the pipe is in a horizontal position, a layer of mortar shall be applied uniformly to the upper half of the tongue.

The tongue shall be inserted into the groove until the mortar is squeezed out on the interior and exterior surfaces. The interior of the joint shall be brushed smooth and the exterior of the joint shall be completely filled. A band of mortar extending completely around the joint and connecting with the mortar previously placed below the joint shall be carefully applied and smoothed. The completed exterior of the completed joint shall immediately be protected from air and sunlight with an initial covering of canvas, burlap, plastic, heavy paper, or a curing compound conforming to Section 201-4. Any permeable covering shall be kept moist for at least 48 hours.

For pipe 27 inches in diameter and larger, the interior of the joints shall be filled with mortar from inside the pipe. Within 12 hours from the time the pipe was placed. In order to prevent the mortar from setting up too rapidly, the ends of the pipe shall be covered to prevent the flow of air through the pipe while the mortar is plastic.

## 307-2.3.2 **JOINTS USING JOINT SEALANT**

Rubber-based joint sealant shall conform to the provisions of Section 202-3, "Joint Sealant for Concrete Pipe." The sealant shall be applied in conformance with the manufacturer's recommendations. The joint surfaces shall be clean and dry prior to application. Heat shall be applied as necessary to dry wet surfaces. The recommended joint primer adhesive shall be used on all horizontal installations of pipe. For pipe 27 inches in diameter or larger, two coils of sealant shall be used. After the pipe is positioned, the pipe ends shall be brought together to squeeze the sealant until it forms a watertight seal.

## 307-2.4 JOINTS, CONCRETE BELL AND SPIGOT PIPE

Concrete bell and spigot pipe shall be jointed using rubber gasket joints conforming to the provisions of ASTM C443. The gaskets shall be flexible and able to withstand expansion, contraction and settlement.

All rubber gaskets shall be stored in as cool a place as practicable, preferably at 70°F. or less. In no case shall the rubber gaskets be exposed to the direct rays of the sun for more than 72 hours.

Rubber gaskets, of the type requiring lubrication, shall be lubricated with the lubricant recommended and supplied by the manufacturer of the pipe.

The sections of pipe shall be laid such that the inside surfaces form a smooth and regular surface. The maximum allowable offset of each joint shall be three-eighths inch.

Each joint shall contain a solid gasket which shall be the sole element providing water-tightness of the joint. Each joint shall be watertight and flexible.

During laying and jointing operations, mating surfaces of each joint shall be thoroughly cleaned, lubricated and properly assembled, in accordance with the manufacturer's recommendations, and in accordance with good construction practice. Feeler gauges shall be used to check the gasket location after assembly of the joint, when required by the City Engineer.

## 307-2.5 JOINTS, ASBESTOS-CEMENT PIPE

A small excavation shall be made at the joint so that the collar of the pipe does not bear on the bottom of the trench. The gasket and gasket seat inside the collar shall be wiped clean before the gasket is inserted. A thin film of lubricant shall be applied to the gasket and the outside of the pipe end to be inserted into the collar. Lubricant other than that furnished with the pipe shall not be used unless prior approval has been given by the City Engineer.

The ends of the pipe shall then be forced into the collar to complete the joint.

## 307-3 CAST-IN-PLACE NON-REINFORCED CONCRETE PIPE (CIPP)

## **307-3.1 GENERAL**

Cast-in-place, non-reinforced concrete pipe is conduit made of Portland cement concrete cast in a monolithic pour in a properly prepared trench, using equipment specifically designed for such construction. The equipment the Contractor proposes to use shall be approved by the City Engineer. The Contractor may be required to furnish evidence of successful operation on prior work.

All CIPP shall be designed by the Project Engineer to resist all loading conditions. The details of the CIPP design will be shown on the approved Improvement Plans. The minimum allowable thicknesses shall be as follows:

CIPP MINIMUM WALL THICKNESS		
Internal Diameter	Minimum Wall Thickness	
24" to 30"	3"	
36"	3-1/2"	
42"	4"	
48"	5"	
54"	5-1/2"	
60"	6"	
66"	6-1/2"	
72"	7"	
84"	8"	
96"	9"	
108"	10"	
120"	12"	

## CIPP shall be constructed only:

- 1. In the presence of the City Engineer, and
- 2. In ground capable of standing unsupported from the bottom of the trench to the top of the pipe without sloughing, or,
- 3. In fill when it can be demonstrated to the satisfaction of the City Engineer that the fill will adequately support the pipe.

If the City Engineer determines that soil conditions are unsuitable for constructing CIPP, or that sloughing of the trench may occur to the extent that earth or other objectionable material could be included in the concrete, the Contractor shall install reinforced concrete pipe or an acceptable alternate as directed by the City Engineer. All costs for this substitution shall be borne by the Contractor.

Unacceptable portions of CIPP shall be replaced or repaired to the satisfaction of the City Engineer at no additional cost to the City.

The Contractor shall provide adequate means of providing fresh air delivery to the inside of the pipe. This shall be for the use of workers during construction and for the use of the City Engineer during inspection. The methods and quantities of fresh air delivery shall be suitable for the purpose and shall conform to applicable requirements of local, state and federal rules, regulations, laws and ordinances.

#### 307-3.2 MATERIALS

Concrete shall conform to the requirements of Section 203-2.3, "Concrete for Cast-In-Place Pipe."

## 307-3.3 EXCAVATION

Trenches shall be excavated on the alignment and to the grades shown on the Plans. The subgrade shall be fine graded to the tolerances specified in Section 307-3.6.5. No concrete shall be placed unless the trench is within the specified grade and alignment tolerances.

The trench shall be wide enough to accommodate the equipment and provide the required wall thickness of the pipe. The bottom of the trench shall be shaped to serve as the outside form for the pipe. The trench must provide full, firm and uniform support over the bottom 210° of the pipe, which is referred to as the "trench form."

Where isolated rock or other unsuitable material is encountered within the trench form, it shall be removed. If the rock is too large to be removed by hand, all portions of the rock within six inches of the lower 90° of the trench form shall be removed. The void shall be filled with concrete placed in a monolithic pour with the pipe or backfilled with compacted soil.

At the time of concrete placement, all soils to be in contact with CIPP shall be moist, but shall not contain standing, seeping or flowing water. Provisions shall be made to de-water the trench so that flowing or standing water is eliminated. At no additional cost to the City, the Contractor may place a layer of one inch crushed rock, six inches thick at the trench invert to assist in water control.

#### 307-3.4 PLACEMENT

Prior to placing any pipe, the Contractor shall secure the City Engineer's written approval of the excavated trench.

#### **307-3.4.1 GENERAL**

Pipe shall be constructed with equipment specially designed for constructing cast-in-place concrete pipe. The Contractor shall furnish evidence of successful operation of the proposed equipment on other work. Equipment not suitable to produce the quality of work required for the pipeline will not be permitted to operate on the Work.

Concrete placement shall be in accordance with Section 303, except as provided herein. The flow line grade and alignment of the finished pipe shall conform to the tolerances stated in Section 307-3.6.5. All forms shall be cleaned of laitance and old concrete before being used on the job and in between placement operations.

The concrete shall be placed around the full circumference of the pipe in one operation by means of fixed forms and traveling forms. The internal fixed forms shall be of sufficient strength to withstand the vibrating or tamping of concrete. Workers shall not walk or stand on the placed concrete. The concrete shall be vibrated, tamped or worked with suitable devices until the concrete has been consolidated and completely fills the forms.

Where junction structures are to be constructed, the concrete shall be placed continuously through the structure locations, in accordance with the City Standard Plan No. 201-2, "Maintenance Hole Details."

## 307-3.4.2 CONSTRUCTION JOINTS

A construction joint shall be constructed when placement is stopped for such time that initial set is likely to occur. The fresh concrete shall be cut off so that the end of the pipe is square. Dowels, consisting of No. 4 reinforcing bar, 24 inches in length, shall be inserted into the fresh concrete. They shall be inserted 12 inches into the fresh concrete at intervals not to exceed 18 inches.

A concrete collar shall be placed in a monolithic pour around the old concrete upon resumption of placement operations. This collar shall be formed by excavating around the old concrete. The minimum dimensions shall be six inches thick and twelve inches in length, or one and one-half times as thick as the wall thickness and four times as long as the wall thickness, whichever is greater. The old concrete shall be cleaned of surface laitance and aggregate shall be exposed.

Precast manufactured pipe shall be joined to CIPP using a reinforced concrete collar conforming to the details of City Standard Plan No. 401-2, "Concrete Collar for Joining RCP and CIPP."

## **307-3.4.3 FORM REMOVAL**

Internal fixed forms shall remain in place until the concrete is self-supporting, after which they may be loosened but shall not be removed until at least six hours after placement. As soon as possible thereafter, the forms shall be removed to facilitate inspection and prompt repair.

## **307-3.4.4 FINISHING**

The interior of the pipe shall be at least as smooth as a wood-float finish except for the form lap ridges permitted in Section 307-3.6.4.

## 307-3.4.5 CURING

Immediately after concrete placement, the exposed top portion of the pipe shall be cured by placing a polyethylene film at least .0015-inch (1.5 mil) thick so as to completely cover the top surface, or such other method as approved by the City Engineer.

In order to minimize the concrete shrinkage, all openings in the pipe shall be covered for at least five days immediately after placement, except at locations where work on the pipe is required, and only during the period that such work is actually in progress.

## **307-3.4.6 REPAIRING**

After the internal fixed forms have been removed, the inside of the pipe shall be inspected. All rock pockets, blisters, voids or similar defects shall be repaired immediately in a manner approved by the City Engineer.

After placement of the backfill, the Contractor and the City Engineer shall reinspect the inside of the pipe. Cracks less than 0.01 inch in width shall be painted with a cement paste. Transverse cracks 0.01 inch or more in width, and longitudinal cracks 0.01 inch or more in width and less than 12 inches in length shall be repaired. The method of repair and the material used shall be approved by the City Engineer.

Longitudinal cracks exceeding 0.01 inch in width and 12 inches or greater in length shall be cause for rejection of the cracked pipe. If such cracks occur intermittently in more than 25 percent of the length of any reach of pipe, the entire reach is subject to rejection. Reaches subject to rejection shall either be removed and replaced or shall be strengthened in a manner approved by the City Engineer at the expense of the Contractor.

#### **307-3.5 BACKFILL**

Placement of backfill shall conform to the requirements of Section 304, "Underground Pipeline Construction," and the City Standard Plan No. 201-1, "Trench Details." The equipment and methods used in placing backfill shall not damage or overload the pipe.

Backfilling operations will not be permitted until the concrete attains at least the strength specified on the Plans or in the Special Provisions. The Contractor may elect to place backfill prior to the City Engineer's 28-day strength tests, provided it can be shown to the satisfaction of the City Engineer, that the required strength has been attained.

## 307-3.6 DIMENSIONS AND TOLERANCES

## 307-3.6.1 MINIMUM SIZE CIPP

The minimum size of CIPP shall be 24 inches, inside diameter.

#### **307-3.6.2 DIAMETER**

The actual internal diameter at any point shall not be less than specified on the Plans. If the diameter is found to be less than that specified, the work shall be stopped and the necessary adjustments made. The City Engineer may require the pipe to be removed and replaced with pipe of the correct diameter. All such adjustments or replacements shall be at the expense of the Contractor.

## 307-3.6.3 WALL THICKNESS

The wall thickness at any point shall not be less than specified. Failure to meet the thickness requirements shall be cause for rejection. The grade and alignment shall be controlled so that the wall thickness of the pipe is symmetrical.

## 307-3.6.4 OFFSETS AND INDENTATIONS

Transverse and longitudinal form offsets and form strut bearing plate indentation shall not exceed three-eighths inch for pipe with specified internal diameter of 72 inches or less, and one-half inch for pipe with specified internal diameter greater than 72 inches.

Offsets or indentations in excess of these limits shall be repaired as directed by the City Engineer.

## **307-3.6.5 LINE AND GRADE**

Line and grade shall be maintained in accordance with the provisions of Section 304-4, "Horizontal and Vertical Alignment."

Departure from and return to established grade shall not exceed one-eighth inch per linear foot (±one percent slope) and maximum departure shall not exceed one-half inch (0.04 foot). Maximum departure from established alignment shall not exceed two and one-half inches (0.2 foot) on tangents and four inches (0.3 foot) on curves. Departure from and return to established alignment shall not exceed one-fourth inch per lineal foot (1 degree angular).

If the departure exceeds the maximum allowed, the work shall be stopped and the Contractor shall make the necessary adjustments. The City Engineer may require the affected portions of the conduit to be removed and replaced at the proper grade and alignment.

## 307-3.6.6 LINES ADJACENT TO EXISTING WATER LINES

There shall be a minimum of six inches of vertical clearance between storm drain lines and water lines. If this clearance requirement is unobtainable, the City Engineer may reduce the clearance requirement to a minimum of two inches. In this event a manufactured nonmetallic "saddle" type spacer shall be used between the storm drain and the water line.

## 307-3.7 TEST REQUIREMENTS

## 307-3.7.1 SEQUENCE OF SAMPLING AND TESTING

All sampling and testing shall be performed by the City Engineer. The initial testing and sampling during placement operations shall be performed at no cost to the Contractor. The Contractor shall be responsible for the cost of all additional testing which is required as a result of unsatisfactory initial test results.

During the concrete placing operation, slump tests shall be performed, concrete cylinder specimens shall be molded for strength determination, and the thickness of placed material shall be measured. If the concrete does not meet the required 28-day strength, cores shall be obtained from the completed pipe. Cores shall be used to determine thickness and compressive strength. If the strength of these cores fails to meet the design requirements, the affected sections of pipe shall be rejected and replaced at no cost to the City.

The City Engineer will determine the number and location of core samples and related tests. The location shall be identified by station, and where applicable, the angle from vertical measured clockwise facing up-station.

## **307-3.7.2 SLUMP TESTS**

Slump tests will be required for each set of test cylinders and shall be performed in accordance with ASTM C 143.

## 307-3.7.3 CONCRETE CYLINDERS

Concrete cylinders shall be molded and cured in accordance with ASTM C3 1 and tested in accordance with ASTM C39, except as modified herein. Cylinder molds and caps shall be provided by the concrete supplier.

The City Engineer shall prepare and test a sufficient number of concrete cylinders to verify the strength of the concrete mix. Cylinders shall be prepared and tested in multiples of three each. The first cylinder of each set shall be tested to determine seven day strength, and the second tested to determine 28-day strength. If the second cylinder test fails the strength requirement, then the third cylinder shall be tested at 45 days after concrete placement.

Backfill shall not be placed until so approved by the City Engineer.

Copies of all test data and reports shall be provided to the Contractor.

## **307-3.7.4 THICKNESS**

The City Engineer will determine the appropriate method for measuring the in place wall thickness of the pipe. The methods used may include, but not be limited to, probing through wet concrete, probing through drilled holes, or excavating holes using a shovel.

After measurement, the Contractor shall patch all holes.

#### 307-3.7.5 CONCRETE CORES

The City Engineer reserves the right to require the Contractor to perform all coring operations. Cores, where required, shall be obtained from the pipe and tested in accordance with ASTM C42. The cores shall have a length-to-diameter ratio of not less than one. The diameter of cores shall be at least three times the maximum size of the aggregate used in the concrete, except where the wall thickness is such that the length-to-diameter ratio will be less than one, in which case the core diameter may be reduced to 2.5 times the maximum aggregate size used. There shall be at least four cores taken for each 200 linear feet, or fraction thereof, of pipe represented by any cylinder that fails the required tests. Cores shall be taken at the following points at stations selected by the City Engineer: One through the crown, one through the invert, and two in the lower half of the pipe 450 from the vertical. The City Engineer may require additional cores at any location. The Contractor shall patch all core holes in such a manner that the patch will be permanent, will not leak, and will have a smooth finish flush with the interior surface of the conduit. All costs of coring, testing and patching core holes shall be paid by the Contractor.

## 307-4 STREET UNDERDRAINS

## 307-4.1 TIMING OF CONSTRUCTION

Street underdrains shall not be installed until all other underground utility construction is complete. It shall be installed after the street subgrade in the vicinity of the underdrain has satisfactorily passed testing for compaction and grade.

## **307-4.2 LOCATION**

Street underdrains shall be installed on the uphill side of all drop inlets when so required by the City Engineer. Low points (sags) will require an underdrain extending from both sides of the drop inlet. The minimum distance for Street underdrains shall be 100 feet extending upstream from all drop inlets. The underdrains shall be installed on both sides of the street. The underdrains shall be sloped toward the drop inlet at the same slope as the flowline of the gutter.

The underdrain shall be installed in accordance with the details of Standard Plan #401-3. It shall be placed substantially under the lip of gutter line. Minor deviations from this location will be approved in the field by the City Engineer. Any substantial deviation from this location requires special approval of the City Engineer.

## 307-4.3 EXCAVATION

The trench shall be excavated neat and true to line and grade, with vertical trench walls. All trench spoils shall be incorporated in the unfinished portions of the street subgrade or removed from the street right-of-way. Any overexcavation or variation in trench dimensions shall be accommodated by backfilling the subject area with drain rock.

## 307-4.4 FABRIC PLACEMENT

After completion of excavation, geotextile fabric shall be placed in the trench. Nonwoven geotextile fabric shall be Mirafi 150N, Propex Geotex 501, or approved equal. The width of the fabric shall be sufficient to encompass the drain rock without parallel seams or splices. Splices perpendicular to the trench shall be made with a minimum of 12 inches of overlap. The fabric overlap at the top of the drain rock shall be at least six inches.

## 307-4.5 DRAIN ROCK AND PIPE PLACEMENT

The pipe shall be bedded on one inch of drain rock. The pipe shall be placed in the trench with the perforations down. The remainder of the trench shall be backfilled with drain rock and the fabric folded over the top. The drain rock shall be compacted by suitable methods.

The top of the fabric shall be no more than two inches below the subgrade, provided that the remainder of the trench is backfilled with drain rock to the level of the finish subgrade.

## 307-4.6 DROP INLET CONNECTION

The pipe shall connect to the drop inlet. Connections to storm drain pipes will not be allowed. The hole in the wall of the drop inlet shall be made by a method that produces a clean and neat entrance with minimal cracking and spalling of the concrete. The hole shall not exceed six inches in least dimension. The annular space between the pipe and hole shall be filled with non-shrink grout. The pipe shall protrude at least one inch into the basin.

## 307-4.7 END OF LINE CLEANOUT

A cleanout shall be installed at the end of each run of street underdrain. The cleanout at the end of the line shall be installed in the pavement area immediately adjacent to the lip of gutter. In order to accommodate the cleanout box, one  $45^{\circ}$  (1/8 bend) fitting shall be used to horizontally and vertically angle the pipe toward the box.

# SECTION 308 TRAFFIC STRIPING, DELINEATION AND SIGNS

## 308-1 TRAFFIC STRIPING AND MESSAGES

This work shall consist of painting traffic stripes, painting traffic messages and markings, including applying glass beads, and applying pavement markers.

#### 308-1.1 PAVEMENT OVERLAY WORK

Prior to any pavement overlay work, the Contractor shall prepare a detailed record (i.e., plan or list) of all existing striping, pavement markers and pavement messages. This record shall reference suitable physical features, such that the existing traffic delineation can be recreated upon completion of overlay operations. Copies of this record shall be reviewed and approved by the City Engineer prior to commencement of overlaying.

Upon completion of the overlay operations, the Contractor shall reproduce the striping to its original layout

## **308-1.2 NEW WORK**

The Contractor shall accurately layout all traffic delineation from the approved plans. The City Engineer will review and approve the layout prior to commencement of placement operations. Alternate methods of layout may be used by the Contractor, subject to the approval by the City Engineer, for streets that are not open to general traffic.

Where new streets are open to general traffic prior to completion of final striping, then temporary delineation and traffic control shall be provided. In these cases, alternate methods of layout will not be approved.

## 308-1.3 TEMPORARY DELINEATION

Attention is directed to the provisions of Section 7-7, "Public Safety." The Contractor shall provide temporary delineation and traffic control, unless the subject streets are closed to general traffic.

Temporary delineation and traffic control shall be in place at the conclusion of each working day. Strips of reflective tape, at least eight inches in length, shall be provided at intervals not to exceed fifty feet, for all centerlines, lane lines and bike lanes. Continuous stop bar shall be provided at all stop signs.

# 308-1.4 REMOVAL OF EXISTING STRIPING AND PAVEMENT MARKERS

Whenever the plans require alteration of striping on an existing street, all existing striping and pavement markers shall be removed using striping grinders, sandblasting or other appropriate methods in the case of pavement markers. Care shall be exercised to minimize damage to the existing

pavement when a pavement overlay will not accompany the new striping or pavement markers installation. Existing pavement markers shall be removed using appropriate methods prior to any pavement overlay work.

The entire area where striping has been ground shall receive a seal coat in accordance with Section 202-2, "Emulsified Asphalt."

## 308-1.5 PERMANENT STRIPING AND MARKING

## **308-1.5.1 GENERAL**

Painting shall be performed only when weather conditions are favorable and suitable for such application. Traffic paint shall be applied to dry surfaces.

Painting shall not be performed when the atmospheric temperature is below 50°F; when freshly painted surfaces may become damaged by rain, fog or condensation; or when it can be anticipated that the atmospheric temperature will drop below 50°F during the drying period.

The Contractor shall clean surfaces to be painted as deemed appropriate. All loose dirt and other deleterious materials shall be removed. All existing pavement markers in overlay areas shall be removed and disposed in an appropriate manner.

## **308-1.5.2 EOUIPMENT**

Mechanical means shall be used to paint traffic stripes and pavement markings and to apply the glass beads for traffic stripes.

All equipment used in the application of traffic stripes and pavement markings shall produce stripes and pavement markings of uniform quality that conform to the specified requirements.

Stencils and hand spray equipment shall be used to paint pavement markings. Stencils shall conform to the specified dimensions. The Contractor shall borrow the City's stencils for all pavement legends. Borrowed stencils shall be returned in substantially the same condition as when initially borrowed.

Mechanical mixers shall be used to mix paint. Prior to applying, the paint shall be mixed a sufficient length of time to thoroughly mix the pigment and vehicle together, and shall be kept thoroughly agitated during its application.

## 308-1.53 LAYOUT

Layout shall be performed prior to permanent painting and shall consist of "cat-tracking" the surface. Cat-tracking shall consist of placing spots of paint not more than three inches in width and not more than five feet apart along the line established. Paint for cat-tracks shall be the same as that used for the traffic stripe for which it is placed.

All layout work shall be approved by the City Engineer prior to permanent painting.

## **308-1.5.4 APPLICATION**

Each coat of paint for any traffic stripe, including glass beads where required, shall be applied in one pass of the striping machine, regardless of the number, widths, and patterns of individual stripes involved. Glass spheres shall be incorporated in traffic stripes immediately after application of the paint.

The paint and glass beads shall be applied so as to produce a uniform wet film thickness of 15 mils (equal to one gallon of paint per 107 square feet). The glass beads shall be applied at a rate of 5 pounds per gallon of paint.

The completed stripes shall have complete uniform coverage and well defined edges. The stripe shall not deviate more than 1/4" in width.

Drips, overspray or improper markings shall be immediately removed from the pavement surface by blast cleaning or methods approved by the City Engineer, at the Contractor's expense.

Paint shall not be heated to a temperature greater than 160°F. A 3"-wide black stripe shall be painted between the two outside 4"-wide yellow stripes of a double traffic stripe.

## 308-1.5.5 CLEANUP

The Contractor shall not clean the painting equipment such that any leftover paint or cleaning fluids run onto any portion of the public roadway and adjacent dirt areas. The Contractor shall cleanup and remove any spillage or dripping due to equipment cleaning. All cleaning and disposal of appurtenant liquids and solids shall be performed in accordance with all applicable rules, regulations, laws and ordinances.

## 308-2 TRAFFIC SIGNS

## 308-2.1 STANDARD PLANS

All traffic sign installations shall conform to Standard Plan No. 30 1-9, "Traffic Signing Details."

## 308-2.2 POST INSTALLATION

Posts shall be placed in holes excavated in the ground. Holes shall be excavated 3" deeper than the required depth for the bottom of the posts as shown on the Plans. The space around posts shall be backfilled to finished ground with Class "C" concrete. The concrete shall be consolidated by spading with a shovel. Material excavated from the hole shall be disposed of in an appropriate manner.

Posts shall not be spliced, except as allowed at ground level per the Standard Plans. Posts shall be installed plumb.

## 308-2.3 SIGN PANEL INSTALLATION

Sign panels shall be installed using the appropriate brackets, fasteners and tools as supplied by the sign manufacturer. Mounting hardware supplied by the sign manufacturer will be the only type

allowed. Any chipping or bending of sign panels shall be considered as sufficient cause to require replacement of panels at the Contractor's expense.

Signs shall not be attached directly to sign posts or other poles by drilling a hole through said post or pole. All signs shall be attached by using appropriate clamp-on U-brackets or straps. Parking regulatory signs which are 12" in width and 18" in height shall be attached to the post using a post top L-bracket. Where appropriate, street name signs shall be mounted to electrolier poles using a wing bracket which is strapped to the pole.

All sign panels shall be vertical and plumb after attachment to the post. Sign panels shall be oriented so as to be most visible to oncoming traffic, as directed by the City Engineer.

# SECTION 309 STREETLIGHT INSTALLATION

## 309-1 GENERAL

Streetlight work shall consist of furnishing, installing, modifying, and removing one or more streetlighting systems, including provisions for future systems, in the public right-of-way, as shown on the Plans, as provided in these Specifications, and the Special Provisions. All systems shall be complete and in operating condition prior to acceptance of the Contract.

Material shall conform to the provisions of Section 206, "Streetlight Materials." All incidental parts which are not shown on the Plans, or specified herein or in the Special Provisions, and which are necessary to complete or modify the existing system, shall be furnished and installed as though such parts were shown on the Plans or specified herein.

## 309-2 REGULATIONS AND CODES

All work shall be performed in accordance with the listing in Section 206-1.1, "Regulations and Codes."

The project owner (whether the City or a private developer) shall obtain a building permit, including payment of fees, for any new metered electrical services. The project owner shall obtain the PG&E short circuit rating for submittal with the building permit application.

## 309-3 SHOP DRAWING SUBMITTALS

The Contractor shall submit to the City Engineer, for review and approval, a list of equipment and materials proposed for installation, as specified in the Plans and Specifications. This list shall be submitted and reviewed in accordance with the provisions of Section 5-2, "Plans and Shop Drawings."

When electrical work is of standard manufacture and constructed according to the Plans, the submission of detailed drawings and diagrams is not required.

Prior to acceptance, the Contractor shall furnish copies of the manufacturer's instruction sheets, parts lists, warranties and guarantees, for all materials used in the work.

## 309-4 PROTECTION OF PROPERTY

## **309-4.1 GENERAL**

The Contractor shall comply with the provisions of Section 7-9, "Preservation of Property."

## 309-4.2 EXISTING LIGHTING SYSTEMS

The Contractor shall notify the City Engineer at least two working days prior to performing any work on existing systems.

Lighting system shutdowns shall not interfere with the regular lighting schedule, unless otherwise permitted by the City Engineer.

The Contractor shall ascertain the exact location and depth of existing conduits, pull boxes and other electrical facilities before using any tools or equipment that may damage such facilities or interfere with any electrical system.

Where roadways are to remain open to traffic and existing lighting systems are to be modified, the lighting systems shall remain in operation and the final connection to the modified circuit shall be made so that the modified circuit will be in operation by nightfall of the same day.

## 309-4.3 REMOVING AND REPLACING IMPROVEMENTS

Improvements such as sidewalks, curbs, gutters, Portland cement concrete and asphalt concrete pavement, underlying material, lawns and plants, and any other improvements removed, broken or damaged by the Contractor's operations, shall be replaced or reconstructed with the same kind of material as found on the work or with materials of equal quality. Such improvements shall be left in a serviceable condition.

Whenever a part of a square or slab of existing concrete sidewalk, curb, gutter, or driveway is broken or damaged, the entire square or section of slab shall be removed and the concrete reconstructed.

The outline of all areas to be removed in Portland cement concrete sidewalks and driveways and in pavements shall be sawcut to a minimum depth of 0.17 foot prior to removing the sidewalk, driveways and pavement material. Cuts shall be neat and true along score lines, with no damage outside the removal area.

## 309-4.4 SALVAGED ELECTRICAL EQUIPMENT

Existing equipment removed and not reused shall remain the property of the City. Salvaged equipment shall be delivered to the City's Corporation Yard (1717 Fifth Street) unless otherwise specified in the Plans and Specifications.

## 309-5 UNDERGROUND CONDUIT INSTALLATION

## **309-5.1 GENERAL**

All underground conduit construction shall conform to the provisions of Section 304, "Underground Pipeline Construction," and the requirements of this Section.

## 309-5.2 EXCAVATION

## **309-5.2.1 GENERAL**

The trenches shall not be excavated wider than necessary for the proper installation of the electrical appurtenances and foundations. Excavation shall not be performed until immediately before installation of conduit and other appurtenances. Where excavation is in existing streets, the excavated material shall be cleaned up and disposed of properly, immediately following the excavation operation.

The excavation work shall be performed so as to avoid any unnecessary damage to streets, sidewalks, landscaping, or other existing improvements.

## 309-5.2.2 ROCK-WHEEL TRENCHING

The Contractor may use a Rock-wheel trencher in existing paved streets. Trenches shall be excavated by a machine that will produce smooth edge cuts in the pavement and will move at a speed in excess of four feet per minute while cutting pavement. The trenching machine shall be shielded to prevent loose material from being thrown away from the machine. Loose material deposited on the pavement behind the cutting machine shall be immediately removed from the pavement and the pavement cleaned to allow the passage of traffic. The cutting machine and cleanup operation shall be located within the lane closed to traffic. The lane shall be reopened as soon as the work has moved sufficiently to clean and reopen it. Backfill shall commence immediately after conduits have been installed and approved by the City Engineer. Streets shall be open to traffic at the end of each day's work. Temporary street resurfacing material shall be placed over the surface of the trench area daily.

## 309-5.3 CONDUIT INSTALLATION

Conduit shall be installed for all conductors, except where conductors are inside poles. All conduit shall be installed underground, shall not be smaller than one inch nominal diameter, and shall be of the sizes shown on the Plans or as provided in the Special Provisions. At the Contractor's option and expense, conduit of a larger size than that shown or specified may be used, provided that the larger size is used for the entire length of the run from outlet to outlet. Reducing couplings will not be permitted. New conduit shall not pass through streetlight foundations.

Underground conduit placed within road right-of-way areas (roadway) shall be 30 inches deep, measured from the top of conduit to the pavement surface. Conduits crossing under existing roadways must be jacked or drilled unless otherwise approved by the City Engineer. Conduits placed in roadways under construction shall be in trenches with a maximum width of six inches.

All conduit installation in new roadways shall be performed prior to completion of subgrade. Conduit placed parallel with roadways shall be approximately one foot behind the sidewalk.

PVC conduit placed outside the roadway shall have a minimum cover of 24 inches. Metal conduit placed outside the roadway shall have a minimum cover of eighteen inches.

In all conduit systems, installation shall permit the wire to be drawn into the conduit without injury. In any case, bends in conduit shall not be less than six times the inside diameter of the conduit.

The ends of all metal conduits shall be well reamed to remove burrs and rough edges. Field cuts shall be made square and true so that the ends will butt or come together for the full circumference thereof. Slip joints or running threads will not be permitted for coupling conduit. When a standard coupling cannot be used, an approved threaded union coupling shall be used. The threads on all metal conduit shall be well painted with a good quality lead or rust preventive paint before couplings are jointed. All couplings shall be tightened until the ends of the conduits are brought together. A good grounding connection shall be made throughout the entire length of the conduit run. Where coating on conduit has been injured in handling or installing, damaged areas shall be thoroughly painted with an approved rust preventive paint.

Where PVC conduit is used in lieu of rigid galvanized conduit, ends of conduit must be clean and free of burrs before gluing them together.

Conduit terminating in standards or pedestals shall extend a minimum of three inches above the top of finished concrete foundation, and shall be sloped toward the hand hole. Conduit entering concrete pull boxes shall terminate two inches inside the wall of the box and not less than three inches above the bottom and shall be sloped to facilitate pulling of the cable. Conduit entering through the bottom of a pull box shall be located near the end walls to leave the major portion of the box clear. At all outlets, conduit shall enter from the direction of the run. All conduit ends shall be provided with an approved bonding type bushing, except for PVC conduit.

## 309-5.4 PULL BOX INSTALLATION

Pull boxes shall be installed at the locations as shown on the plans, as specified herein, and as directed by the City Engineer.

The distance between pull boxes or between streetlights and pull boxes shall not exceed 200 feet. Additional pull boxes shall be installed, at the above spacing, when a conduit run exceeds 200 feet. A Pull Box shall be installed immediately adjacent to the Pacific Gas and Electric service point for each conduit run.

The Contractor may install, at the Contractor's expense, such additional pull boxes that may facilitate the work.

Pull boxes shall be installed so that the covers are level with the top of the curb, pavement, sidewalk, or level with the surrounding ground when there is no established grade. Excavations for the installation of pull boxes shall be at least 18 inches below the bottom of the pull boxes and at least six inches larger on all sides of the pull boxes. This area outside the pull box shall be filled with pea gravel for drainage.

## **309-5.5 BACKFILL**

## **309-5.5.1 STREET AREAS**

All backfill material and methods within the street right-of-way shall conform to the provisions of Section 304-6, "Backfill and Compaction." Said Section contains specific requirements for backfill within three feet of the finished subgrade, as well as other general requirements.

## 309-5.5.2 NON-STREET AREAS

All excavations not within the street right-of-way may be backfilled with native material. This native backfill shall be earthen, varying in size from clays to gravels, without any stones or lumps larger than two and one-half inches in greatest dimension. The backfill shall be thoroughly compacted by an approved method.

Conduit shall not be covered until inspected and approved by the City Engineer or until the City Engineer has measured the location of junction boxes and conduit.

Trenches shall be backfilled up to the elevation of the top of sidewalk or adjacent finish grade and shall be leveled and smoothed.

## 309-5.5.3 NARROW TRENCHES IN EXISTING STREETS

Excavations in existing pavement which are less than six inches in width shall be backfilled with slurry cement conforming to the provisions of Section 200-8, "Slurry Cement Backfill." Slurry cement backfill shall be placed to within one inch of the existing pavement. Following slurry backfill and until permanent asphalt surfacing is in place, the trench shall be protected by barricades, plates or cutback, as approved by the City Engineer. Prior to final resurfacing, the edges of the pavement shall be coated with paint binder. The permanent pavement shall be placed one-eighth inch above the existing pavement with asphalt concrete, State of California mix design as follows:

ASPHALT CONCRETE MIX DESIGN			
Aggregate Grading	Type B, 1/4" Max.		
Asphalt Binder	AR-4000		
Asphalt Content	5.8% to 6.2%		

Permanent paving shall be completed within 72 hours after initial backfill has taken place. If a neat trim pavement edge has been maintained, no saw cut or extra pavement removal is required.

Where trenches are wider than six inches but less than 18 inches due to the needs of the construction activity or sloughing of the trench or other similar occurrence, the slurry method of backfill as described above for trenches less than six inches wide may be used. The pavement shall be patched in accordance with Standard Drawing No. 201-1, "Trench Details," including the saw cut and additional pavement removal.

## 309-6 STREETLIGHT INSTALLATION

## **309-6.1 LOCATION**

Unless otherwise shown on the Plans or required in the Special Provisions, streetlight foundations shall be placed adjoining the back edge of sidewalk. The bolt pattern shall be laid out so that the mast arm is perpendicular to the street centerline, unless otherwise shown on the Plans, or directed by the City Engineer.

## 309-6.2 STANDARD PLANS

All construction and materials shall conform, where appropriate to the following City Standard Plans:

STANDARD PLANS			
Plan No.	Title		
301-11	Location Details for Lights		
301-12	Streetlight Luminaires		
301-13	Standard Streetlight		
301-14	Post Top Streetlight		
301-15	Streetlight Numbers		

## 309-6.3 FOUNDATIONS

Concrete for use in foundations shall conform to the provisions of Section 20 1-1, "Portland Cement Concrete." All miscellaneous mounting materials, including nuts, bolts, and washers, shall be galvanized in accordance with the provisions of ASTM A153.

Existing conduits, as well as new conduits, shall not penetrate the streetlight foundation. Where such penetration is unavoidable, the City Engineer shall require that the streetlight location be adjusted (moved), or shall require such additional measures as deemed necessary to protect the conduits. Each such penetration requires specific approval on a case-by-case basis.

Foundation bolts and conduit to be set into the concrete shall be suspended and held in place by a template securely fastened to the foundation forms. Foundations shall be poured in 2 lifts, the first lift to extend up to within approximately 6" of the top of finished concrete. The first lift will serve to hold the bolts in place. Nuts, with washers above and below the streetlight base, will be placed on the bolts and poles set upon these nuts. Reinforced (rebar "cages") cast-in-drilled-hole concrete foundations shall cure at least 7 calendar days prior to erecting poles. For lesser foundations, 3 calendar days shall be the minimum.

## **309-6.4 POLES**

Poles shall be erected and set in a vertical position. Poles shall be erected after the first lift of concrete has cured as required. All nuts shall be tightened to a snug fit prior to placing the second lift of concrete.

Poles with mast arms shall be erected so that the arm is perpendicular to the street centerline, unless otherwise shown on the Plans, or directed by the City Engineer. The second lift of concrete shall be placed and finished after the pole has been erected.

## **309-6.5 LUMINAIRE**

The luminaire for standard streetlights shall be installed on the mast arm in accordance with the manufacturer's recommendation. It shall be installed and adjusted to obtain the required distribution pattern.

The luminaires for post top streetlights shall be installed in accordance with the manufacturer's recommendations. It shall be installed in a true vertical position in the proper orientation to produce the required distribution pattern.

All luminaires shall be installed so as to produce weather-tight connections. The luminaire shall be wired in accordance with the requirements of Section 309-7, "Electrical Wiring."

## 309-7 ELECTRICAL WIRING

## **309-7.1 CONDUITS**

All conductors (wires) shall be installed in conduit. Conduit shall be installed in accordance with the provisions of Section 309-5, "Underground Conduit Installation."

Only one conduit and one set of conductors shall be used to connect to the PG&E service point. The ground or bonding conductor shall terminate in the City pull box immediately adjacent to the PG&E service point.

## 309-7.2 CONDUCTOR INSTALLATION

No conductors shall be drawn into any conduit until the installation run of conduit is complete and inspected. Conduit within a concrete foundation shall have no wires drawn through it until the concrete has set for at least 24 hours. Conductors shall be installed without injury to the insulation. All conductors shall be drawn into the conduit at the same time. The pull-in wire or rope used for drawing conductors into conduit shall not be attached to the copper conductor alone. A cable grip shall be used and applied in such a manner to place tension on both conductor and insulation. A UL listed inert lubricant shall be used.

Cables shall be continuous from luminaire to luminaire, if practicable without splices. Splices, if any, shall be made in pull boxes and the base of light standards.

## 309-7.3 CONDUCTOR SUPPORT

Conductor support shall be provided in all light poles where the distance from the post base to the luminaire exceeds 25' in height. The conductor support shall be attached to the inside wall of the pole or mast arm. It shall be a clamping device constructed of or employing insulating wedges or other suitable insulating support. Where clamping of insulation does not adequately support the cable, the conductor shall also be clamped.

## **309-7.4 CONNECTORS**

Conductors shall be joined by UL listed connectors. Connectors shall be "Scotchlok" by 3M or an approved equal shall be required for splicing all #8 AWG conductors or smaller. Compression type connectors, Thomas and Betts ("T & B") or approved equal or split-bolt connectors, "FCI-Burndy" or approved equal, shall be used to make up all splices #6 or larger on copper wire. Aluminum wire splices shall be made up by using compression type connectors, "T & B" or approved equal. Aluminum wire shall be coated with "Noalox" or approved equal, prior to splicing.

## **309-7.5 SPLICES**

Splices will only be permitted in pull boxes and the base of light standards. All splices shall be capable of satisfactory operation under continuous submersion in water. 3M "Scotchcast" splice kits or approved equal shall be used to insulate below-ground splices. 3M Scotch Super "88" and "Skotchkote" or approved equal shall be used to insulate above-ground splices.

## 309-7.6 FUSED SPLICE CONNECTOR

In each light pole, level with the hand hole, a fused disconnect splice connector shall be installed in each ungrounded conductor between the line and the ballast. The connector shall be readily accessible regardless of whether the ballast is remote or is integral with the luminaire. The fuseholder shall be TRON "HEB-AA" by Cooper Bussman (30A, 600V), or approved equal.

For 240-volt circuits each connector shall be designed so that both ungrounded conductors are disconnected simultaneously. The connector shall have no exposed metal parts, except the head of a stainless steel assembly screw may be exposed. The head of the metal assembly screw shall be recessed a minimum of 1/32" below the top of a plastic boss which surrounds the head.

The splice connector shall completely enclose the fuse and shall protect the fuse against damage from water and weather. The contact between the fuse and fuse holder shall be by spring pressure. The terminals of the splice connector shall be rigidly crimped, using a tool of the type recommended by the manufacturer of the fused splice connector, onto the line conductors and the conductors to the ballasts and shall be insulated and made waterproof in accordance with the splice connector manufacturer's recommendations. Fuses shall be standard midget, fermie type.

## 309-7.7 BONDING AND GROUNDING

Metallic cable sheaths, box covers, metal conduit, non-metallic conduit grounding wire, ballast and transformer cases, service equipment, sign switches, anchor bolts, and metal poles and pedestals shall be made mechanically and electrically secure to form a continuous system, and shall be effectively grounded. Bonding and grounding jumpers shall be copper braid of the same cross-section area as No. 8 or larger for all systems. Equipment grounding conductor shall be color coded to Code requirements or shall be bare.

Bonding of poles and pedestals shall be by means of a bonding wire or braid attached from a grounding bushing or wire to all anchor bolts, or to a 3/16" (or larger) cadmium plated bolt installed in the lower portion of the pole. The terminal for grounding the pole shall be accessible from the handhole.

Grounding of metal conduit, service equipment and the grounded conductor at service point shall be accomplished as required by the Code and the serving utility. Except where using a driven grounding electrode, the grounding conductor need not be any larger than #6 AWG. For bonding purposes in all non-metallic type conduit, a bare #8 AWG stranded copper wire shall be run continuously in all circuits.

A ground electrode shall be installed in the Pull Box which is immediately adjacent to the Pacific Gas and Electric service point. The ground electrode of non-ferrous materials shall not be less than one-half inch in diameter and eight feet in length. Ground electrodes shall be installed in accordance with the provisions of the Code. The service ground shall be bonded to the ground electrode by use of a ground clamp or exothermic weld. Refer to Standard Drawing No. 301-11 for ground electrode location.

Bonding of metallic conduit in concrete or plastic pull boxes shall be by means of galvanized grounding bushings and bonding jumpers.

## **309-8 TESTING**

Prior to acceptance of the work, the following test shall be made on all lighting circuits, in the presence of the City Engineer.

- 1. Test for continuity of each circuit.
- 2. Test for grounds in each circuit. The insulation integrity shall be as specified in Article 110-7 of the National Electrical Code.
- 3. A functional test in which it is demonstrated that each part of the system functions as specified or intended herein. Streetlights shall be functional for a continuous period of two days. At that point in time, a maintenance period of 90 days shall commence. During the maintenance period, the Contractor shall be responsible for the replacement of any defective components or workmanship.

Any faults in any materials or in any part of the installation revealed by these tests shall be replaced or repaired in a manner approved by the City Engineer at the expense of the Contractor. The same test shall be repeated at the expense of the Contractor until no faults appear.

## 309-9 PG&E SERVICE

Upon satisfactory completion of testing and all Contract work, the City Engineer will arrange with Pacific Gas and Electric to complete service connections to the streetlights and commence service.